CASH FLOW FORECASTING PROCESS AND ITS IMPACT ON CAPITAL BUDGETING: EVIDENCE FROM LIBYA

ALI ABDUSALAM ALSHARIF

A THESIS SUBMITTED TO THE UNIVERSITY OF HUDDERSFIELD IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF HUDDERSFIELD

SEPTEMBER 2016

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ABSTRACT

This study highlights the role of cash flow forecasting process in capital budgeting decisions, where the forecasting process starts with identifying the procedures and methods used in forecasting, and ends by estimating future cash flow required by managers for decision-making. This study utilised questionnaire survey to collect data from 69 manufacturing and oil companies operating in Libya within contingency and new institutional sociology theories, which are commonly used in capital budgeting research. Further, this study seeks to ascertain the key variables associated with the forecasting process in capital budgeting decisions. In this regard, this study examined the contingent and institutional variables influencing the use of forecasting procedures and methods associated with the adoption of different capital budgeting processes.

Consequently, the results of this study explored the forecasting procedures, methods and the capital budgeting techniques used in manufacturing and oil companies operating in Libya. The researcher found that most manufacturing and oil companies depend on personal and management's subjective estimates in forecasting their future cash flows. In terms of the extent of use of capital budgeting techniques, the findings indicate that most Libyan manufacturing and oil companies use the payback period (PB) and accounting rate of return (ARR) to evaluate and select the investment opportunities, as well as rely upon subjective assessments in evaluating the project risk inherent within capital budgeting decisions.

In addition, this study applied the partial least squares structural equation modelling (PLS-SEM) technique to test the research hypotheses. Using the same sample of Libyan manufacturing and oil companies, the findings are as follows. First, the use of forecasting procedures/methods and components of cash flow are positively associated with the extent of use of capital budgeting techniques. Second, the forecasting horizon and the use of multiple data sources in forecasting are significantly associated with the use of forecasting procedures and methods. Third, the presence of qualified persons responsible for estimating future cash flow is positively associated with the use of forecasting procedures and methods. Fourth, the findings suggest that the influence of contingent variables differs from public to private companies. Fifth, the study findings also suggest that coercive, mimetic and normative pressures are significantly associated with the use of forecasting procedures and methods. Finally, the research findings revealed that there is a significant relationship between the procedures and methods used in forecasting (PMUF) and the firms' financial performance (PERF), whilst the study does not find any evidence that the extent of use of capital budgeting techniques improves the firms' financial performance. The findings of this study offer new important insights and contributions to the existing literature, as well as have useful implications for practitioners and researchers.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGEMENTS

At the beginning, I would like to thank the Almighty God for all the blessings bestowed on me. This thesis was completed with the assistance of many people.

Firstly, I would like to express my deepest heartfelt gratitude and thanks to my supervisors, Professor Collins Ntim and Mr Wayne Fiddler, for their invaluable assistance, guidance and generous support throughout the duration of this study.

Secondly, I appreciate the efforts of the staff at the Libyan Bureau of Cultural Affairs in London, particularly Dr Abdelbasit Gadour, Dr Nasser Ghaith, Mr Ali Abdulrahim and Mr Faraj Safar, for their support and assistance, which have had a fundamental role in the completion of this research. I am also sincerely grateful to the University of Elmergib for awarding me a full scholarship to complete this study.

Thirdly, I would like to extend my gratitude to all the staff at the Business School, Research Hub, Central Library and International Student Office of the University of Huddersfield for their assistance and support. Special thanks goes to Professor David Taylor, Professor Christopher Cowton, Wilma Teviotdale, Dr Messaoud Mehafdi, Dr Shabbir Dastgir, Dr Omar AL-Tabbaa and the PhD students, who gave me useful assistance during the period of this study.

My gratitude is also due to the staff at the National Oil Corporation (NOC), Ministry of Industry and Privatization & Investment board for their assistance to apply this study in the manufacturing and oil companies operating in Libya.

In general, I would like to express my sincere thanks to the study participants who completed the questionnaire survey and enabled me to carry out this study.

Finally, I would also like to thank all the people who gave me the enormous assistance, particularly during the period of this study, who are too many to recount.

DEDICATION

I dedicate this thesis to:

My beloved parents (God's mercy on them),

My brothers and sisters,

My wife and kids,

My relatives and my friends,

Who always give me their wonderful love, their unlimited support and their sincere prayers.

LIST OF ABBREVIATIONS

AAS	Average of annual sales
AIE	Average of investment expenditures
AORR	Average operating rate of return
ARR	Accounting rate of return
ATOA	Average of total operating assets
BLD	Billions of Libyan Dinar
CA	Chartered accountant
CB	Capital budgeting
CBL	Central Bank of Libya
CBN	Central Bank of Nigeria
CBP	Capital budgeting process
CBT	Capital budgeting techniques
CB-SEM	The covariance based structural equation modelling
CEO	Chief executive officer
CF	Cash flow
CFF	Cash flow forecasting
CFFP	Cash flow forecasting process
CFO	Chief financial officer
CMNP	Coercive, mimetic and normative pressures
CEC	Commission of the European Community.
CV	Contingency variables
CVP	Cost-volume-profit analysis
CR	Composite Reliability
DCF	Discount cash flow
DCFM	Discounted cash flow methods
DCFT	Discounted cash flow techniques
DP	Dynamic programming
DS	Data sources
DT	Decision Tree
EB..AAS	EBITDA/ average of annual sales
EB..AIE	EBITDA/ average of investment expenditures

EBITDA	Earnings before interest, taxes, depreciation and amortization
FAT	Financial appraisal techniques
FF	Financial firms
FH	Forecasting horizon
FPM	Forecasting procedures and methods
FMPF	Financial, marketing and production factors
FS	Firm size
GPCO	General Planning Council in Libya
GNC	General National Congress in Libya
IMF	International Monetary Fund
IND	Industry
INST	Institutional theory
IOs	Investment opportunities
IRR	Internal rate of return
JM	Judgmental methods
LAB	Libyan Audit Bureau
LP	Linear programming
LD	Libyan Dinar
LGOV	Libyan government
LGPC	Libyan's General People Congress
MA	Management Accounting
MAPs	Management Accounting Practices
MAS	Management accounting system
MAP	Mathematical programming.
MOFs	Manufacturing and oil firms
MGA	Multi-group analysis
MLD	Millions of Libyan Dinar
MRA	Multiple regression analysis
NEM	Number of employees
NIE	New institutional economics
NIS	New Institutional Sociology
NOC	National Oil Corporation

NPV	Net present value
OIE	Original institutional economics
ORR	Operating rate of return
ORT	Operations research techniques
OW/L	Outer weight/loading
PB	Payback period
PC	Path coefficient
PCFE	Preparing the cash flow estimates
PERF	Performance (firms' financial performance)
PES	Political and economic situation
PEU	Perceived environmental uncertainty
PIB	Privatization and Investment board.
PI	Profitability index
PLS-SEM	Partial least squares structural equation modelling
PLS-MGA	PLS Multi-group analysis
PMPs	Performance measurement practices
PMS	performance measurement systems
PMUF	Procedures and methods used in forecasting
POS	Position of forecaster
PUF	Procedures used in forecasting
QM	Quantitative methods
QUA	Qualification of forecaster
R&D	Research and development
RAT	Risk appraisal techniques
RCC	Revolutionary Command Council
RDR	Raise the discount rate
ROA	Return on assets
ROB	Research objective
ROI	Return on investment
RQ	Research questions
RM	Malaysian Ringgit
SA	Sensitivity analysis

SAB	State Accounting Bureau
SAS	Subjective assessment
SCA	Scenario analysis
SCT	Structural contingency theory
SD	Standard deviation
Se	Standard error
SGPC	Secretariat of the General People's Committee
SMEs	Small and medium enterprises
SP	Strategic priorities
SPB	Shorten the payback period
SRMR	Standardized Root Mean Square Residual
SUF	Software used in forecasting
TLD	Thousands of Libyan Dinar
TNF	Total number of forecasters
TOW	Type of ownership
VAF	The variance accounted for
WACC	Weighted average cost of capital

1 CHAPTER ONE: OVERVIEW OF THE STUDY

1.1 Introduction

Planning is considered to be the most important function of both businesses and the state. In both contexts, it aims to utilize available resources to maximize production efficiency and achieve desired objectives. In this regard, it is not easy to identify the optimal investment opportunities in using available resources in the economic environment characterized by technological development and intensive competition, especially if the resource use is multi-faceted and technical methods are complex. It is universally acknowledged that there is a close correlation between economic growth and the method of allocating available resources, where economic growth does not depend only on the size of the latter, but also on the efficiency with which resources are extracted, processed and deployed.

The allocation of limited resources to different investments became a pertinent consideration after the Second World War with global reconstruction efforts (Weingartner, 1974). The modus operandi that emerged for the planning and control of investment expenditures was analysed in a capital budgeting decision context, which generally refers to the investment decisions in finance literature (Pike and Dobbins, 1986). Capital investment decisions include current capital outlays and future cash flow generated by the investment projects (Drury, 2012). Capital investment decisions are extremely important to corporate management as they determine firms' future growth and prospects. Naturally, more effective investment decisions can be made with an improved forecast accuracy of cash flow and the evaluation of investment alternatives.

Planners consider the cash flow forecasting process (CFFP) to be an essential factor affecting investment decisions. According to Sanders (1997, p.32), "forecasting is one of the most critical aspects of planning for many companies" and it can be applied in numerous decisions, such as production and sales planning, inventory scheduling and capital budgeting (CB). In fact, cash flow forecasting (CFF) is essentially the expectation of cash flow generated by the investment project (Ochs & Parkinson, 2006). Thus, as Fight (2006) observed, it is used to determine the effectiveness of sizable capital projects (e.g. public infrastructure such as metropolitan railway systems and airports). Accordingly, the accuracy of CFF strengthens confidence in the use of discounted cash flow methods in CB (Liu et al., 2010).

However, capital budgeting is one of the important developments in budgeting. Not only is capital budgeting used in the planning and control of investment expenditure, but it also plays an essential role in the optimal allocation of various resources. Consequently, the responsibility for making capital budgeting decision belongs to the top management, where the management accountant provides managers with valuable information for planning and control of investment expenditures. In fact, the philosophy of CB depends on the modern concept of management accounting where the administrative functions of both accounting and management complement each other and each is a tool to achieve organization’s goals.

Dean (1951) presented a seminal contribution to CB and subsequently numerous works have emerged (Bierman and Smidt 2007; Clark et al., 1979; Peterson and Fabozzi, 2002; Welsch, 1976; Wilkes, 1977). Currently, investment appraisal techniques are taught as a synonym for CB (Drury, 2012; Horngren et al., 2002; Seal et al., 2012). The theoretical argument made in this thesis relies on contingency and institutional theories to explain the reasons for adopting the forecasting processes in capital budgeting decisions.

Recent empirical literature shows that there is a tendency towards the use of CBT in evaluating investment opportunities. In this regard, discounted cash flow methods are commonly used by the UK, European, Canadian and US firms (Bennouna et al., 2010; Burns and Walker, 2009; Drury et al., 1993; Holmen & Pramborg, 2009). Conversely, Malaysian, Sudanese, Nigerian and Libyan firms used payback period and accounting rate of return methods in CB decisions (Alhouderi, 1997; Anuar, 2005; Eljelly & Abuidris, 2001; Eloubedi, 1993; Obi & Adeyemo, 2014).

Furthermore, the process of CB is divided into four stages: identifying and evaluating investment opportunities, allocating financial resources to desirable investment alternatives, preparing CB and implementing investment projects (Drury, 2000). Most studies focus on enumerating the methods used in evaluating and selecting investment projects, while there is little interest in the subject of CFFP in CB decisions (Turner & Guilding, 2012).

Subsequently, several studies focused on the evaluation of methods used in forecasting (Lim & O'Connor, 1996; Sanders & Manrodt, 1994; Sparkes & McHugh, 1984; Winklhofer, et al., 1996; Zotteri & Kalchschmidt, 2007). Consequently, this study aims to ascertain the role of the CFFP in CB decisions to explore whether the CFFP plays an important role in CB. To achieve its main aim, this study seeks to identify the procedures and methods used in forecasting process, which starts with identifying the procedures and methods used in forecasting and ends by estimating future cash flow (Danese & Kalchschmidt, 2011a, 2011b).

The researcher also attempts to investigate the relationships among the forecasting process variables and the extent of use of capital budgeting techniques. Moreover, this study examines the influence of institutional and contingent variables on the use of forecasting procedures and methods. In addition, this study seeks to explore the indirect effect of the forecasting procedures and methods on the financial performance of firms through the extent of their use of capital budgeting techniques (CBT). Furthermore, the data sources used in forecasting, the forecasting horizon and the existence of qualified and official persons, who are responsible for preparing future cash flow, are the key factors associated with the use of forecasting procedures and methods.

This study employs institutional and contingency theories of CB. According to Haka (1987), analytical developments in financial and contingency theories contribute primarily to construct and test contingency theory for CB. Contingency theory assumes that there is no optimal technique applied in most of management accounting systems. This principle can be applied to the CB process where there is no universal appraisal technique used in most manufacturing firms (Anuar, 2005). In other words, the application of certain appraisal techniques in CB is dependent on specific contingencies, such as firm size, environmental uncertainty, technology and the competitive strategy (Haka, 1987). This research applies contingency theory to explain the differences in using the forecasting procedures and methods that affect the selection and use of CBT.

Institutional theory is a sociological paradigm that “explains the processes through which organizational structure is adopted” (Donaldson, 2008a, P.6). In literature, there are three different branches of institutional theory used in management accounting research: original institutional economics (OIE), new institutional economics (NIE) and new institutional sociology (NIS) (Burns & Scapens, 2000; Hussain & Hoque, 2002; Moll et al., 2006; Scapens, 2006). This thesis applies NIS theory to explain the reasons for adopting the forecasting procedures and methods that may affect the adoption of CB processes. In other words, NIS seeks to determine the pressures and processes associated with an organizations’ work. These pressures may affect and are affected by the social environment in which these organizations operate. Hence, organizational performance is contingent not only on maximizing profitability index but also on its homogeneity to social rules and standards of accepted practice (DiMaggio & Powell, 1983, 2012; Meyer & Rowan, 1977). In this context, "homogeneity" is synonymous with "isomorphism", of which there are three types according to Liang et al. (2007): coercive, normative and mimetic pressures. Subsequently, organizations seek to adopt the optimal structures, which deal with social rules and values (Moll et al., 2006).

This study employs a quantitative method (QM), which is generally associated with deductive reasoning as its research paradigm. The purpose of the quantitative method is to study the facts in certain conditions and describe the interaction between the research variables in order to address the research problem. In addition, this study used a questionnaire survey to collect data. This survey was delivered to the financial directors or the persons who are responsible for making CB decisions in Libyan manufacturing and oil firms. In this regard, the research methodology is based on logical procedures to obtain factual data about research variables. The researcher used a pilot study to modify the survey based on the ability of respondents to complete the questionnaire survey, in addition to the feedback issued by faculty staff at the Huddersfield Business School. Consequently, the reason for selecting this methodology is that most CB research applied questionnaire surveys to collect data (Arnold, & Hatzopoulos, 2000; Drury et al., 1993; Graham & Harvey, 2001; Lazaridis, 2002, 2006; Pike, 1996; Pohlman et al., 1988; Sangster, 1993; Verma et al., 2009).

Regarding the study's sample, there are about 257 manufacturing and oil companies operating in Libya (excluding foreign companies), and the researcher identified 100 companies as the target sample. The quantity of usable questionnaires completed by respondents totalled 69 questionnaires. Accordingly, the response rate for this study is 31%. Moreover, this study applied PLS-SEM to test the research hypotheses. PLS-SEM is a combination of factor analysis and multiple regression equations.

This thesis produced a number of contributions to existing knowledge. First, it is a unique study for exploring the relationship between the PMUF and the extent of use of CBT. Second, this study presents a conceptual framework to identify the factors related to the cash flow forecasting process in CB. Third, it builds a causal sequence model based on the interrelated parts of the research framework (independent, mediated and dependent variables). Most previous studies related to CB research in Libya depended on descriptive and classical models.

Consequently, this is the first study in Libya, as a developing country, to explore the key factors influencing the CFFP.

1.2 The motivation for conducting this study

In previous years, financial analysts focused on profit methodology as a basis to estimate future earnings, which caused several companies to manipulate earnings through fraudulent reports, as in high-profile cases such as the Enron accounting scandal. As a result, the necessity of CFFP has become a vital factor in most of organizations, because cash flow information is a useful indicator in appraising investment opportunities (Krishnan and Largay, 2000). Hence, businesses should plan the investment projects based on the CFFP.

A growing tendency towards massive investment projects has been seen throughout the world, with investment decisions having importance at local, national and international levels, with most projects success being dependent on initial investment decisions. In fact, the investment expenditure decisions are the most important decisions adopted by top management. These decisions are associated with several variables that shape firms' performance. In addition, the degree of risk associated with these decisions is relatively high, because they are required to make forecasts for a long period. Therefore, most firms plan these decisions in the form of capital budgets. Accordingly, the application of scientific methods in planning the investment expenditures is perceived to be more important in both developed and developing countries.

In MA practices, the philosophy of CB processes depends on the modern concept of management accounting, where the administrative functions of both accounting and management complement each other, and each is a tool to achieve the organization's goals. Accordingly, CB is a management accounting tool that can be used in the process of planning and control of investment expenditures.

According to Arnold and Hatzopoulos, (2000), there is a gap between the theory and practice of CB. This relates to three core aspects of CB problems identified by Wilkes (1977): those related to investment proposals and cash flow generated by investment opportunities; those associated with the evaluation and selection of investment opportunities; and those concerned with providing available funds to be allocated in capital budgets.

Bierman and Smidt (2007) concluded that cash flow estimates resulting from investment projects are purely speculative due to the use of personal estimates in the comparison between investment opportunities. Therefore, the use of objective techniques to estimate cash flow is the basis of the capital budget process.

Subsequently, the main aim of this study is to establish the role of the CFFP in CB and the research questions derive from the research objectives. Two of these questions aim to explore techniques used in cash flow forecasting and capital budgeting. The third, fourth and fifth questions address the relationships among the CFF process variables (PMUF & FMPF) and the extent of use of capital budgeting techniques. The sixth, seventh and eighth research questions aim to examine the key factors related to forecasting process including the influence of demographical characteristics (QUA & POS) and the contextual factors on the PMUF. In the ninth and tenth questions, the relationship between the use of forecasting procedures and methods, capital budgeting techniques and financial performance is investigated.

In developing countries, several studies have been conducted on CB research. Alzoubi and Alazawi (2010, p.5) examined the influence of "demographical characteristics of the respondents, type of capital investment" on the degree of use of CBT, which comprise financial and risk appraisal techniques. They identified the respondents' ability to judge the benefits and drawbacks of each technique used by listed Jordanian service firms. Alzoubi and Alazawi's study (2010) explored the use of CFF techniques in Jordanian services firms. A study was conducted in Oman, where Al-Ani (2015, P. 469) investigated the impact of contingency variables on the extent of use of the payback period (PB) in appraising the investment projects in Oman; associated contingencies include "financial ratios, risk, market obstacles, management compensation and firm size". Al-Ani's study (2015) made comparisons between managers and investors in their use of the PB. In a similar way, Al-Ajmi et al., (2011, p.111) examined the effects of a CFO's and firm's characteristics on the use of capital budgeting techniques of "conventional and Islamic financial institutions", where financial and risk appraisal techniques were addressed as the CBT. A fourth study was conducted in UAE. According to Ahmed (2013), the basic determinants for selecting the CBT were understood as the main factors affecting the CB decisions made by 35 companies listed in the Dubai Financial Market. These factors include the firm size, qualifications of decision makers, familiarity with the project, availability of cash and financial indices (revenues, profitability, leverage level, size of expenditure).

Moreover, most CB research in African countries addressed and surveyed the factors affecting the extent of use of CBT (Brijlal and Quesada 2009; Saidu, 2014). Nevertheless, none of these studies examined the factors relating to cash flow forecasting processes in CB, which in turn create significant effects on the selection and use of CBT, because the third stage of CB (investment appraisal process) is dependent on cash flow estimates. In addition, most CB studies have presented traditional models to solve problems related to CB, where there is only a direct relationship between independent and depended variables. Conversely, the mediated and causal relationships among research variables were addressed in this thesis.

Theoretically, the importance of this study has numerous aspects. Firstly, the cash flow forecasting process (CFFP) plays an essential role in appraising investment opportunities. Secondly, determining the factors related to the CFFP helps to attain the optimal investment opportunities in capital budgeting decisions. Thirdly, the success of the capital budgeting decision is dependent on the forecast accuracy of cash flow (Kalchschmidt, et al., 2010; Lazaridis, 2002, 2006; Pohlman, et al., 1988; Turner and Guilding, 2012; Wacker and Sprague, 1998).

In general, cash is the main engine of the operational and investment activities for most organizations, and the main problem in most organizations is how to forecast future cash flow generated by investment opportunities (McIntosh, 1990; Pinches, 1982; Scott and Petty, 1984). Therefore, this thesis emphasises the role of CFFP in CB decisions.

The reasons for selecting Libya as the field study is based on the specific considerations. Firstly, the manufacturing and oil sectors play an important role in the Libyan economy (Alkizza, 2006; El-Sharif, 2005; Saleh, 2001). Oil exports are the main driver of the Libyan economy and have an essential role in economic growth (Central Bank of Libya and Ministry of planning). In 1973, Libya became the fourth country “in oil production among the Middle East and North African producers” (El-Sharif, 2005, p.62). Oil revenues in 2012 reached 66.9 BLD, which is the equivalent of $45.7 Billion (LAB, Annual report 2015). In Libya, the oil sector represents more than 60% of GDP and 95% of total revenues (IMF, March 6, 2013). In terms of the industrial sector[1], the total investments allocated to this sector until 31/03/2010 totalled 9.7 BLD (PIB, 2011). Between 1976 and 1996, the total amount allocated to development plans in the manufacturing sector was 5.54 BLD. Secondly, in the late 1990s, the Libyan economy shifted from a planned to a market economy. This transformation had fundamental changes in reforming state-owned firms (SGPC, 2001). The Privatization and Investment Board started to re-evaluate state-owned companies in the industrial sector, to assess their assets and liabilities in recent times (PIB, 2011). Regarding investment decisions, the Libyan Government issued law No.6 of 2003 and law No. 9 of 2010 to encourage and attract local and foreign investors to invest in industrial and technological activities (SGPC, 2003 and LGPC, 2010). Thirdly, CB research in Libya is a recent development beginning in the early 1990s when the majority of the Libyan firms adopted CB processes in their investment decisions (Alhouderi, 1997; Alwakil, 2000; Eloubedi, 1993). Finally, the results of this thesis confirm that most Libyan manufacturing firms depended on subjective estimates to forecast future cash flow relating to CB decisions and some Libyan manufacturing and oil firms used quantitative methods to estimate future cash flow. This is because the components of cash flow in the industrial sector are relatively difficult to estimate. Furthermore, the researcher has experience in CB research, when dynamic programming was applied to prepare capital budgeting in a study of Ras Lanuf Oil and Gas Processing Company (Alsharif, 2004).

With regard to CB processes, Libyan companies are required to disclose a comprehensive budget related to future expenditures to the Libyan Audit Bureau (GNC, 2013). In addition, banking facilities in Libya depend on feasibility studies submitted by investors to finance the investment projects (Central Bank of Libya), and these feasibility studies determine the type and size of investment and the budget required to finance these projects. The feasibility study includes the methods used to appraise the investment projects.

Subsequently, the development of accounting practices in Libya derives from Western countries. Leftesi (2008) ascertains that the diffusion of Western accounting practices in Libya

[1] The categories of Industry type have been identified by PIB (2011) as follows: Cement, Sanitary materials, Electrical , Household appliances, Plastics, Leather, Food, Mechanical, Chemical, Manufacture and maintenance of marine fishing equipment, Manufacture of educational items, Iron and steel, Recycling and Solar and renewable energy.

can be linked with two key factors: foreign companies (especially oil companies operating in Libya) and the Libyan accounting education system.

Although Libya has potential to act as a gateway between Europe and Africa regarding several resources including renewable energy; the Libyan economy is totally dependent on its oil and gas industry, both for state revenue and employment of nationals, mainly in a bloated state sector with government-subsidized employment rules rather than the industry itself (El-Sharif, 2005; Ayad, 2001). The National Oil Corporation (NOC) was established under Act No. 24/1970 (RCC, 1970). NOC has substantial interests in decisions concerning with investment in new oil projects or developing existent ones, which is undertaken by affiliates. This can be reflected in the management's interest in such strategic decisions by using extensive feasibility studies, which should be undertaken before implementation. Accordingly, several plans have been studied to develop the oil investment projects. However, most of these were not implemented and were delayed for numerous reasons, including circumstances influencing the local oil industry and the significant impact of limited financial resources (periodically exacerbated by international political considerations). The main instrumental barrier arising from these circumstances is the lack of foreign partnerships to drive successful implementation. For these reasons, management has faced some difficulties in terms of estimating the cash flow resulting from these projects, although they may be economically feasible.

Among the factors in the evaluation of oil projects when making investment decisions, cash flow estimates are a key factor. Therefore, the framework identifying the factors associated with the CFFP helps in determining the optimal portfolio of investment opportunities in the oil sector. The NOC confirms that most of the oil, gas and petrochemical investment projects in Libya depend on feasibility studies in order to forecast the cash flow resulting from investment projects, and most feasibility studies are conducted by foreign consultants.

Since the early 2000s, reforms in Libya’s former socialist economy have seen the privatization of ninety units (PIB, 2012). These projects require development and financial support. Thus the PIB is planning to re-evaluate these projects to estimate their future cash flows.

There are four main theoretical and logical reasons for conducting this thesis. Firstly, most studies focus on the selection stage in the capital budgeting process, whereas the cash flow forecasting stage has received less attention (Pinches, 1982; Turner & Guilding, 2012).

Secondly, none of the previous studies have examined the impact of the cash flow forecasting process on capital budgeting decisions; specifically, the relationship between forecasting procedures and methods and the extent of use of CBT has not been addressed. Thirdly, none of the previous studies addressed the influence of contingent and institutional variables on the procedures and methods used in forecasting future cash flow generated by investment projects. Finally, this thesis is a unique study exploring the demographical characteristics of forecasters (qualifications and position of forecasters) responsible for preparing cash flow estimates in CB decisions made by top management in Libyan manufacturing and oil companies.

1.3 Research aim, objectives and questions

1.3.1 Research aim and objectives

This study aims to establish the role of cash flow forecasting process in capital budgeting. To achieve the main aim, the following objectives were established:

ROB1: To identify and describe the forecasting procedures and methods (FPM) and the capital budgeting techniques (CBT) used in manufacturing and oil firms operating in Libya.

ROB2: To examine the relationships among the forecasting process variables (PMUF & FMPF) and the extent of use of CBT.

ROB3: To examine the effect of the key factors related to the forecasting process on the use of forecasting procedures and methods. These factors include data sources (DS), the forecasting horizon (FH) and the qualifications and position of forecasters (QUA & POS). In this regard, the forecasters are those responsible for forecasting future cash flow.

ROB4: To investigate the influence of contingent and institutional variables on the use of forecasting procedures and methods.

ROB5: To examine the indirect effect of the use of forecasting procedures and methods (FPM) on the firms' financial performance (PERF) which occurs across the extent of CBT usage.

ROB6: To examine the direct effect of the extent of use of CBT on the firms' financial performance (PERF).

1.3.2 Research questions.

As mentioned previously, the purpose of this study is to establish the role of CFFP in CB. Therefore, this study aims to answer the following main question:

To what extent can the cash flow forecasting process (CFFP) play an important role in capital budgeting?

In order to answer the main question, ten sub-questions need to be answered:

RQ1: To what extent can the capital budgeting techniques be used as an essential priority in the investment appraisal process?

RQ2: What are the forecasting procedures and methods (FPM) often/always used in estimating future cash flow generated by the investment projects?

RQ3: What is the relationship between the use of forecasting procedures and methods (FPM) and the financial, marketing and production factors (FMPF)?

RQ4: What is the relationship between the use of forecasting procedures and methods (FPM) and the extent of CBT usage?

RQ5: What is the relationship between the financial, marketing and production factors (FMPF) and the extent of CBT usage?

RQ6: What is the relationship between the use of forecasting procedures and methods and the key factors (DS, FH, QUA and POS) related to the forecasting process?

RQ7: What is the influence of combined contingency variables on the use of forecasting procedures and methods (FPM)?

RQ8: What is the influence of institutional variables on the use of forecasting procedures and methods (FPM)?

RQ9: What is the indirect relationship between the use of forecasting procedures and methods (FPM) and the firms' financial performance (PERF) which occurs across the extent of CBT usage?

RQ10: What is the direct relationship between the extent of use of CBT and the firms' financial performance (PERF)?

1.4 Thesis structure.

This thesis is organized into nine chapters. As explained above, the first chapter presents an overview of this study, including an introduction, the research aim, objectives and questions, and the reasons for conducting this study.

In the second chapter, the Libyan business environment is presented in terms of the political and economic changes in Libya during the period 1951-2011 and after the fall of Gaddafi regime, overview of accounting in Libya, the diffusion of management accounting practices (MAPs) and the application of CB processes in Libya.

Chapter three focuses on the CB process; specifically, the CFFP is illustrated in terms of the meaning of forecasting process and the methods used in forecasting future cash flow. In addition, it summarises the investment appraisal techniques used in CB decisions.

The fourth chapter represents an application of the theoretical approach related to this study, whereby the researcher applies contingency and institutional theories to explain the differences and similarities in using forecasting procedures and methods and investment appraisal techniques. It posits that these theories are consistent with the research framework. Therefore, this chapter links the second and third chapters with the fifth.

Chapter five deals with empirical literature related to the five main variables of this study, particularly the CFFP variables, the factors related to the CFFP, contingent and institutional variables, the use of CBT and the firms' financial performance. This chapter debates the main research hypotheses formulated to test the relationships among the research variables.

The sixth chapter illustrates the structure of research design and research methodology. It outlines the methods used for data collection. In this part of the study, the researcher decides upon the procedures employed to collect data. In addition, the research model presents the main research variables and highlights the extent of interdependence of these variables. Moreover, it explains how the research variables are measured and explores the statistical techniques used in data analysis. Furthermore, the reliability and validity of indicators used to measure the research variables will be addressed as a synonym of the assessment of measurement models when the researcher used PLS-SEM. In this regard, SmartPLS 3 software is applied and the measurement model tests the relationship between the constructs (latent variables) and their indicators in terms of internal consistency, convergent and discriminant validity, indicator reliability, and collinearity/multi-collinearity analysis.

Chapter seven presents the analysis of data collected from the questionnaire survey. SPSS (version 22) is used to analyse the descriptive data. In this chapter, five procedures will be used to assess the PLS-SEM structural model results. Section three will present the assessment of the research hypotheses as discussed in terms of the relationship between the exogenous and endogenous constructs. Then, the remaining procedures related to the results of structural models will be addressed in section four.

Chapter eight discusses the differences and similarities between the research findings and the results derived from previous studies addressing the research variables, especially related to the CFFP and appraisal techniques used in CB decisions. The key factors influencing the forecasting process will also be discussed. Similarly, the findings related to the contingent and institutional variables are explored. In the last section, the researcher will present the prior studies addressed the relationship between the PMUF, CBT and the financial performance of firms.

Finally, chapter nine shows a summary of research findings and discusses the contributions, practical implications and limitations of the study. Furthermore, the suggestions for further research and recommendations are made for CFFP and CB research.

2 CHAPTER TWO: LIBYAN BUSINESS ENVIRONMENT

2.1 Introduction

Investment expenditure decisions are the most important decisions made by top management. These decisions are associated with several variables affecting the firms' performance. Libyan companies are required to reveal their development expenditures in formal reports (GNC, 2013).

However, the social, political and economic events in the state have an important role in the planning and control of investment expenditures, whether in the public or in the private sector. The factors influencing the political and economic context in Libya are considered as the basis for understanding the circumstances surrounding the research environment (Mohammed, 2013). Several political and economic changes occurring in the Libyan business environment have had an impact on the oil and manufacturing sectors.

Hence, this chapter aims to explore changes in the political and economic environment in Libya during 1951-2011 and investigate their impact on accounting practices, particularly management accounting and the CB process. This chapter is divided into five main sections to trace the development of accounting, according to wider political changes in Libyan society during the period 1951-2011, in terms of economic changes, the accounting practices and profession, the diffusion of MAPs and the application of CB processes.

2.2 The political environment in Libya (1951-2011)

From 1911 until 1951, Libya was governed by the Italian colonial regime. Most of the fighting in North Africa between the Allied and Axis powers took place in Libya, which was under British administration after the Second World War. On 24th December, 1951, Libya became an independent state. Since independence, the political situation in Libya can be understood in three stages: the Kingdom of Libya (1951-1969), the Gaddafi Regime (1969-2011) and after the fall of Gaddafi Regime.

2.2.1 The Kingdom of Libya (1951-1969)

The declaration of the Kingdom of Libya marked the country's independence and the adoption of the Libyan Constitution authorised by King Idris, instituting a constitutional monarchy on the traditional British model (Farley, 1971), with parliament assuming responsibility for certain decisions (El-Shukri, 2007). In this regard, the Libyan constitution declared the general principles of the state: Islam as the religion of the state, civil and political rights for all citizens, the responsibility for public duties and equal treatment of all. At this stage, there was political stability in the state. The economy was a conventional developing capitalist system, and the government had normal (indeed, amenable) political relations with Western countries, especially the USA and the UK. Nevertheless, Libya was essentially a poor country before the discovery of oil in 1959, and it depended on agriculture and foreign aid (Farley, 1971; Higgins, 1968; Wright, 1981). After the discovery of oil in 1959, Libya suddenly acquired wealth and the national economy grew rapidly, with several plans carried out to develop numerous sectors, particularly manufacturing and modern agriculture. As a result, the state invited foreign direct investment, particularly by foreign oil companies, to develop the Libyan economy and production (Bait-El-Mal et al., 1973). These developments in the state had a positive impact on lifestyle and education in Libya (Agnaia, 1996).

2.2.2 The Gaddafi Regime (1969-2011)

Gaddafi's long tenure as the leader of Libya can be understood in terms of two political paradigms: the Libyan Arab Republic from the 1969 Revolution until 1977, and the Libyan Arab Jamahiriya during 1978-2011. In the former era, Gaddafi clearly aspired to replicate the success of Nasser in neighbouring Egypt. Despite the fact that Egypt sought closer relations with the US during the 1970s, Libya instead followed the opposite trajectory of closer ties with the Soviet Union, which resulted in the development of the state (Wright, 1981).

On 1st September 1969, the political system in Libya was changed to a Republic by a military revolution led by Colonel Muammar Al Gadhafi. The initial authority was the Revolutionary Command Council (RCC), which declared the establishment of the Libyan Arab Republic and the Legitimate Constitution, and passed several legislations, which led to nationalization of most foreign organizations operating in the Libyan market (Kilani, 1988). This era focused on supporting the state institutions and the political system in the first phase, relying on both socialist and capitalist systems. In 1976, the General National Congress of the Arab Socialist Union (ASU) was reformed by the RCC. After that, the General National Congress of the ASU was renamed the General People's Congress. Subsequently, the leader of the revolution made substantial changes to the Libyan Constitution, where "the official name of the country was changed to the Socialist People's Libyan Arab Jamahiriya" (Ibid, p.25). Since 1977, Libya underwent several major political changes, which can be summarised as follows:

- In 1977, Colonel Gaddafi issued the *Green Book*, his manifesto proposing solutions for political, economic and social problems, which influenced political and social life in Libya over the last four decades.
- In 1979 the government abolished private ownership, and most private companies were nationalized (Bait-Elmal, 2000; Derwish, 1997).
- In 1985, the United Nations imposed economic sanctions on Libya because of its support for international terrorism.
- During 1985-1992, the relationship between Libya and Western countries was considerable deterioration, culminating in economic sanctions and intermitted US bombing, which undermined the Libyan economy, particularly the oil industry (Kribat, 2009 and Mahmud, 1997).
- From 2001, the Libyan Government began promoting private ownership and the restructuring of the public sector (El-Sharif, 2005; El-Shukri, 2007; Kribat, 2009).
- In 2003 (contemporaneous with the regime change in Iraq), Gaddafi sought to accelerate rapprochement with the West, and the United Nations lifted the economic sanctions on Libya.

With regard to the political changes necessary for economic liberalization, the Secretariat of the General People's Committee (SGPC) issued the following decisions:

- SGPC issued Resolutions No. 198/2000 and 118/2001 regarding the establishment of the Public Foundation of Privatization, which is responsible for transforming the ownership of public sector units to the private sector (SGPC, 2000, 2001).
- SGPC issued Law No. 9/2010 on investment promotion. In this regard, the government issued several decisions related to private investor support, such as Act No. 9/1992, Act No. 198/2000 and Act No. 107/2005 (Abugalia, 2011, p.16; LGPC, 2010).
- SGPC issued resolution No. 313/2003 related to the reformation of the state-owned firms.
- SGPC issued Resolution No. 20/1999 regarding the establishment of the Free Trade Zone; the purpose of the establishment of the Free Trade Zone as a space for the international market and to export local products (SGPC, 1999).

- Secretariat of Planning, Economic and Trade (2001, 2005) issued Resolutions No. 21/2001 and No. 105/2005 concerning the economic practices.
- Supporting financial and commercial activities, the Libyan Stock Exchange was established in 2005 (Secretariat of Planning, Economic and Trade, 2005).

In October 2004, Libya sought to become a membership in the World Trade Organization (WTO), whose main aim is to “reduce entry-exit barriers for international businesses and make business easier” (Abugalia, 2011, p.17). In the last decade, the Libyan Government has allowed multinational and international firms to invest in Libya (El-Sharif, 2005; El-Shukri, 2007; Kribat, 2009).

2.2.3 The political and economic situation in Libya after the fall of Gaddafi Regime.

On the 23rd of October 2011, the Gaddafi regime has faded; this is due to “the resolution No. 1973 dated on 17 March 2011 issued by “the United Nation Security Council that authorized the use of military force for human protection purposes against Gaddafi’s army” (Williams and Bellamy, 2012, p.273). During the period of civil war (17/02/2011-23/10/2011), Libya was governed by the Transitional Council. Since 2012, the General National Congress (GNC) became the legal representative of the Libyan state; this political change was carried out based on the draft of Libyan constitution and its amendments in 2014 (GNC, 2012, 2014). In this regard, Article 16 of the constitution of 2011 indicated that private property is protected by the Libyan state and any person or investor has a right to transfer his property " except within the limits of the law " (GNC, 2011). This confirms that the Libyan economy had completely shifted from socialist to capitalist.

Subsequently, the GNC announced its decision to “hold parliamentary elections on the 25th of June 2014”, after which the House of Representatives (HoR) replaced the General National Congress and HoR (the Libyan Parliament) became the transitional council to govern the state until a constitution is written (GNC, 2014 and HoR, 2014). Indeed, Libya has made major strides towards establishing a democratic system of governance. Elections were held on July 7, 2012 for the General National Congress (GNC) and 25th June 2014 for the House of Representatives.

During 2012-2014, there were three governments established by the GNC, yet rapid economic growth was observed in 2012, where “the overall balance moved from a budget deficit of

18.7 percent of GDP in 2011 to a surplus of 24 percent of GDP in 2012" (IMF, 6 March 2013). This is due to a high rate of oil production, which produced to 1.5 million barrels per day. It is close to the oil production rate specified by the OPEC. Table 2.1 illustrates Libyan Oil production and revenues during 2012-2015.

Table 2.1: Libyan Oil production and revenues during 2012-2015

Production & revenues	Measurement Unite	2012	2013	2014	2015	Total
Crude oil	billion barrels	531	363	175	146	1215
Condensate Gas	billion barrels	22	20	19	19	80
Natural Gas	Billion cubic feet	861	808	742	787	3198
Oil & Gas revenues	Billion LD	66.9	51.7	19.9	10.6	149.1
Oil & Gas revenues	Billion $	45.7	36	15.4	7.6	104.7

Source: Libyan Audit Bureau, report 2015.

At the beginning of the revolution, the Libyan state allocated large expenditures to reconstruction projects, while there was little interest in manufacturing and oil projects. Hence, the researcher designed the survey to cover the period 2008-2010. Table 2.2 identifies the budget allocated to development plans during 2012-2015.

Table 2.2: The budget allocated to the development and reconstruction projects.

(Veritable Expenditures) [In MLD]

Year	Reconstruction projects and other activities	Manufacturing	All sectors
2012	5395	105	5500
2013	9276.5	20	9296.5
2014	3307.4	N.A	3307.4
2015	3861.7	N.A	3861.7
Total	21840.6	125	21965.6

Sources: Libyan Audit Bureau, report 2015. 2- Ministry of Finance. 3- Ministry of Planning.

Table 2.2 shows dramatic changes in expenditures for manufacturing projects during the period 2011-2015. In contrast, the Libyan Government allocated 3930 MLD to spend on development plans in the manufacturing sector during 1981-1985. In this regard, the president of the Libyan Audit Bureau confirms that the lack of security and a grave conflict between two governments (Tripoli and Tobruk) expanded the level of political instability in Libya; hence, state resources and institutions became divided (LAB, report 2015).

Following the revolution of 17th of February 2011, economic stability was achieved in most sectors, owing to the high rate of oil production as mentioned above. Unfortunately, this was not continuous, and renewed civil war and intervention by international parties affected the

Libyan conflict. Accordingly, the Libyan Government could not export oil and gas to international markets and faced difficulty in carrying out development and reconstruction projects. During 2013-2015, when the civil war broke out again, "virtually all economic activities, especially oil production witnessed a dramatic decline", and by 2013, the Libyan economy contracted to what it was prior to the uprising (Khan and Mezran, 2013).

Moreover, investment activities were affected by the economic and political conditions since the revolution of 17th of February 2011. As shown in table 2.2 the development and investment plans related to the manufacturing sector were reduced to minimal levels, because “the country’s legal system was weak” and most of the government’s institutions failed to achieve their goals in that period (US Department of State, 2014). Therefore, Libya faces challenges of lack of security, financial corruption and weak institutions. Libya was ranked as very highly corrupt (161/168) according to the corruption index of 2015 which is based on how current conditions in Libya have corrupted its public sector (Transparency International, 2015).

Thus, the Libyan government should enforce the rule of law. Moreover, "Libya also needs to set up a governance framework linked to transparency and accountability, including governance elements that would promote private sector-led growth" (IMF, May 2013, P.4). Accordingly, there is little interest in researching the political and economic situation after the revolution of 17th of February 2011, due to political instability in Libya.

Consequently, this thesis addresses the investment decisions before the revolution of 17th of February 2011. Several procedures were issued by the previous government to promote national and foreign capital investment, the most recent being the investment law No.9 of 2010, which allows investment in industrial and service activities (LGPC, 2010). Under the investment law No.9 of 2010, commercial banks operating in Libya has allowed investors to open foreign exchange accounts and conduct cash payments and transfers in foreign currency. Banking Law No. 1 of 2005 allows the Libyan commercial banks to “grant credit in foreign exchange and conduct transactions in foreign exchange among themselves” (LGPC, 2005, pp.15-17). Further details of the investment laws regarding the manufacturing and oil sectors are contained in section 2.3

2.3 Economy in Libya

2.3.1 The Libyan economy before the discovery of oil

In the 1950s, prior to the discovery of oil, Libya was dependent upon agriculture and animal husbandry. The industrial sector was dependent primarily on agricultural and livestock products because of the limitation of natural resources, lack of raw materials and limited funds available for investment. Moreover, skilled and educated labourers were not available in the Libyan market (Higgins, 1968). Subsequently, the industrial products produced prior to the discovery of oil were flour, textiles, tobacco, footwear and clothing (Abbas, 1987). Accordingly, the average income per capita was less than $40 per year (Higgins, 1968). More detail on government revenues and expenditures during the period 1954-1959 are shown in Table 2.3.

Table 2.3: Government revenues and expenditures during the period 1954-1959

[In MLD]

No.	Details	1954/55	1955/56	1956/57	1957/58	1958/59
1	Expenditures	7.897	12.978	15.433	17.031	19.179
2	Domestic Revenues	5.549	7.061	8.147	9.595	12.049
3	Foreign Revenues	5.641	6.270	4.234	12.069	11.045
2+3	Total Revenues	11.190	13.331	12.381	21.664	23.094

Source: International Bank for Reconstruction and Development (1960, p.347)

Even by the 1960s "economic development in Libya had slowly changed and Libya remained a poor and underdeveloped country heavily dependent on foreign aid" (El-Sharif, 2005, p.43).

2.3.2 The Libyan economy after the discovery of oil

Libyan oil was discovered by the US firm 'Esso' in 1959 (Vandewalle, 1998; Wright, 1981). The discovery of oil was an important event that represented a seminal change in the economic life of Libyans and Libya. For instance, in 1969, bank lending totalled 88.846 MLD, compared to 6.031 MLD in 1956 (Attiga, 1972). In this regard, Sanger described the changes in the Libyan infrastructure as follows:

> *Hospitals of standard design were being built in half-dozen lots... The giant campuses of the University of Tripoli and Benghazi were the most impressive in Africa... Above many side streets and garden suburbs the tall chimneys of new factories rose behind the minarets, their dark smoke clouds proof of the boom in cement, reinforcing wire, plumbing fixtures, textiles, food processing and, most successful of all, the drive to expand electricity (*Sanger, 1975, pp. 413-414*).*

Furthermore, the significant development of oil revenues led to higher investment expenditures, followed by an increase in GDP and per capita income. Therefore, the Libyan economy depends primarily on oil export revenues, which accounted for 3848.70 MLD in 1979, compared to 125.40 MLD in 1965. Table 2.4 shows the levels of improvement in GDP and per capita income during 1967-2012, after the discovery of oil.

Table 2.4: Libyan GDP and GDP/Per Capita, 1967-2012

Year	Total GDP (MLD*)	GDP-oil sector (MLD)	GDP-other sectors (MLD)	Per capita (LD*)	Per capita ($)
1967	747.8	402.5	345.3	430	1250
1970	1288.3	812.6	475.7	656	2216
1975	3674.3	1961.1	1713.2	1369	4624
1980	10553.8	6525.7	4028.1	3252	10985
1985	7852.1	3500.4	4351.7	2140	7228
1990	7749.6	2740.8	5008.8	1600	4320
1997	12975.5	2977.5	9998	2426	6064
2001	17605	6009	11596	3171	4186
2010	52009.93	23379.6	28630.33	8526.2	N.A
2011	20146.32	6546.29	13600.03	3236.9	N.A
2012	39922.67	20385.05	19537.62	6289	N.A

Sources: (i) Ministry of Planning, Department of National Accounts, National Accounts, Libya; (ii) Central Bank of Libya, Economic Bulletin and Annual Report (various issues); (iii) El-Sharif (2005, p.55); (iv) Zoubi (2011, p.32)

From 1962, Libyan oil entered the commercial export phase and the state sought to implement several “development plans which generally covered three- or five-year periods” (El-Sharif, 2005, p.56).

2.3.3 The development plans in Libyan economy

The general goal of any nation's economy is to improve GDP and per capita income. In Libya, as in many developing countries, this was implemented by micromanaged state economic development plans. According to Kindleberger (1965, P.18), "economic development implies both the output and changes in the technical and institutional arrangements by which it is produced". Hirschman (1965, p.5) argues that “economic development depends not only on finding optimal combinations of available resources and production factors”, but also on the recruitment of all human resources and capacities, to achieve economic development goals.

Most analysts use per capita income as a measurement of development in developing countries (Kilani, 1988). As shown in table 2.4, income per capita reached 3171 LD in 2001 ($4186). Therefore, Libya is considered as a less developed country, “because the majority of the population does not contribute to the relatively high national income”, and oil exports comprised approximately 90% of total Libyan exports in 1980 (Kilani, 1988, p.29).

In 1963, the Libyan Parliament admitted the First Plan through 1963-1968 with the main goals of building the Libyan economy, developing infrastructure, supporting the public sector and reducing dependence on foreign aid. This plan cost approximately 331 MLD, according to the Ministry of Planning (Abusneina, 1992; Giurnaz, 1985; Kilani 1988).

In 1967, the Libyan National Planning Council permitted the Second Development Plan (1969-1974), which was allocated approximately 1000 MLD, with the aims of completing "ten unfinished projects from the first plan and implement an industrial programme with emphasis on petroleum refining and other light industries" (Kilani, 1988, p.53). This plan was rejected after the Revolution in 1969 and was ultimately replaced by a provisional plan covering the period from 1973 until 1975. The investment expenditure allocated in this phase was 1965 MLD, including 266.7 MLD allocated to manufacturing, but actual spending reached 2600 MLD (Ministry of Planning, 1973-1975).

In 1976, the Third Development Plan was promoted to cover a five-year period (1976-1980) and targeted "economic and social transformation". It was allocated 7.84 BLD, but also came in over budget at 9.2 BLD (Ministry of Planning, 1976-1980).

The Fourth Development Plan (1981-1985) concentrated on the industrial sector, particularly the food, iron and steel and petrochemical industries (Ministry of Planning, 1981-1985; El-Sharif, 2005; Shareia, 2006). The main goal of this plan was to increase the "added value" of the industrial sector and create a significant change in the structure of the industrial production (Bait-Elmal, 2003; Barker, 1982; El-Jehemi, 1987). In addition, the capital investment allocated to this plan was 18.5 BLD (Kilani, 1988; Saleh, 2001) .

The government deferred most subsequent economic development plans during 1986-2003 due to international sanctions and the decline in crude oil prices during 1986-2000 (Fisher, 1990; Shareia, 2006). Accordingly, the expenditure for social and economic development plans was made dependent on annual development budgets, which were included within the administrative budget. A summary of these details is shown in table 2.5, which illustrates the investment expenditures for Development Plans during 1963-1996.

Table 2.5: Expenditure for development plans during 1963-1996

No	Sector	1963-1968	1973-1975	1976-1980	1981-1985	1994-1996	Total (MLD)
1	Agriculture & forestry	63.00	327.80	1030.10	3100.00	158.00	4678.90
2	Oil and natural gas	0.00	48.90	41.00	200.00	0.00	289.90
3	Manufacturing industries	32.60	234.50	1515.40	3930.00	94.70	5807.20
4	Transportation & communication	118.60	253.80	1197.80	2100.00	194.00	3864.20
5	Education	59.90	192.10	513.00	1000.00	289.00	2054.00
6	Health	24.30	71.00	145.20	560.00	205.00	1005.50
7	Housing	109.30	361.30	887.50	1700.00	297.45	3355.55
8	Man-made river	0.00	0.00	0.00	0.00	100.00	0.00
9	Other activities	217.60	475.60	1841.00	5910.00	1061.15	9605.35
	Total	625.3	1965	7171	18500	2399.3	30660.6

Sources: Saleh (2001); Central Bank of Libya, Economic Bulletin-various issues; Ministry of Planning, Department National Accounts, Libya (various issues).

After the collapse of crude oil prices in the global market during 1983-2000, Libyan oil revenues declined. This had a negative reflection on the implementation of development plans in the manufacturing sector (Shareia, 2006). UN sanctions on Libya during 1985-2003 also had a negative impact on the implementation of development plans, particularly in terms of the manufacturing sector, as summarized below:

- Many factories could not achieve target production capacity, and achieved only 41% of available capacity (General Planning Council, 2001).
- Financial resources allocated to the manufacturing sector during the period from 1986 to 1997 were very limited (Secretariat of Planning, 1997).
- During 1986-2003, inflation was very high, amounting to a 350% net (Altarhoni, 2003, p.143)

Most studies in Libya do not refer to the implementation of new development plans since 1997. Generally, the administrative and development budgets during 1998-2009 are demonstrated in the table 2.6.

Table 2.6: Expenditure budgets during 1998-2009

[In MLD]

Year	Administrative	Development	Extra	Total
1998	3163.80	485.20	792.00	4441.00
1999	2966.90	794.10	535.00	4296.00
2000	3153.20	1541.00	556.00	5250.20
2001	3596.60	1539.00	496.00	5631.60
2002	4210.30	3701.70	575.00	8487.00
2003	3577.70	2530.00	758.50	6866.20
2004	6720.00	6718.00	3792.00	17230.00
2005	8282.00	10273.00	2788.00	21343.00
2006	9054.00	11039.00	1285.00	21378.00
2007	11890.00	18993.00	0.00	30883.00
2008	11874.80	28903.30	0.00	40778.10
2009	13757.40	17651.80	8915.30	40324.50
Total	82246.70	104169.10	20492.80	206908.60

Source: Central Bank of Libya, Economic Bulletin (various issues)

Although the economic development plans played a significant role in increasing GDP growth rates, the government failed to diversify from crippling dependence on oil. This is due to limited exploitation of oil and internal and global factors with the suspension of the implementation of important strategic projects such as petrochemical plants during the 1980s, and generally low crude oil prices from the mid-1980s into the 1990s (El-Sharif, 2005; Shariea, 2006). As a result, the Libyan government could not achieve the main social and economic objectives of the Development Plans. In this regard, Edwik (2007, p.97) believes that the failure to achieve the economic development goals in Libya was due to multiple factors: "lack of responsibility, commitment, credibility, the absence of feasibility studies and other reasons account for the poor performance of any development initiatives".

2.3.4 Libyan manufacturing and oil sectors

Before the discovery of petroleum, Libya depended on agriculture and animal husbandry (Wright, 1969). After the discovery of petroleum, several industries were established during the period 1977-1993, which the state encouraged investment in the public sector. Accordingly, the Libyan government established massive industrial projects in collaboration with multinational companies, which contributed in improving the industrial sector. In general, the Libyan economy comprises agriculture, transportation, construction, petroleum, manufacturing and financial services, while manufacturing refers specifically to the production of goods. This study focuses on the manufacturing and oil sectors managed by two organizations in Libya, namely the Ministry of Industry and the National Oil Corporation (NOC), respectively.

2.3.4.1 Manufacturing sector

The Libyan Government undertook several decisions to encourage investment in the manufacturing sector, such as Laws No. 5/1996, 6/2007 and 9/2010, issued to support foreign and local investors (SGPC, 1996, 2007, 2010). The government also issued several decisions related to supporting private investors generally, such as Act No. 9/1992, Act No. 198/2000 and Act No. 107/2005 (SGPC). In this regard, the Libyan government encourages investment in the industrial sector, with its logistical advantages as a gateway between Africa and Europe and cheap natural resources (i.e. petrol-based raw materials) and energy (PIB, 2012).

However, the privatization process in Libya led to the PIB revising formerly state-owned companies to estimate their future cash flow, because the Libyan government issued several decisions to reform and re-evaluate state-owned companies. Indeed, the Libyan state has an ongoing stake in privatized industries, having invested approximately 23 BLD in different investment sectors, with 42% of funds (9.7 BLD) allocated to the industrial sector (see figure 2.1). This investment is divided into three types: local, joint and foreign investments. Based on the most recent data (PIB, 2011), 84.7% of investment projects were implemented as of 2011.

Consequently, the investment process in Libyan industry relied on the development plans during the period 1973-1985, where there were a number of small, medium and large-sized industrial projects, which had a significant impact on the Libyan economy during that period.

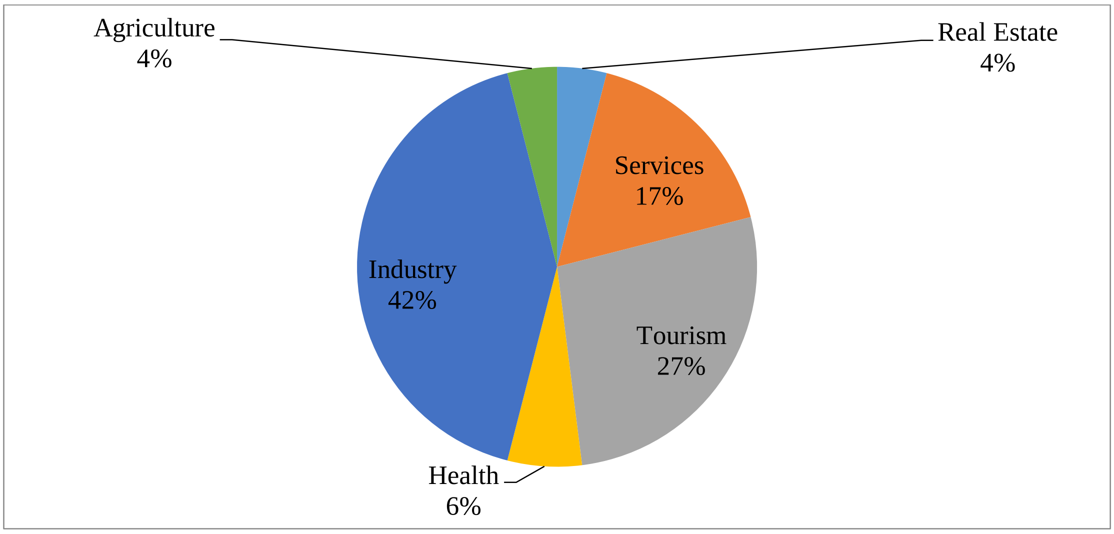


Figure 2.1: Projects that entered operation & under execution according to the area

Source: Adopted from Privatization and Investment board (2011/2012)

The economic changes that occurred during the Gaddafi Regime can be summarized in the following four stages:

1969-1977: This period was marked by some political and economic stability, with a conventional economic model widely prevalent among post-colonial states at that time.

1978-1985: During this period, the government nationalized private sector companies, abolished private property and espoused an overtly socialist system.

1986-2002: During this period the US and UN imposed economic sanctions on Libya when it was indicted for terrorist attacks in Rome and Vienna airports in December 1985. The sanctions in 1986 were based on the International Emergency Economic Powers Act and the International Security and Development Cooperation Act of 1985 (EL-Sharif, 2005, p.50).

2003-Feb 2011: In mid-September 2003, economic sanctions were lifted by the UN Security Council. This period was characterized by the support of the private sector and the privatization of state-owned companies, whereby the Libyan economy shifted from a planned to a market economy.

During and after the abolition of the UN-imposed sanctions, the Libyan Government sought to improve relations with Western countries and undertook a series of economic liberalization reforms. Subsequently, the privatization foundation was established in 2001 (SGPC, 2001). In 2003, this institution was renamed the Privatization and Investment Board (PIB) as described previously, which is responsible for transforming the ownership of public sector units to the private sector. Subsequently, the SGPC issued resolution No. 313/2003 related to restructuring state-owned companies (SGPC, 2003). The privatization programme for state-owned businesses was as follows:

- The position of 360 public economic firms, including 204 manufacturing units, are considered to be private companies, with total assets incorporated into the private sector of about 8 BLD with more than 100,000 employees (Masoud, 2009).
- The privatization program was to be implemented within five years, but was subsequently extended until 2015 (SGPC, 2005).

In the transfer to a market economy, manufacturing firms were segmented into two groups: subsidiaries of the Ministry of Industry and others affiliated with the PIB. However, the PIB

(2011/2012) stated that only 97 manufacturing units successfully transferred to the private sector (see table 2.7).

Table 2.7: Privatized firms until 2011

No	Area of Privatized firms	No. of units
1	Food industries	20
2	Metal, engineering and electrical industries	22
3	Animal and marine production	18
4	Chemical industries	13
5	Leather industries	7
6	Spinning and weaving	5
7	Furniture industry	6
8	Building materials industry	5
9	Paper industry	1
	Total	97

*Adopted from the PIB Report (2011/2012)

In each of the three governments established by the GNC, the Ministry of Industry had a place. It is universally acknowledged within Libya, and internationally, that Libyan industry has suffered from decades of neglect due to political and economic instability, which resulted in several economic studies suggesting the liberalization of the economy never came to fruition (Abusneina, 1992). No serious privatization was implemented until 2003; this was largely attributable to the personal control of Colonel Gaddafi over the key economic decisions in the state.

Currently, the Ministry of Industry supervises and manages most manufacturing companies, whether affiliated with the Ministry or other public institutions such as the PIB. The number of industrial companies operating in the public and private sector in Libya is about 620. The role of the Ministry of Industry is to monitor companies supervised by 64 industrial headquarters distributed throughout Libya, employing approximately 74230 citizens and foreigners (Ministry of Industry, 2014). Table 2.8 illustrates more information about the Libyan industrial companies and their institutional affiliation.

Table 2.8: The Libyan industrial companies and their supervision

No	The companies and their supervisory bodies	No. of companies	No. of employees
1	Companies supervised by the Ministry of Industry*	9	9250
2	Companies supervised by the Economic and Social Development Fund*	17	6000
3	Companies supervised by the Libyan Fund for Development & Internal Investment	2	100
4	Companies supervised by the National Investment Firm	2	4000
5	The industrial enterprises affiliated with the Ministry of Health	1	500
6	Companies supervised by the PIB (public companies required for privatization)*	16	3330
7	Participating companies	4	1500
8	Companies supervised by the Ministry of Economy	2	300
9	Privatized companies & private factories whose capital exceeds 5 MLD*	200	25000
10	Companies supervised by the oil sector (5 oil refineries +2 petrochemical factories)*	7	10000
11	Factories implemented in accordance with the laws of investment 5, 6, 7	56	5730
12	Factories funded by the Development Bank	117	1550
13	Factories funded by the Agricultural Bank	175	170
14	Factories and companies implemented in the free zone	12	6800
	Total =	620	74230

Source: Adapted from Ministry of Industry (2014)
* Privatized companies (90 companies) are the state-owned companies transferred to the private companies (PIB, 2011/2012). * Manufacturing and oil companies related to the population and sample of the study.

In summary, investment in the manufacturing sector remains limited and more attention should be paid by the Libyan government. Critical action in this regard necessitates further studies on the methods used to estimate cash flow resulting from investment projects in industrial sector.

2.3.4.2 Oil sector

The oil sector is the most important source of wealth in Libya, as it is the main constituent of economic growth and employment, and thus, of social and political stability (Ayad, 2001; El-sharif, 2005). Management of the oil sector by the NOC was originally instituted under Act No. 24/1970, where the NOC is responsible for the exploration and production operations. In a similar way, the LGPC issued Resolution No. 10/1979 authorizing the NOC to implement Development Plans relating to oil exploration and production (LGPC, 1979). In carrying out oil operations, the NOC was also allowed to enter exploration and production sharing agreements with other companies. Subsequently, oil exploration and production operations were carried out by companies affiliated to NOC.

The critical lost years for Libya, run from the mid-1970s to the mid-1980s. In 1973, “Libya's growth in oil production had taken the country into fourth place among the Middle East and North African producers” (El-Sharif, 2005, p.62). In this regard, the oil production had reached

3.3 million barrels per day in 1970 and then dropped to 1.48 million barrels in 1975, and by the 1980s the average was only 1.1 million per day due to the OPEC intervention in determining Libya's share in oil production. The Libyan oil production is approximately of the same quantity as the 1980s levels (Ibid).

As mentioned above, oil revenues are considered the main engine of the Libyan economy, and the Development Plans were dependent on this resource. Table 2.9 illustrates oil revenues in Libya segmented into two stages: 1963-1979 and 1998-2012. Revenues vary considerably from year to year due to changes in oil prices, which reached more than $100/barrel during 2008-2012, but which were less than $30/barrel in the 1980s and 1990s. Hence, El-Sharif (2005) indicated that the Libyan economy is dependent on the oil prices.

Table 2.9: Oil revenues in Libya during 1965-1979 and 1998-2012

Stage 1	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	**Total**
Million LD	125.40	186.70	223.30	357.80	419.70	482.60	593.70	514.00	663.60	1776.00	1510.30	2220.40	2620.00	2486.80	3848.70	18029.00
Stage 2	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	**Total**
Million LD	2551.00	3444.40	2203.00	3603.00	6551.00	3929.00	19956.00	34378.00	43566.00	48638.30	64417.00	35347.00	55713.00	15830.10	66932.30	407059.10

Sources: Lawless and Findlay (1984, p.240); Central Bank of Libya, Economic Bulletin, various issues; Zoubi, (2011, p.30)

The companies affiliated to the NOC vary in accordance with the nature of the activity and the type of participation and ownership (NOC, 2016), as shown in the table 2.10.

Table 2.10: Companies supervised by NOC

No	Fully state-owned companies:	No	EPSA companies (followed):
1	Sirte Oil Co*.	3	India oil Co.
2	Arabian Gulf Oil Co.	4	Total E&P Co.
3	Ras Lanuf Oil and Gas Processing Co.	5	Petro Canada Co.
4	Zawia Oil Refining Co.	6	Polish Oil and Gas Co.
5	Brega Petroleum Marketing Co.	7	OMV Co.
6	National Oil Wells Drilling and Work over Co.	8	OXY Co .
7	Jowfe Oil Technology Co.	9	Exxon Mobil Co.
8	National Oil Fields and Terminals Catering Co	10	ONGC Limited Co.
9	North Africa Geophysical Exploration Co.	11	BP Exploration Libya Limited Co.
10	Taknia Libya Engineering Co.	12	STATOIL Co.
11	Petro Air Co.	13	Gazprom Co.
No	Joint Ventures:	14	Repsol-Murzuq Co.
1	Zueitina Oil Co.	15	Petrobras Co.
2	WAHA Oil Co.	16	Chevron Libya LTD Co.
3	Mabruk Oil Operation Co.	17	Shell Co
4	Harouge Oil Operation Co.	18	RWE Co
5	Akakus Oil Operation Co.	19	Sonatrach Co
6	Nafusah Oil Operation Co.	20	Turkish Petroleum Corporation
7	Mellita Oil and Gas Co.	21	Medco Energy Co
No	EPSA* Companies:	22	Tatneft Co
1	Eni North Africa Co.	23	Wintershall AG Co (Franchise)
2	Amerada Hess Co.		

* EPSA: Exploration and production sharing agreements. * Co: company.
Source: http://noc.ly/index.php/ar/companies.

However, the NOC has substantial interest in decisions concerning investments in new projects or the development of existing ones. These projects are carried out by affiliated companies, as reflected in the management interests in such strategic decisions using extensive feasibility studies that should be undertaken before implementation. Accordingly, several plans have been implemented to develop the oil projects, most of which were delayed because of the circumstances affecting the oil industry and the limitation of financial resources in Libya. Indeed, there was no possibility of importing petroleum technology into the Libyan oil sector, from 1986-2003. Therefore, management faced some difficulties in terms of estimating the potential cash flow from these projects, even though they may have been feasible from a purely economic perspective.

However, the myriad factors used as criteria for evaluating oil projects are important as the basis for making decisions, and CFF is a key determinant of preference when judging between oil investment projects. Therefore, the framework for identifying the factors associated with the cash flow forecasting process helps in determining the optimal portfolio of investment opportunities in the oil sector. As a result, oil, gas and petrochemical companies in Libya depend on feasibility studies in order to forecast future cash flow generated by investment projects, most of which are undertaken by foreign consultants (Franlap, 1997; Brown & Root, 1984; Linsley & Fotouh, 1979).

2.4 An overview of accounting in Libya

The roots of Libyan accountancy are to be found in the Ottoman Empire (1551-1911), which was noted for efficient bureaucratic innovations during its early period (e.g. the use of paper documents). Initial public financial accounting was undertaken to collect *Zakat al-Mal* (Islamic charitable tax on assets) from Libya that was then transferred to the central government in Istanbul for disbursal to the needy (Buzied, 1998). There was no consideration of cost and management accounting in this enterprise because of the absence of industrialisation during the early modern period. As in the rest of the Mediterranean world, Libyan life remained relatively unchanged since Roman times, with an agricultural and craft-based economy, and limited mining activities (Higgins, 1968).

During the period of Italian colonisation (1911-1951) the Italian regime planted settler colonies in Libya as part of various investment projects which had been allocated over 10 billion Italian Lira. In considering the Italian period, it should be noted that although some of these developments were later beneficial for the country, they were obviously implemented for the benefit of the colonisers rather than the indigenous Libyans, who were systematically oppressed and denied human rights in their native land (Ghanem, 1982).

Italian settlers modernised the agricultural system in many ways, creating large farms that played a major role in the establishment of industrial projects based on farming schemes. According to El-Mehdawi (1981, p.109), in 1938, 789 manufacturing firms were established in Libya, the majority of which were controlled by Italian settlers. Moreover, the Italian colonisers played a significant role in establishing Italian banks in Libya. According to Kilani (1988, p.85), the first Italian bank established in Libya was "the Bank of Roma, which was opened to help Italian settlers to finance their businesses". Subsequently, the Italian colonial authorities implemented Italian legislation wholesale in Libya, which included Italian tax laws, and Libya was considered a part of Italy itself under the 'Fourth Shore' imperialist ideology (Ghanem, 1982). Italian accountants were brought to work on Italian projects operating in Libya, which played an important role in spreading European financial accounting. Therefore, the two main catalysts for the modernization of accounting in Libya were the application of the Italian accounting profession and the Italian Tax Law of 1923. Consequently, accounting during Italian colonisation was more developed and efficient than under the preceding Ottoman administration (Buzied, 1998).

Following independence from Italy, the next evolution of accounting in Libya occurred between 1951 and 1977, spanning the period of the discovery of oil in 1959, the Kingdom (1951-1969) and the early Gaddafi Regime. The Kingdom of Libya witnessed two distinct economic periods: 1951-1959 and 1960-1969. During the former Libya was one of the poorest countries in the world and dependent on UN aid, particularly from the US and the UK. During the latter, the country became rapidly wealthy (Kilani, 1988). Moreover, Libya had good diplomatic relations both regionally and internationally, and foreign firms (including banks) invested heavily in the country, which stimulated the development of financial accounting.

Conversely, the Gaddafi Regime was characterized by political and economic fluctuations which had a significant effect on the evolution of accounting. The Gaddafi Regime can be segmented into three stages: the development of accounting during 1969-1977, 1978-1997 and from 1998 to 2011. In the early post-revolutionary years (1969-1977), the government expanded the public sector and nationalized foreign companies. This prevented further foreign investment and the same accounting practices inherited from previous regimes were implemented.

The second period (1978-1997) witnessed "the establishment of public sector enterprises and the rapid disappearance of the private sector" (Kilani 1988, p.91). During this period, large industrial projects were established to implement the Development Plans by collaborating with multinational companies, which supported the Libyan projects. This procedure had a significant impact on the development of accounting in Libya and the Ministry of the Treasury imposed specific regulations related to government accounting in the public sector. Hence, the application of cost accounting systems in the Libyan industrial enterprises by multinational companies had a substantial impact on the development of accounting. Furthermore, the State Accounting Bureau (SAB) is an independent body responsible "for auditing the government and corporate accounts and for programming the accounting systems" (Buzied, 1998, p.149). Although there were existing commercial and financial laws related to organizing accounting regulations in Libyan corporations, Libyan law did not adequately provide for accounting procedures, principles and standards. Accountants in Libya conventionally applied the Generally Accepted Accounting Principles (GAAP) inherited from foreign companies operating in Libya. Bouzid (1998. P.126) divided the factors contributing to the evolution of accounting in Libya into external and internal groups:

- External factors: the effect of colonisation, aid agencies and multinational corporations.
- Internal factors: laws and taxation system, accounting education and profession as well as economic, political and cultural settings.

The third period from 1998 to 2010 had a number of political changes, which occurred after economic sanctions on Libya were revoked. As mentioned in the previous section, political changes led to significant changes in the Libyan economy, whereby the state privatized most public companies (360 economic units, of which 110 units had been processed as of 2010) and authorized the private sector to manage former state institutions. Additionally, chartered accountants who were authorized to assess the public companies transferred to the private sector. They used different methods to evaluate companies' assets, including discounted cash flow methods, but most privatized companies were appraised by using the historical cost approach (PIB, 2011/2012). In order to understand the extent of development in accounting in the last era of Gaddafi's Government, the State Accounting Bureau (SAB) authorized chartered accountants to audit the financial statements of state-owned companies. Moreover, the Libyan government reduced the role of the public sector, while the private sector was authorized to manage and operate several public hospitals and hotels. Consequently, the economic changes that occurred after 1998 had a significant effect on the evolution of accounting.

In terms of the accounting profession in Libya, the first regulation introduced was Law No. 116 of 1973, which allowed the accountants and auditors to improve professionally and academically. The Libyan Accountants and Auditors Association (LAAA) was established under this law (RCC, 1973). Buzied (1998, p.163) showed that the LAAA had a limited role in developing the accounting system in Libya and he found that "Libyan professional accountants have no role in developing accounting standards". The LAAA did not enforce any regulations related to practitioners' ethics even though the income tax Law and commercial code had major effects on accounting practices in Libya (El-Sharif, 1981). Most of the companies listed on the Libyan stock market have documented their financial statements based on tax law and financial regulations, and the preparation of financial reports has to comply with the GAAP (Faraj and

El-Firjani, 2014). Accordingly, the accounting profession in Libya has failed to create local accounting standards such as GAAP/GAAS.

However, IASs/IFRS are difficult to implement in the Libyan business environment, and face the following challenges and obstacles (Faraj and El-Firjani, 2014; Laga, 2013). Firstly, most Libyan accountants have not got the necessary experience and ability to apply IASs/IFRS in their accounting systems. Secondly, Libyan universities have not offered courses/programs related to the application of IASs/IFRS. Thirdly, the LAAA and Libyan organizations do not offer training programmes to professional accountants/accountants who would be applying the IASs/IFRS. Fourthly, Libyan accountants face difficulties in improving their existing accounting systems and in suggesting practical frameworks to deal with economic and social development. Fifthly, cultural and social factors impede the application of IASs/IFRS. Finally, corporate governance in Libya is essentially non-existent.

On the other hand, proponents of the application of IASs/IFRS in the Libyan environment maintain that appropriate accounting information is a mandatory requirement for economic development. Adopting IASs/IFRS may lead to the development of capital markets, reinforce the confidence of investors and reduce the risk of uncertainty (Almashat and Abuzeid, 2014). This is consistent with the work of Moulin and Solomon (1989) and Collins (1989).

As discussed above, financial and investment regulations are considered the primary factor affecting accounting practices in Libya. The Libyan commercial code issued in 1953 and its amendments, determined articles 586, 590, 593, 594 that indicate capital investment areas, where an organization can increase or decrease its capital. However, this law does not refer to the procedures and methods used in capital budgeting processes.

In Libya, the private sector and local individuals were permitted to practice their businesses under law No. 9 of 1992. In the late 1990s, the Libyan government applied a number of procedures to promote local and foreign investment. Law No. 5 of 1996 (amended by Law No. 7 of 2003) concentrates on encouraging investment of foreign capitals (SGPC, 1996). According to this law, large projects in the manufacturing sector were offered to foreign investors in order to obtain capital and technology. The Libyan government (LGOV) recommended to implement these projects through the foreign-private partnership route. In line with this, LGOV issued Law no. 6, 2007 to encourage national capital investment (SGPC, 2007).

Subsequently, the latest investment decision issued by LGOV was Law No. 9 of 2010 related to “investment promotion” (SGPC, 2010). This law contains many rules/instructions/directives relating to investment decisions. For example, capital invested in production and service areas can be implemented in cases of national, foreign, or joint venture capital (Article No. 2 and 8). Moreover, Article 6 refers to the authority responsible for the Law’s application. This article is divided into three stages or steps. Firstly, the administrative authority should identify available investment opportunities and present a comprehensive investment plan. Secondly, the authority is responsible for providing a feasibility study of the investment project, which should involve financial and economic constraints on the implementation of the investment project. Thirdly, the information of feasibility studies should be disclosed in order to identify the extent of their contribution to the country’s economic development.

Apparently, the procedures as mentioned in the investment Law No. 9 of 2010 (Article 6) are similar to the stages of the CB process. In this regard, the first procedure refers to the identification of investment opportunities. The second one is related to the appraisal process, including the cash flow estimates and the criteria used in the selection of investment projects. The purpose of the final procedure is to measure the effectiveness of investment projects. The Libyan investment law does not identify the appraisal techniques used in evaluating investment projects, and this is left to the authority responsible for appraising the investment project. Considering this, the World Bank has asked the Libyan government to “develop guidelines on the standards, methods and procedures involved in preparing and appraising investment projects, for public investment programming” (Schiavo-Campo et al., 2014, p.6).

2.5 The diffusion of management accounting practices in Libya

As discussed previously, accounting practices in Libya developed from Italian fiscal legislation and practices, and the accounting systems of multinational corporations, particularly after the influx of foreign investment following the discovery of oil in Libya. Moreover, the establishment of massive enterprises, which are enabled by collaborating with multinational companies in the manufacturing and oil sectors, had a central role in the diffusion of MAPs, especially cost accounting (Bouzid, 1998; Leftesi, 2008). In this regard, four key works have explored management accounting practices (MAPs) in Libya.

Alkizza (2006) examined the changes in MAPs identified in terms of the modification of existing systems and the application of new management accounting systems. During the 1990s, the researcher's view relied on "the major changes in the Libyan economy from a centrally planned to a market-based system" (Alkizza, 2006, p.46). The researcher also distributed a questionnaire survey to 79 Libyan companies in different industries (Ibid). Also, the application of MA systems in two Libyan companies was investigated as case studies. Factor analysis and descriptive statistical methods were used in analysing the data. Moreover, this study tested four hypotheses. Firstly, the extent of use of management accounting systems as a whole, and the different types of firms surveyed were tested in the first and second hypotheses, respectively. Secondly, hypothesis three stated that the change in MAPs is affected by internal and external contingent factors related to the business environment. Finally, the effect of the business environment on Libyan firms' performance in relation to the extent of changes in MAPs was tested by hypothesis four. With regard to internal and external contingent factors, the researcher investigated the effect of "change in the firm's strategic goals, firm size, industry type, competition and the change in state regulations" on the change in MAPs (Alkizza, 2006, p.108). Subsequently, the results from this study found increased growth in the usage of MAPs in Libyan firms. There was also a significant correlation between the change in MAPs and effects from several factors related to the business environment, such as new state legislation, competition, and the need for more accounting information. Moreover, Alkizza's study demonstrated that local and foreign investors play an important role in the rapid diffusion of MAPs, such as cost accounting systems and investment appraisal techniques.

Leftesi (2008) explored the extent of use of Western MAPs and examined the factors affecting and impeding their diffusion in Libyan manufacturing companies. The researcher conceptualized the change of the Libyan economy from a planned economy to an open market as a response to the change in MAPs. In this respect, an institutional perspective was used to design the research framework, assuming the change in accounting practices was based on the underlying change in the Libyan economic system. Subsequently, the factors affecting the development and change of MAPs in Libyan manufacturing companies were investigated. A questionnaire survey of 81 Libyan manufacturing companies and ten interviews were used to collect data. Factor analysis, statistical methods and multi-regression analysis were used for analysis.

Leftesi's study (2008) found that the diffusion of MAPs in Libyan manufacturing companies was significantly affected by the availability of resources, top management support and company size. Environmental uncertainty and market competition had no impact on the diffusion of MAPs in Libyan manufacturing companies. Accordingly, the diffusion of Western accounting practices in Libya can be linked to two key factors – foreign companies, especially oil companies operating in Libya, and the Libyan accounting education system (Ibid).

Subsequently, the development of accounting practices in Libya derives from the dependence on teaching from Western textbooks, Libyan students studying abroad, and foreign accountants working in the Libyan oil sector and other multinational companies (Bait-El-Mal et al., 1973; Buzied, 1998; Mahmud, 1997; Mahmud and Russell, 2003; Saleh, 2001).

However, both Leftesi (2008) and Alkizza (2006) found that the application of management accounting systems in Libya was less common than in other developed countries. They also found that Libyan industrial companies focused on the use of budgeting and traditional cost systems, whereas performance evaluation, activity-based costing (ABC) and balanced scorecards (BSC) were less familiar. Moreover, their findings indicate that "the adoption of advanced MAPs in Libyan manufacturing companies" receives less attention than those in developed countries (Leftesi, 2008, p.201).

Abugalia (2011) investigated the extent of use of MA systems in Libyan firms. This study employed contingency theory to test the relationship between contingent factors and MAPs in Libyan companies and examined the influence of this relationship on Libyan companies' organizational performance. The researcher used questionnaires and interviews to collect data, and regression and factor analyses were used. Abugalia's study (2011) revealed that the uses of MA systems in Libya, such as cost accounting, budgeting and performance systems, are of less interest than in developed countries (e.g. the US, UK and Australia). Additionally, Abugalia (2011) found that contingency variables such as strategic policies, formalization, environmental diversity, firm size and ownership, have a significant association with MAPs. In support of this, findings from the ten interviews indicated that the contingent variables are related to MAPs.

However, this study stated that a number of Libyan companies did not adopt the MA systems due to a “lack of knowledge about MA, shortage of financial resources, the company being newly established, the lack of top management support, absence of the culture of using MAPs and fear of change” (Ibid, p.1). Over the last two decades, management accounting studies were of less interest in developing countries, whereas financial accounting research was favoured (Abugalia, 2011).

Finally, Zoubi (2011) explored the processes of changes in management accounting and managers' perceptions of new management accounting systems in two Libyan privatized manufacturing companies. This study examined the influence of institutional factors on management accounting systems. Interviews, observations and documentation were used to collect data. Moreover, this study showed that the goal of privatized manufacturing companies had completely changed from social to economic imperatives in response to privatization processes. However, findings from the case studies found that institutional factors had a significant impact on management accounting practices both before and after privatization (Ibid). Furthermore, the results also showed that there was no update or development of management accounting systems, and that the use of information technology (IT) in MA systems was resisted by Libyan companies. On the other hand, “the companies faced several serious problems in many areas, before and after privatization, which included lack of liquidity, foreign competition, high costs of labour and other problems related to the production process” (Zoubi, 2011, p.255).

Table 2.11 summarises the main findings of these studies. In the near future, budgeting and cost accounting systems, cost-volume-profit analysis and performance evaluation are expected to receive more attention in the Libyan business environment (Abugalia, 2011; Alkizza, 2006; Leftesi, 2008; Zoubi, 2011). Based on this analysis, there are four main aspects related to the diffusion of MAPs in Libya:

- The development of MAPs in Libya derives from Western countries (who have historically been the main international investors in Libya and who will likely continue to be so in the coming years).
- The role of multinational corporations in the diffusion of management accounting techniques after the discovery of oil in Libya has been an important factor in the diffusion of MAPs.

- The establishment of massive industrial projects in collaboration with foreign companies is a crucial factor in the application of management accounting systems in the Libyan market, particularly cost accounting and budgeting systems.
- The role of Libyan universities in teaching management accounting is an essential factor in the diffusion of MAPs.

Table 2.11: Previous studies related to MAPs in Libya

Independent and mediating variables	Dependent OR outcome variables	Method	Sample
Alkizza (2006) [contingency theory]			
Internal business environment: 1. Poor financial performance 2. New information needed 3. Change in the company's strategic goals (competitive strategy) 4. Dissatisfaction with existing systems 5. Size, sector and industry type 6. Technology 7. Knowledge and observability *External environmental variables:* 1. Change in state regulations 2. Increasing competition *Mediating variables:* management accounting change: 1. New practices 2. Modification of existing practices	*Outcome variable:* Consequences of management accounting change: 1. Better financial performance 2. Cost reduction 3. More roles for accountants	Questionnaire and case study (two Libyan companies)	79 Libyan firms
Leftesi (2008) [institutional theory]			
1. Availability of resources, training and top management support 2. Firm size 3. Differentiation 4. Formalization and centralization 5. Business strategy 6. Environmental uncertainty 7. Market competition 8. Use of consultants 9. Knowledge resources	Impact on the adoption rate of MAPs [diffusion of MAPs in Libyan Transitional Economy]	Questionnaire and interview	81 large- and medium-sized Libyan manufacturing companies, 10 interviews
Abugalia (2011) [contingency theory]			
1. External environment impacts (dynamism, heterogeneity and hostility) 2. Business strategy 3. Organization structure (formalization and centralization impacts) 4. Manufacturing technology 5. Characteristics of organization (age, size, ownership and main products) *Mediating variable:* MAPs	Organizational performance	Questionnaire and interview	123 Libyan companies, 10 interviews

Table 2.11**: (continued)**

Zoubi (2011) [institutional theory]			
1. Institutional factors (coercive, mimetic and normative isomorphism) 2. Organizational structure 3. Technology used in production and administration 4. New management applications (TQM) 5. MA systems and practices	The processes of management accounting change within the organizational context after privatization	Case study with triangulation of data collection methods (interviews, observation and documentation)	Two privatized Libyan manufacturing companies

2.6 The applications of capital budgeting processes in Libya

The legacy budgeting system authorised by SAB (formerly the Secretariat of the People's Control) is divided into two main sections: administrative and development budgets. The administrative budget relates to operating activities including revenues and ministry expenses, while the development budget is associated with investment expenditures throughout the Libyan public sector, such as manufacturing and oil, and traditionally implemented in three or five-year plans. In this regard, Libyan companies are required to use compulsory forms of control for future expenditures, including the operating and investment activities of Libyan companies (GNC, 2013). In addition, most banking facilities in Libya depend on the feasibility studies submitted by investors in order to finance their investment projects (as per the regulations of the Central Bank of Libya), which specify the type and size of investment, and the required budget to finance these projects. Similarly, the feasibility study details the procedures and methods used in appraising the investment projects.

This part of the study focuses on the extent of diffusion of the CB processes in Libyan manufacturing and oil firms. Judging from available literature, CB research in Libya is of less interest than other accounting research, and only five studies were found related to CB (Alhouderi, 1997; Alwakil, 2000; Alsharif, 2004; Eloubeidi 1993; Mohammed, 2013).

Mohammed (2013) examined the extent to which the capital investment appraisal process is used in Libyan companies by posing four questions to them on the methods and procedures used in appraising investment projects. One question addressed risk assessment in capital investment decisions, while another focused on the capital rationing problem in CB, where managers have limited funds to successfully implement all investment opportunities. The study also explored the availability of applying Islamic finance in CB decisions. In line with the CBP, the capital investment appraisal process in Libyan companies was also investigated.

Mohammed's study (2013) used mixed methods to collect data, including 20 interviews and 45 questionnaires, with a sample that included service, manufacturing, food, financial and oil firms. The study was based upon new institutional and post-colonial theories to interpret the investment appraisal process. Firstly, institutional theory is used to recognize the institutional factors affecting capital investment decisions. These factors are identified in terms of the impact of Libyan government policies, educational and professional organizations and financiers on the investment appraisal process (Mohammed, 2013). Secondly, post-colonial theory explores the influence of educational systems in Western countries, international accounting standards, and multinational and foreign accounting bodies on the investment appraisal process in Libya (Ibid).

Mohammed's study found that Libyan government policies, development plans and manpower skills are perceived to be more important than financial factors. The payback period method is also commonly used in Libyan companies, whereas discounted cash flow (DCF) techniques are of less interest than in developed countries. In this regard, the source of funding, and the size and nature of investment projects are significant factors affecting the selection of investment appraisal techniques. The process of making capital investment decisions in Libya is implemented through five stages: "determination of budget, research and development, evaluation, authorisation and monitoring and controlling" (Mohammed, 2013, p.xv). Moreover, 67% of Libyan companies considered the use of Islamic financial products to be the appropriate financing source "to finance their future projects" (Ibid, p.xvi).

Alwakil (2000) sought to explore the procedures and methods used in CB, which is a tool for planning, control and performance improvement. To collect data, the researcher distributed a questionnaire to 43 firms operating in commercial, industrial, agricultural and service sectors. It was found that 74% of Libyan companies used the PB method, followed by ARR (35%), PI (26%) and NPV (14%), while 5% of Libyan companies utilized the IRR in CB decisions. Moreover, 63% of Libyan companies used subjective assessment in addressing risk in CB decisions.

Eloubeidi (1993) and Alhouderi (1997) surveyed the techniques used in the preparation of capital budgets and determined the impact of monitoring procedures on capital expenditure in the Libyan companies. The findings from these studies indicated that most Libyan companies applied traditional methods in their capital budgets. On the other hand, the main difference between the two studies was in their different samples, where Eloubeidi (1993) examined Libyan manufacturing firms, while Alhouderi (1997) investigated national companies operating in the transportation sector. In terms of similarity, both studies used questionnaires as their data collection method.

Eloubeidi (1993) found that 26.4% of manufacturing firms used objective methods: 21.1% used DCF methods (NPV, IRR and PI), and 5.3% used the PB method. Both Eloubeidi (1993) and Alhouderi (1997) indicated that the Libyan firms did not utilize objective methods to assess risk in their capital budgeting process. Furthermore, neither Alhouderi (1997) nor Eloubeidi (1993) referred to appropriate quantitative methods that can be used in the evaluation of, and comparison between investment alternatives. They only mention that Libyan companies did not apply scientific methods to evaluate investment alternatives.

Finally, Alsharif (2004) used the dynamic programming technique to prepare the CB for capital rationing; the researcher selected Ras Lanuf Oil and Gas Processing Company as a case study, which as a company application gives much importance to investments. The findings of this study are summarized as follows (Ibid):

- The mathematical model applied only addressed factors that can be quantified, while qualitative factors were subjectively judged by official management.
- The application of the mathematical model is based upon a deterministic approach. However, stochastic dynamic programming models may be constructed with deterministic and random variables (Bellman and Dreyfus, 1962; Denardo, 1975).
- With regard to feasibility studies for oil and petrochemical investment projects, the Ras Lanuf Company used linear programming to determine the optimal production selection and estimate cash flow generated by the investment projects.
- The results obtained from the application of a dynamic programming model in Ras Lanuf Oil and Gas Processing Company's investment projects, produces an optimal plan for

investment alternatives that achieve the maximum possible return within the constraints of having limited available funds.

Table 2.12 summarizes the studies related to capital budgeting practices in Libya.

Table 2.12: Previous studies related to the use of investment appraisal techniques in Libya

Study	Data collection method	Sample size	Research findings				
			PB	ARR	NPV	IRR	PI
Mohammed (2013) (PhD)**	Interview and questionnaire	45 manufacturing firms & 10 Interviews	98% (1)	69% (6)*	80% (4)	73% (3)	56% (2)
AlWakil (2000) (Master)	Questionnaire	43 firms operating in four sectors	74%	35%	14%	5%	26%
Eloubeidi (1993) (Master)	Questionnaire	24 firms	5.3%	NA	10.5%	5.3%	5.3%
Alsharif (2004) (Master)	Case study	Ras Lanuf Oil and Gas Processing Company	1- Ras Lanuf Company used linear programming to evaluate investment projects. 2- Dynamic programming model, suggested by the researcher, is used to determine the optimal plan for investment alternatives within limited available funds.				

* MIRR: modified internal rate of return ranked in number (5);
** Mohammed (2013) applied the institutional theory and post-colonial theories

2.7 Chapter summary.

This chapter details the changes in the Libyan political and economic environment, whereby the discovery of oil was the most important event in expanding the Libyan economy. This discovery had a significant role for the implementation of the social and economic development plans between 1963 and 1985. At the beginning of the 2000s, the Libyan economy transferred to a market-based economy from a socialist one. Consequently, the investment process in the Libyan industry depended on development plans and budgets from the early 1970s and 1990s, when several industrial projects were established. Hence, fluctuations in the implementation of development plans were due to international economic sanctions imposed on Libya between 1986 and 2003. Accordingly, the privatization of public companies was a reflection of economic changes in Libya. From the mid-1990s until 2010, the Libyan Government allowed local and foreign companies to invest in all economic sectors. Similarly, after the revolution of the 17th of February 2011, the National Transitional Council (later the GNC) permitted private ownership and investment in the Libyan market (GNC, 2012). Consequently, the Libyan economy completed its shift from socialism to capitalism.

Accounting practices in Libya are derived from, and continue to be driven by Western models. Leftesi (2008) ascertained that the diffusion of MAPs in Libya is due to foreign companies (especially oil companies) operating in Libya, and the dependence of the Libyan accounting education system on Western textbooks. In terms of the CBP, Mohammed (2013) found that Libyan government policies, Development Plans and staff skills are perceived to be more important factors affecting the capital budgeting processes than financial factors. Additionally, the payback period method is commonly used in Libyan companies, whereas DCF is of less interest than in developed countries (AlWakil, 2000; Mohammed, 2013). In this regard, the source of funding, and the size and nature of investment projects are significant factors affecting the investment appraisal processes in Libya (Mohammed, 2013). Moreover, the accounting profession in Libya depend on the GAAP to prepare the financial reports. The following chapter discusses a literature review in the field of CB that emphasises the role of CFF in CB.

3 CHAPTER THREE: CAPITAL BUDGETING PROCESS (CASH FLOW FORECASTING AND INVESTMENT APPRAISAL TECHNIQUES)

3.1 Introduction

As discussed in the first chapter, investment decisions are vital to a firm's success. This requires the adoption of appropriate scientific methods to plan and control investment expenditures. CB is proposed as the appropriate tool to achieve this purpose.

This chapter explains the CB process and the techniques used in forecasting and CB generally. Firstly, it presents various definitions of CB then determines the stages of the CB process, followed by a detailed description of the appraisal techniques used in CB decisions. Following this, the meaning of forecasting future cash flow is elaborated. Finally, the qualitative and quantitative methods available for use in forecasting are presented.

3.2 An overview of capital budgeting

A budget is essentially a formal plan of action expressed in figures, whereas budgeting is the technique used in preparing budgets. It is one of the most important subjects in management accounting and has therefore, received significant research attention. A management accountant helps to prepare budgets, which allows businesses to plan ahead. A budget is also used as a quantitative plan for exploiting available resources within a specified period. CB is one of the most important developments in budgeting, used in the planning and control of investment expenditures as well as the optimal allocation of limited resources among investment alternatives. In this respect, the philosophy of CB depends on the modern concept of management accounting, whereby the administrative functions of both accounting and management complement each other, and each is a tool to achieve the firm's goals. Accordingly, CB is a management accounting tool for the planning and control of investment expenditures.

Dean (1951) presented the first original contribution in CB, which adopts economic theory as a basis for selecting investment projects in CB decisions using the marginal cost of capital. More recent literature has addressed numerous concepts and methods related to CB. Drury (2000) described CB as a process that includes methods used in appraising investment projects and a way of providing funds for financing these projects. In this regard, the preparation of the CB should take place after the evaluation and selection of investment projects (Ibid). The majority of management accounting textbooks indicate that the term "capital investment appraisal" is often used as a synonym for CB (Drury, 2012; McLaney, 2009). However, the investment appraisal technique is a part of the CB process.

Nevertheless, "there is an endemic conflation of the term 'investment appraisal' and 'CB' throughout the whole literature" (Seward, 2003, p.8). According to Arnold and Hatzopoulos (2000), there is a gap between the theory and practice of CB. Dickerson (1963) identified two types of problems related to CB: the problem of determining the theoretical model used in CB decisions and the problem of how to apply this model in practice. Similarly, Wilkes (1977) referred to three features of investment problems. Firstly, the problems are related to the investment proposals and cash flow generated by these investments. Secondly, the problems are associated with the evaluation and selection of investment projects. Thirdly, the problems are concerned with providing the available funds that need to be allocated in capital budgets.

"Capital" means firms' total tangible and intangible assets (Peterson and Fabozzi, 2002), and the funds that finance these assets. Hence, capital investment decisions involve capital investment projects. A capital project "is a set of assets that are contingent upon one another and are considered together" (Peterson and Fabozzi, 2002, p.3). For example, the purchasing of a new production line depends upon acquiring new facilities, such as land and buildings. However, the CB presents the detailed plans by top management relating to new production lines, production development, machine replacement, and how the funds required in order to implement these plans are provided (Welsch, 1976). Similarly, the US National Association of Accountants defines CB as "a financial plan for spending on new assets and development programs" (National Association of Accountants, 1967, p.29). According to Bierman and Smidt (2007, p.3),

> *"Capital budgeting is a many-sided activity that includes searching for new and more profitable investment proposals, investigating engineering and marketing considerations to predict the consequences of accepting the investment and making an economic analysis to determine the profit potential of each investment proposal".*

In the same way, CB decisions are sometimes referred to as "investment decisions" (Pike and Dobbins, 1986), which are the decisions that include current capital outlays and the revenues resulting from these decisions in the long-term (Drury, 2012). Moreover, CB refers to the procedures and methods used in appraising and selecting the investment projects (Dickerson, 1963). In fact, cash flow forecasting is the most important stage in the capital budgeting process (Turner & Guilding, 2012).

3.3 Capital budgeting process.

The CB process is a set of actions related to the planning and control of investment expenditures. According to Drury (2000, p.518), "the process of CB reconciles the corporate goals of survival and profitability by assuming that the goal of management is to maximize the market value of shareholder". In accountancy and finance literature, the process of CB is divided into four stages: "identification, development, selection and control" (Burns and Walker, 2009, p.79). Firstly, the identification stage refers to investment alternatives initially considered as investment ideas. Secondly, the development stage is the initial evaluation of investment opportunities, which rely on the CFFP and screening phase. Thirdly, the selection stage compares investment opportunities as based upon the evaluation criteria. Finally, the control phase is the post-audit and performance appraisal of investment projects.

Similarly, Pike, Neale and Linsley (2012, p.149) determine five stages of CB process: "determination of the budget, search and development, evaluation, authorization and monitoring and control". The budget is determined by the funds available for financing the investments. The search for investment opportunities such as successful ideas, is based on the projected cash flow resulting from these investments. Next, the evaluation and authorization stage depends on the methods and criteria for measuring the project's profitability, in order to make an optimal decision. Finally, the monitoring and control stage tracks progress of investment projects during the implementation period and compares between the estimated and actual costs. The stages of CB are summarised in table 3.1.

Table 3.1: Stages of capital budgeting

<table>
<tr><th>No</th><th>Burns and Walker (2009, p.82), USA*</th><th>No</th><th>Pike, Neale and Linsley (2012, p.149), UK</th><th>No</th><th>Arnold (2013, p.142), UK</th></tr>
<tr><td rowspan="3">1:

A
B
C

D</td><td rowspan="3">Idea generation (identification stage):
Source of origination
Reasons for idea origination
Process of origination and submission
Time pattern of origination</td><td>1</td><td>Determination of the budget:
The financial sources allocated to spend on investment opportunities</td><td>1</td><td>Generation of ideas</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Search and development:
- What project ideas have emerged?
- What type of project?
- What are the costs and benefits generated? (screening)</td><td>2</td><td>Development of proposals</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Project classification and screening process</td></tr>
<tr><td rowspan="2">2:
A

B
C
D</td><td rowspan="2">Proposal development
Level at which screening takes place
Screening process
Cash flow estimates.
Responsibility for budget preparation</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Evaluation:
-What is the value of the projected costs and benefits?
-What is the target rate of return?
-Does the project's IRR exceed this?
-Does it have a positive NPV?
-How risky is the project?</td><td rowspan="2">4</td><td rowspan="2">Appraisal stage.

The constraints:
- Strategic policy
- Budget (available funds)</td></tr>
<tr><td rowspan="4">3:
A
B
C1
C2
Dl
D2
D3
E1
E2
E3
F
G</td><td rowspan="4">Selection of projects
Classification of projects
Personnel responsible for analysis
Listing techniques used
Reasons for techniques used
Risk recognition
Risk assessment
Risk adjustment
Capital rationing: how extensive?
Capital rationing rationale
Capital rationing methods used
Cost of capital
Project approval</td></tr>
<tr><td>4</td><td>Authorisation and project implementation</td><td rowspan="2">5</td><td rowspan="2">Authorisation and implementation</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Monitoring and control:
5.1: During implementation:
Is the project on schedule?
Will initial costs exceed the budget?
5.2: Ongoing:
Is the project performing to budget?
5.3: Post-auditing:
Is the project performing to initial expectations?
What lessons can we draw to assist future appraisals?</td></tr>
<tr><td>6</td><td>Control and post-completion audit phase</td></tr>
<tr><td>4:

A
B
C
D</td><td>Control (project performance evaluation)
Extent of use of post-audit
Personnel involved/procedure
Performance measurement
Use of evaluation (punishment/reward)</td><td></td><td></td></tr>
</table>

It is evident that the only salient difference between Burns and Walker (2009) and Pike, Neale and Linsley (2012) is that the latter began the first phase in their CB process by determining the size of the available budget for investment, whereas the former did not attend to this. Furthermore, Pike, Neale and Linsley (2012) stated that identification and development are incorporated into one stage, called "search and development".

Similarly, Arnold (2013) suggest the CB process has six stages, beginning with the identification of investment opportunities and ending with control and post-auditing of investment projects. Table 3.1 shows the similarity between the stages of CB process in the

UK and USA. Arnold (2013) and Pike, Neale and Linsley (2012) perceived the CB process to be constrained by the size of available funds.

Apparently, the process of CB decision-making in Libyan companies is similar to the CB process in UK firms as mentioned by Pike, Neale and Linsley (2012), and is divided into five stages: "determination of budget, research and development, evaluation, authorization and monitoring and Post-implementation audit" (Mohammed, 2013, p.212). Clearly most stages of CB must include two main stages: CFF and evaluation of investment alternatives in order to select the best one. Nevertheless, the sequence of stages in CB decision-making is different from one case to another, and some are not essential features of the CB process (Pinches, 1982).

Consequently, most US studies focus on enumerating the methods used in selecting and evaluating the investment projects (Burns and Walker, 2009). In other words, the comparison and preference between investment alternatives is the main objective in the CB process, and there is correspondingly less interest in the CFF phase in CB (Pohlman et al., 1988; Pruitt and Gitman, 1987). Figure 3.1 provides a survey of the studies related to CB stages in the USA.

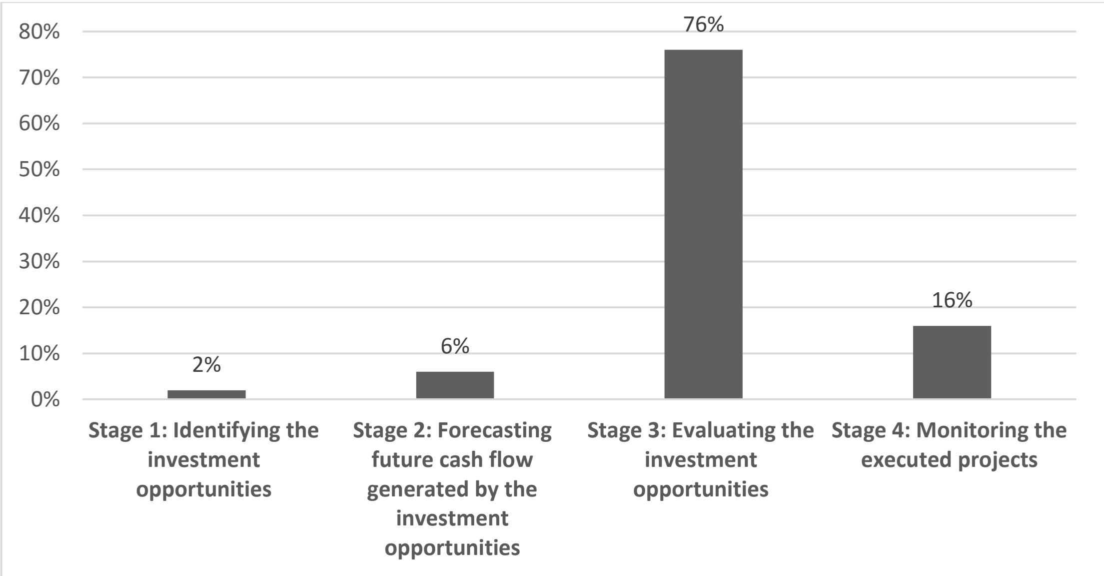


Figure 3.1: Survey of US studies related to the capital budgeting stages

Adapted from Burns and Walker (2009)

The next part of this study concentrates on two important stages of the CB process: forecasting future cash flows generated by investment opportunities and evaluating investment opportunities.

3.4 Capital budgeting techniques (CBT).

The focus of this research is CB, of which three main capital budgeting techniques (CBT) are identified in literature: financial appraisal, risk analysis and operations research techniques (Pike, 1988, 1996).

3.4.1 Financial appraisal techniques

The evaluation and selection stage of the CB process focuses on financial appraisal techniques as one of the CBT. Financial appraisal techniques are used as the criterion for selecting investment projects. In the literature, researchers used five common techniques: payback period (PB), accounting rate of return (ARR), net present value (NPV), internal rate of return (IRR) and profitability index (PI).

3.4.1.1 The payback period (PB)

The payback period (PB) is understood as a period required for recovering the funds invested in a project (Gitman and Zutter, 2012; Peterson and Fabozzi, 2002). The PB method is calculated from the traditional net profits or cash flow generated by the project. In textbooks, the PB model can be formulated in its traditional form, according to the following equation:

$$\textbf{PB period} = \frac{\text{The required investment costs}}{\text{Net annual cash flows}^{*}\text{ of the project}} \qquad \text{Eq. 3.1}$$

*Or net annual profits

The calculation of PB is dependent on the assumption of equal annual cash flow and regularity. Contrastingly, in the case of irregular cash flows, the payback period is calculated by the cumulative method. PB is commonly used by multinational companies for appraising the feasibility of their investments, particularly investment projects with high risk.

Most businesses prefer the PB method because it is simple and practical to implement and focuses on addressing the high risks inherent in investment projects where investors' projects are faced with very competitive market conditions. PB is characterized as a traditional model because it does not account for the time value of money. In addition, PB fails to "recognize the cash flow that occurs after the payback period" (Gitman and Zutter, 2012, p.396) and also ignores the cost of capital. The main drawback is that the PB fails to address the risks "associated with the cash flows" (Peterson and Fabozzi, 2002, p.64).

3.4.1.2 The accounting rate of return (ARR)

This method estimates the rate of return on investment and uses conventional accounting concepts of income and investment to evaluate investment projects. ARR can be calculated using accounting measures for traditional net income:

$$\textbf{ARR} = \frac{\text{The average of annual net profits}}{\text{The initial investment}^{*}} \qquad \text{Eq. 3.2}$$

*Or required investment costs

ARR is easy to calculate and it takes into account the average income over the project's lifespan. Therefore, the calculation of the ARR is dependent on the concept of traditional income. Similar to PB, the ARR method ignores the time value of money and ARR fails to use cash flow to compare between investment opportunities. According to Arnold (2005, p.68), "profit figures are very poor substitutes for cash flow because they frequently fail to show when cash is received and when it flows out". Moreover, ARR fails to highlight optimal investment projects and the variations across the lifespan of an economic project (Arnold and Hatzopoulos, 2000).

3.4.1.3 Net present value (NPV)

This method derives from the concept of the time value of money. The net present value method is the direct application of the concept of present value. The NPV is determined by selecting the desired rate for discounting cash flows and calculating the present value of expected cash flow generated by the investment project and the present value of the required investment costs. In other words, the net present value equals the present value of expected cash flow generated by the project, minus the initial investment costs of a project. The main aim of the NPV method is to maximize the owners' wealth (Drury, 2012). The net present value of expected cash flow can be formulated by the following equation (Gitman and Zutter, 2012; Weston and Brigham, 1993; Arnold, 2013):

$$NPV = \sum_{t=0}^{n} \frac{F_t}{(1+R)^t} - [\, I_0] \qquad \text{Eq. 3.3}$$

Where:
F_t= Net cash flow in year t
n= Number of years that represent the expected economic life of the project
n= 0, 1, 2, 3 ...,t year
R= Cost of capital (discount rate)
I_0= Initial investment costs occurred in the established year 0.
[ ]: Refer to absolute value.

Businesses use the NPV method as a criterion for accepting or rejecting investment opportunities, where the largest positive NPV is conducive to investment. In terms of conflicting investment projects (motley), the project obtaining the greatest net present value is ranked first, followed by the project that achieves the second-largest NPV and so on. As shown in equation 3.3, the initial investment costs of a project occur in the established year (0). As long as the investment costs (I) continue for several years into the future, the present value of these costs should be calculated as follows (Weston and Brigham, 1993):

$$I = \sum_{t=0}^{n} \frac{I_t}{(1+R)^t} \qquad \text{Eq. 3.4}$$

The weaknesses and limitations of using the NPV method in investment appraisal processes can be understood as follows:

- The application of NPV requires adequate knowledge of algebra.
- NPV deals only with absolute values, which does not enable one to identify optimal investment alternatives among different sizes of mutual projects (Arnold, 2013).
- NPV does not calculate the percentage of the present value of cash flows to the initial investment cost of a project, which, in turn, may lead to the selection of the non-optimal investment projects.
- The discount rate used in calculating the NPV may be used over the whole extent of the economic lifecycle of a project. In considering globalised economic changes, the discount rate will change based on economic conditions. Most firms adopt a subjective approach to estimate the discount rate.

3.4.1.4 Internal rate of return (IRR)

IRR makes the present value of expected net cash flows of an investment equal to the current value of the initial investment costs for the project. In other words, IRR is the interest rate that makes the net present value of the investment equal to zero (Arnold, 2013). The aim of this method is to maximize the owners' wealth during the productive life of the investment project. In literature, the IRR is calculated based on the following steps: estimating net annual cash flows during the productive life of the project, determining the initial investment costs and calculating the "IRR" rate that makes the net present value of the project equal to zero:

$$\sum_{t=0}^{n} \frac{F_t}{(1+\mathrm{IRR})^t} - [\, I_0 \,] = 0 \qquad \text{Eq. 3.5}$$

IRR takes into account the time value of money and maximises shareholders' wealth. This method is criticised by researchers for the following reasons:

- IRR method uses a trial and error approach.
- IRR requires time and effort to understand unequal cash flows, and requires effective use of advanced algebra and Excel database/functions.
- In the case of mutually exclusive projects, IRR may not lead to identifying optimal projects that maximize shareholder wealth (Peterson and Fabozzi, 2002, p.93).
- IRR does not compare the size of an investment with the sizes of other investment projects (Cooper et al., 2001).
- The "IRR decision rule is reversed for financing-type decisions" (Arnold, 2013, p.79).

Further differences between the NPV and IRR can be found in management accounting, capital budgeting and finance textbooks (Druary, 2012; Peterson and Fabozzi, 2002; Weston and Brigham, 1993).

3.4.1.5 Profitability index (PI)

The NPV method determines that a project is economically feasible if the difference between the current value of the cash flow and the initial investment costs is positive, regardless of the differences in value and the ratio relative to the invested amount. Therefore, NPV may fail to identify optimal investment projects. This deficiency is not clear when the assessor evaluates one project or is in the process of trade-offs between different investment alternatives requiring equal investment amounts. However, this shortcoming is apparent when the trade-offs between the different alternatives require different investment amounts. The comparison between the net present value of a specific project and other alternative proposals favours choosing an alternative which will achieve a lower return relative to the invested amount as based on the net present value. The profitability index provides a solution in cases of trade-offs among investment alternatives requiring different investment amounts. The "profitability index (PI) is simply equal to the present value of cash flows divided by" the initial investment costs (Gitman and Zutter, 2012, p.398). The PI equation can be formulated as follows:

$$\mathrm{PI} = \sum_{t=0}^{n} \frac{F_t}{(1+R)^t} \, / \, [I_0] \qquad \text{Eq. 3.6}$$

$$\textit{Or} \quad \mathrm{PI} = 1 + \{\mathrm{NPV} \div [I_0]\}$$

The PI is an extension of the NPV method and strengthens its results. Therefore, the weaknesses and limitations in using NPV can also be found in the PI method. Moreover, PI may fail to highlight optimal investments in cases of mutually exclusive projects operating in different industries.

Further information on financial appraisal techniques (NPV, IRR and PI) can be found in management accounting, capital budgeting and finance textbooks (Arnold, 2013; Druary, 2012; Gitman and Zutter, 2012; Peterson and Fabozzi, 2002; Weston and Brigham, 1993).

3.4.2 Risk appraisal techniques

Risk analysis techniques are applied to assess the inherent risks in CB decisions. Most businesses face two main tasks: forecasting future cash flow and the degree of uncertainty related to them (Peterson and Fabozzi, 2002). The risk-adjusted discount rate, sensitivity analysis, scenario analysis and break-even analysis are often discussed in CB textbooks (Arnold, 2013; Dayananda et al., 2002).

Sensitivity analysis (SA) is used to evaluate results from the mathematical models; it facilitates changes in the input values (independent variables) and measures the outcomes (dependent variable). In this regard, SA assumes that the changes in dependent variables (DV) rely on changes of an individual factor (Peterson and Fabozzi, 2002); for example, changes in future cash flow depend on changes in the sales forecast.

Scenario analysis (SCA) is one of the most important developments in SA. SCA assumes that changes in outcomes are due to the scope of the firm's work. This method considers the change in the dependent variable to be a function of changes in the input values of several scenarios. SA addresses an issue under specific circumstances and changes in output depend on one factor occurring in static time, whereas SCA offers more options to solve a problem and the relative change in output is a dynamic and continuous process (Alpizar & Bovarnick, 2013).

In developing countries, SCA helps decision makers to plan capital budgeting decisions under uncertain conditions and select optimal investment opportunities according to the strategic priorities of the firm. Hence, "scenario analysis has been used by the private sector for the last 40 years to manage the risk and develop robust strategic plans in the face of an uncertain future" (Maack, 2001, p. 62).

In forecasting processes, SCA analyses the estimated value of future cash flow generated by the investment project during its production life. It assumes that changes in the output values depend on several factors, such as changes in production technology alternatives and the financial resources available to finance the proposed investment projects. For instance, it can estimate sales in relation to customer behaviour with respect to different strategies/scenarios.

In literature, risk analysis approaches are distinguishable from intuitive to analytical techniques. Intuitive techniques involve subjective judgment, risk adjusted cash flows, risk adjusted discount rates and risk adjusted payback periods (Smith, 1994; Eakins, 1999; Cooper et al., 2001). Analytical techniques consist of break-even analysis (cost-volume-profit), sensitivity and scenario analysis (Arnold, 2005; Pike, Neale and Linsley, 2012).

The risk analysis approaches and techniques for investment appraisal processes are "complicated" (Alzoubi and Alazawi, 2010, p.13). Intuitive approaches utilize subjective judgment, which is subject to personal bias. The selection of risk premiums for adjusting discount rates is an arbitrary decision (Arnold, 2013). As discussed above, sensitivity analysis only accounts for changes in one independent variable and their effects on outcomes (Pike, Neale and Linsley, 2012). In economic reality, several factors affect the dependent variable (outcomes) when information is asymmetrical. Sensitivity and scenario techniques are required to understand advanced mathematical analysis. Break-even techniques are dependent on the cost-volume-profit analysis in the industrial sector. Critics argue that the application of CVP analysis is not easy to understand (Von Winterfeldt and Edwards, 1986), because sensitive factors such as cost, volume, profit and quality, affect manufactured products to a greater extent than in other industries. Similarly, the break-even method is a deterministic model because it deals with certain cases (Render and Stair, 2000, p.9).

Also, sensitivity and scenario analysis consume much time and effort, and are very expensive (Arnold, 2005). In fact, SA does not account for the interrelationships among independent variables. For example, sales forecasts depend on product quality, price, volume and competitive conditions. Nevertheless, SA only analyses the changes in one variable in isolation from all other variables (Arnold, 2013).

As previously discussed, SCA is used in dealing with uncertain conditions surrounding the organization's work (Postma and Liebl 2005), when the predictor estimation is based on interrelated factors. There are two main limitations of the scenario (SCA) approach. Firstly, unknowable events are not easy to predict, especially due to economic volatility. The SCA approach seeks to specify knowable and unknowable information related to the estimator or dependent variable (Ibid). In a methodological sense, SCA and SA techniques use optimistic and pessimistic approaches to anticipate future events. Secondly, these scenarios do not prevent organizations from avoiding unexpected events. In other words, the SCA may fail to improve forecast accuracy related to future events.

In summary, textbooks and relevant research all have inherent drawbacks and limitations regarding risk appraisal techniques (Arnold, 2005, 2013; Bradfield et al., 2005; Dayananda et al., 2002; Gitman et al., 2013; Pike, Neale and Linsley, 2012; Postma and Liebl 2005).

3.4.3 Operations research techniques (ORT)

The application of operations research in planning military operations emerged during World War II (Craven and Islam, 2005). Operations research techniques are associated with capital rationing in CB decisions. They are often referred to as quantitative analysis techniques (Render and Stair, 2000; Wagner, 1975). The applications of operations research techniques are subject to the need for allocating limited resources in an optimal way. Several operations research techniques are available, including mathematical programming (MAP), decision trees (DT), program evaluation and review technique (PERT), critical path analysis (CPA), probability distributions and queuing theory. In this research, the first three techniques are surveyed (MAP, DT and PERT/CPA). In fact, operations research techniques seek to improve deterministic models in accounting for the environmental conditions in which a business operates (Render and Stair, 2000). Moreover, ORT can help executives to make optimal decisions.

Weingartner (1974) presented the first mathematical formulation of CB problems using linear programming (LP). In empirical literature, LP is widely used in business applications (Bhaskar, 1978; Chuvieco, 2004; Khan, 2008; Kumar, 2013; Render and Stair, 2000), because it is simple and easy to understand. The linear programming model presented by Weingartner (1974) aims to address capital rationing problems, as based on Lori and Savage's approach (1955). Therefore, the mathematical form of the CB problem can be illustrated as follows (Weingartner 1974):

$$\text{Maximize} : z = \sum_{J=1}^{n} b_J X_J \qquad \text{Eq. 3.7}$$

Subject to:

$$\sum_{J=1}^{n} C_{Jt} X_J \leq B_t ; \; t = 1,2,3,\ldots T \qquad \text{Eq. 3.8}$$

$$0 \leq X_J \leq 1$$

Where:
b_J: Net present value of investment project J
X_J: Decision variable, which represents the percentage of the desired investment project J
C_{Jt}: The investment expenditures for the investment project J in year t
B_t: The available capital budget in year t

As previously discussed, undiscounted cash flow methods do not consider the time value of money and do not effectively address the problem of capital rationing under resource constraints. In empirical literature, most businesses prefer to use discounted cash flow techniques (DCFT). Nevertheless, these techniques require development, such as being extended beyond direct application of NPV or IRR ((Alsharif, 2004).

However, the limitations of ORT are as follows. First, the use of operations research methods requires full knowledge of mathematics and probability theory, particularly algebra science. Probability distribution and decision tree techniques are usually used when the problem comprises a sequence of decisions deriving from an action taken previously (Levy & Sarnat, 1986, p. 295; Pruitt and Gitman, 1987).

Second, most mathematical programming models (LP, IP and GP[2]) are linear, but in many cases the relationships among variables are not linear. In line with this, most operations research algorithms and software are only available for linear programming (Craven and Islam, 2005). Thus, it is important that mathematical programming is based on computer programs that are available and appropriate for practical applications. The reason for this suggestion is:

> "the computer output may be very misleading if you do not know what model, or assumptions, are built into the package, or if you do not know, even in outline, what computational method is being used" (Ibid, p. 11).

Third, the assumptions on which the linear, integer and goal programming are based, are in contradiction with indivisible investment projects (Alsharif, 2004). Fourth, most of the linear, integer, and goal programming models are static, and are somewhat incompatible with economic planning, which is dynamic (Ibid).

Operations research textbooks and relevant scholarly literature discuss the drawbacks and limitations of ORT usage (Bonini & Hausman & Bierman, 1981; Craven and Islam, 2005; Hillier and Lieberman, 2001; Taha, 2007; Williams, 2013; Wagner, 1975; Weingartner, 1974).

3.4.4 An overview of the capital budgeting techniques used in developed and developing countries

Arnold and Hatzopoulos (2000) investigated the financial appraisal techniques used by small, medium and large UK firms and found that the largest firms widely use discounted cash flow (DCF) methods, whereas small and medium firms more often use ARR and PB methods. By

[2] LP, IP & GP: linear, Integer & Goal programming, respectively.

1975, 58% of large UK firms utilized DCF methods and 94%, 81% and 74% employed PB, IRR and NPV methods in appraising investment projects (Pike, 1996). Similarly, Drury et al. (1993) examined the methods used in capital investment appraisal in UK manufacturing companies and found that 63% of firms used the payback period method. The findings of the study conducted by Drury et al. (1993) indicated that 35% of small firms and 90% of large ones always use discounted cash flow techniques (NPV and IRR). Moreover, 28% of respondents in UK manufacturing companies used the PB method combined with DCF, and accounting return on capital-employed methods; the findings also showed that 41% of respondents often used the accounting return on capital-employed method (Ibid).

Graham and Harvey (2001) also found that US firms often use the discounted cash flow methods (NPV and IRR) followed by the payback period method. Bennouna et al. (2010) found that 83% of the large Canadian firms used DCF methods in their CB, whereas the payback method is more commonly used in the UK and Europe (Brounen et al., 2004). In this regard, discounted cash flow methods essentially rely on predicted future cash flow, which carry an inherent risk in terms of decisions related to such data (Olu-Tima, 2003).

Haka et al. (1985) stated that most research in management accounting literature favour discounted cash flow methods in capital investment appraisal. However, these methods need to be developed and extended beyond the direct application of NPV and IRR. Also, in ideal terms, analyses based on NPV and IRR methods would be more useful.

In a recent survey of CB practices among Australian listed companies, Truong et al. (2008) observed that NPV, IRR and payback were the most popular techniques used in evaluating investment projects. NPV method is widely used by Dutch CFOs, whereas Chinese CFOs prefer the ARR method (Hermes et al., 2007). In fact, discounted cash flow methods (IRR and NPV) are extensively used in Australian companies (Freeman & Hobbes, 1991).

Holmen and Pramborg (2009) found that Swedish companies preferred the use of the PB method to account for non-systematic risks, which can lead to high deliberation costs. PB is also commonly used in public and private Sudanese companies (Eljelly and AbuIdris, 2001). Similarly, the payback period and IRR are commonly used in Singapore for evaluating and ranking capital investment projects (Kester & Tsui, 1998). Anuar (2005) stated that 69.4% of respondents in the Malaysian manufacturing firms used PB as a CB technique, followed by

IRR (61.4%) and NPV (60%). PB and NPV methods are also used in South African companies (Brijlal & Quesada, 2009).

Similarly, Mohammed (2013), AlWakil (2000) and Eloubeidi (1993) surveyed the methods and techniques used in the preparation of capital budgets and determined the monitoring procedures implemented on capital expenditures in Libyan companies. They found that most companies applied the ARR, PB and DCF methods in their capital budgets, as shown in Tables 2.12 and 3.3.

Contrastingly, Alhouderi (1997) did not examine appropriate methods for evaluating and comparing between investment alternatives, even though Libyan transportation firms depend upon subjective techniques to estimate future cash flow. Moreover, Ehssona (1994) verified that 30% of Libyan industrial enterprises partly adopted operations research methods to help in making decisions. Accordingly, CBT has been widely adopted in developed and developing countries alike, as summarized in tables 3.2 and 3.3.

Table 3.2: Financial appraisal techniques used in developed countries

No.	Author	Year	Developed countries					
			UK	USA	Canada	Australia	Sweden	Netherlands
1	Haka et al.	1985		DCFT*				
2	Graham and Harvey	2001		DCFT				
3	Bennouna et al.	2010			DCFT			
4	Brounen et al.	2004	PB*					
5	Drury et al.	1993	PB+DCFT					
6	Pike.	1996	PB+ DCFT					
7	Holmen and Pramborg	2009					PB	
8	Arnold and Hatzopoulos Large firms: Small firms:	2000	 DCFT PB					
9	Hermes et al. CFOs	2007						NPV*
10	Truong et al.	2008				DCFT+PB		

* DCFT: Discounted cash flow techniques (NPV, IRR & PI). * PB: Payback period. * NPV: Net present value

Table 3.3: Financial appraisal techniques used in developing countries

No	Author	Year	Developing countries:						
			China	India	Singapore	Malaysia	Sudan	S. Africa	Libya
1	Anuar	2005				BP+DCFT			
2	Kester and Tsui.	1998			PB+IRR*				
3	Eljelly and AbuIdris	2001					PB		
4	Verma et al. Large firms: Small firms:	2009		DCFT PB					
5	Hermes et al. CFOs	2007	ARR*						
6	Brijlal and Quesada	2009						BP+DCFT	
7	Mohammed	2013							PB+ DCFT
8	AlWakil	2000							PB+ARR
9	Eloubeidi	1993							PB+DCFT

* IRR: Internal rate of return; ARR: Accounting rate of return; DCFT: Discounted cash flow techniques

With regard to risk appraisal techniques, Pike (1996) outlined five techniques used in addressing risk associated with CB practices in UK firms: shorter period, risk-adjusted discount rate, probability analysis, sensitivity analysis and Beta analysis. This study found that the use of risk appraisal techniques “have moved from 26% in 1975 to 92% in 1992” (Pike, 1996, pp.84-85). In 1992, 88% of UK firms used sensitivity analysis to manage project risk in their CB decisions. Additionally, increasing the rate of return and shortening the payback period are used as the second and third techniques in risk assessment (Ibid).

Similarly, scenario and sensitivity analyses are perceived to be the two most important techniques used in CB practices in Singaporean firms, while decision tree analysis, probability theory and Monte Carlo simulation are less common (Kester and Tsui, 1998). The uncertainty problem surrounding the investment projects is represented as asymmetrical data relating to CFF in CB decisions (Chiu & Park, 1998; Karsak, 1998). According to Kira et al. (2000), different approaches have been applied to manage project risk, such as opportunity cost of capital, the firm's weighted average cost of capital and divisional cost of capital. Their model focuses on the use of the stochastic variables in selecting investment projects under uncertain circumstances. It is also certain that the borrowing rate is an important factor for calculating the risk parameter to attain the optimal portfolio of investment projects. Graham and Harvey (2001) found that 392 CFOs in the largest US firms are more likely to use the risk-adjusted discount rate, while small firms prefer Monte Carlo simulation for risk adjustment. Risk-adjusted discount rate and the certainty equivalent are also applied to assess project risk in CB decisions (Fama, 1977; Hendricks, 1977; Robichek & Myers, 1966; Sick, 1986). Levels of uncertainty make it difficult to estimate future cash flow resulting from investment projects.

Klammer (1972) identified early progress towards using scientific methods in management, especially operations research methods used in CB and the evaluation of investment projects, noting that 85% of US oil companies (n=17) used one or more of the scientific methods.

Capital rationing exists whenever the firm's capital budget is not adequate to fund all profitable projects. Beraldi et al. (2012) stated that capital rationing is a significant issue in CB decision-making. The link between discounted cash flow methods (NPV) and capital rationing depends on the purpose of capital rationing which aims to maximize the NPV within budget availability (Manalo & Manalo, 2010). In accountancy and finance literature, several mathematical models have been proposed to solve the capital rationing problems. Weingartner (1974) presented an original mathematical formula to solve the capital-rationing problem in CB. Additionally, Khan (2008) stated that in the US, the mathematical programming models used in solving the CB problems are more common in the private sector than in the public ones. The capital rationing problem in the public sector has developed due to limited funds, the legal constraints of borrowing, limited public expenditures and the concentration of sample projects, rather than complex projects requiring large budgets (Ibid).

Most studies focus on linear, integer and goal program in CB preparation (Benjamin, 1985; Bhaskar, 1978; De, Acharya, & Sahu, 1982; Keown & Martin, 1976; Keown & Taylor, 1980; Rychel, 1977). For instance, the NOC subsidiary company, Ras Lanuf, used linear programming to appraise investment projects (Linsley & Fotouh, 1979). Nevertheless, traditional and linear programming techniques have faced considerable criticisms as used in preparation of the CB as they are generally used in static and linear situations. Therefore, this has necessitated the development of a new model to solve current problems. Bellman and Dreyfus (1962) consider the practice of dynamic programming (DP) to be more effective than LP. Hence, DP can be used in preparation of the CB. It can provide an optimised investment plan within the limits of available funding. DP can also be applied in linear and non-linear situations. It provides a solution to the problem of divisibility in investment projects, more so than LP models (Alsharif, 2004). Subsequently, Beraldi et al. (2012) presented a stochastic model to solve the capital rationing problem under uncertain conditions whose objective function aims to maximize the total value of projects, including risk premium.

Haka et al. (1985) used three parameters to distinguish between naive and sophisticated financial appraisal techniques in CB, including risk, cash flow and the time value of money.

Discounted cash flow (DCF) techniques incorporate risk-adjusted discounted rate of return in CB decisions, while non-discounted cash flow techniques (PB and ARR) do not account for the parameters mentioned above. Ideally, analyses based on NPV and IRR methods are more useful than traditional methods. DCF techniques are considered to be the most sophisticated selection methods for screening investment opportunities.

Consequently, Haka et al. (1985) examined the influence of financial appraisal technique usage on corporate performance. They found that the adoption of sophisticated CBT is one of numerous strategic policies used for improving a firm performance, including contextual factors. In this regard, Pike (1984, p.92) stated that sophistication in CBT refers "to the use of theoretical superior methods". Therefore, sophistication does not equate to effectiveness. Hence, DCF techniques must be combined with other policies to improve companies' economic growth and these techniques need to be developed and extended beyond the direct application of NPV and IRR.

In summary, this thesis examines the extent of CBT usage in manufacturing and oil firms, most of which employ financial appraisal techniques as the criteria for evaluating and selecting investment projects.

3.5 Cash flow forecasting process in capital budgeting

Financial analysts traditionally focused on profits as the basis for estimating future earnings. This approach gave cause to various companies to manipulate their earnings through fraudulent reports, as in the Enron accounting scandal. As a result, CFF has become a vital consideration in all organizations because cash flow information is a useful indicator when appraising investment opportunities (Krishnan and Largay, 2000). Long-range planning and forecasting processes emerged in 1945 (Turner, 1974).

However, cash remains the primary resource in most organizations, and cash flow (CF) is essential in the accounting, financial and economic fields. Managerial accountants usually use CF statements to determine firm's liquidity. Brown (1996) stated that CF is the calculation of real investment value resulting from a project. CF can be created from operating, investment and financing activities. Recently, the subject of forecasting has been widely addressed in different areas, including the public and private sectors (Nash & Nash, 2001). McCalman (2012) defined forecasting as the prediction of future events, and "one of the most critical aspects of planning for many companies" (Sanders, 1997, p.32). In fact, there is often a degree of overlap between plans and forecasts. According to Armstrong (1999, p.3), "plans are sets of actions to deal with the future", whereas forecasting is the determination of what will happen in the future. Hence, good plans are seen to depend upon good forecasts. Therefore, the main reason for forecasting is to plan for future events and the key dimension of any plan lies in predicting the circumstances that will affect the business (Makridakis and Wheelwright, 1989). Forecasters can also predict cash inflows and outflows resulting from operating activities, such as revenues, expenses, receipts and payments (Yan-Song, 2011).

Subsequently, Ochs and Parkinson (2006) define CFF as the estimation of cash flow resulting from the investment project. Similarly, Fight (2006) suggests that CFF is a tool used in sizable capital projects, such as building large public infrastructure projects. In fact, the forecast accuracy of cash flow strengthens confidence in discounted cash flow methods usage (Liu et al., 2010). McIntosh (1990) asserts that the main problem in most investment projects is in how to forecast cash flow during planning. After all, forecasting is the planning tool which addresses uncertain future situations, and depends on information collected from historical data, or is based on analysing future trends and changes. Accordingly, CFF is a vital process in evaluating investment projects (Krishnan and Largay, 2000).

However, forecasting can be used in various purposes, which can be deployed in different fields, and for short, medium, and long-term decisions (Klassen and Flores, 2001). According to Zotteri and Kalchschmidt (2007, p.87), the purposes of forecasting are determined in "budget preparation, production planning, subcontracting decisions, material/inventory planning, sales planning, human resource planning, new product development, facilities planning and equipment purchase planning". Moreover, Klassen and Flores (2001) found that 57% of Canadian firms (n=66) used forecasting process in capital investment decisions.

Subsequently, forecasting usage depends on the role of CFF in CB decisions. CFF is the subject associated with future cash risks. According to Fight (2006, pp.6-7), the basis upon which forecasting is conducted relates to "credit worthiness, project feasibility", borrowing risks and financial commitments and covenants. As a result, the CFF process in CB decision-making starts by identifying the components of cash flow that need to be forecasted, collecting data from different sources, and determining the procedures and methods used in forecasting. It concludes by estimating future cash flow, as shown in figure 3.2.

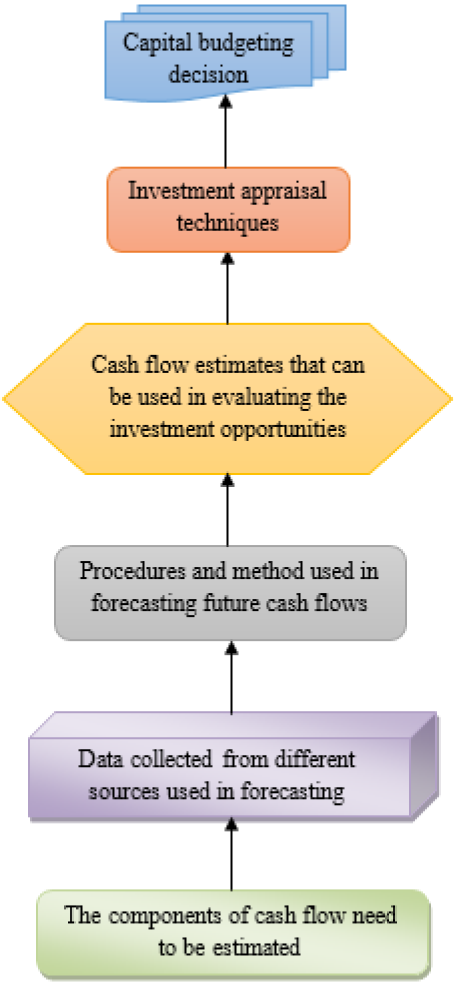


Figure 3.2: The hierarchy of cash flow forecasting process in capital budgeting decision

3.6 The forecasting methods

There is significant variation in the use of forecasting procedures and methods among different industrial sectors. The philosophical approach to forecasting depends on which methods can be used, particularly whether a subjective or objective approach is adopted (Turner, 1974). Render and Stair (2000, p.156) noted the following eight forecasting procedures:

> *Determine the purpose and objective of forecasting, select the items or quantities that are to be forecasted, determine the time horizon of the forecast, select the forecasting model/s, gather the data needed to make the forecast, validate the forecasting model, make the forecast and implement the results.*

In literature, most studies divide forecasting techniques into qualitative (judgmental) and quantitative techniques (Makridakis and Wheelwright, 1989). Similarly, Render and Stair

(2000) categorised forecasting models in three, as follows: time-series, causal quantitative techniques, and qualitative methods (figure 3.3).

3.6.1 Time-series methods

Box et al. (1994, p.1) define a time series as a "sequence of observations taken sequentially in time". Time-series methods are based on historical data. In terms of forecasting, Render and Stair (2000) and Makridakis et al. (1998, p.24) demonstrated four types of time series: "seasonal, cyclical, trend and horizontal data". Moreover, three time-series techniques are commonly used by practitioners and researchers: moving average, exponential smoothing, and trend analysis techniques (Box et al., 1994; Dalrymple 1987; Klassen and Flores 2001; Render and Stair, 2000; Sanders and Manrodt, 1994; Sparkes and McHugh, 1984).

3.6.1.1 Moving average method

Moving average is a simple technique focusing on the arithmetic mean of time-series data as the basis for calculating moving averages. This technique conceptualizes forecasting items as changing steadily over time (Render and Stair, 2000). According to Box et al. (1994), the moving average is an appropriate method for smoothing historical data. The simple and weighted moving average methods are commonly used in empirical literature (Render and Stair, 2000).

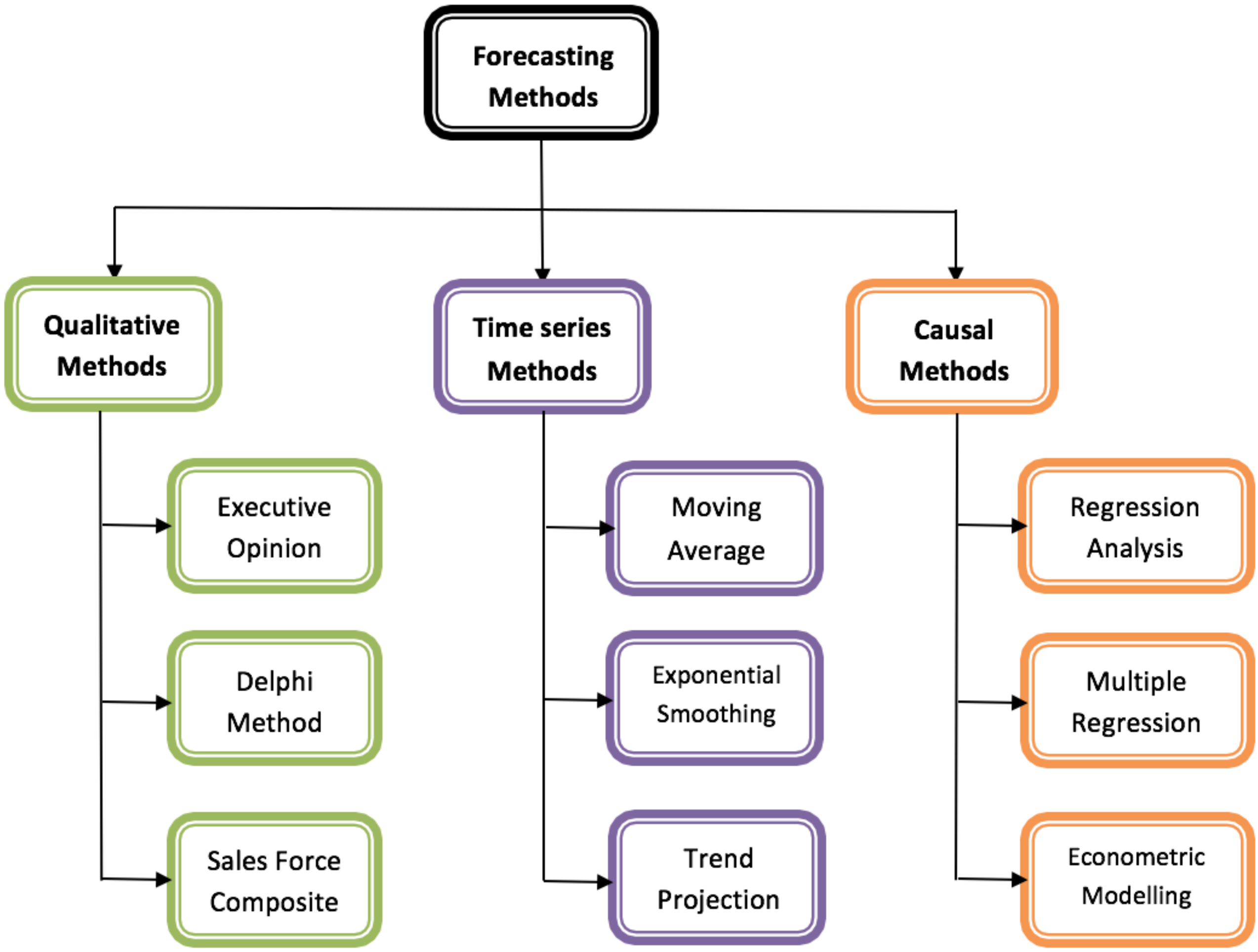


Figure 3.3: Forecasting methods

Adapted from Render and Stair (2000, p.157)

A simple moving average (SMA) is calculated by dropping the oldest observation value and adding the most recent observation value (Box et al., 1994). For example, a three-year moving average is found by calculating the average of sales from 2001 to 2003, then the average of sales from 2002 to 2004, then the average of sales from 2003 to 2005 etc. The simple moving average model is mathematically formulated, as described by Render and Stair (2000, pp.162-170):

$$\text{Moving average} = \frac{\sum \text{Observed values during the time period}}{N*} \qquad \text{Eq. 3.9}$$

Where:
N: Number of observed values

The weighted moving average technique determines the relative importance of each observed value on the average. This method assigns specific weights to the observed values according to their importance. The weighted moving average is then calculated by multiplying the given observations by their associated weights and then summing all of the values for the specific period. The weighted moving average is mathematically formulated as follows (Render and Stair, 2000, p.162):

$$\text{Weighted moving average} = \frac{\sum \text{(Weight for time period t) (observed value in time period t)}}{\sum \text{Weights during the time periods n}} \qquad \text{Eq. 3.10}$$

Where: t =1,2,3,……..n.

3.6.1.2 Exponential smoothing method

Render and Stair (2000, p.163) state that exponential smoothing "is a type of moving average technique" that employs unequal weights and reduces the use of historical data. This technique is grounded upon the concept that "recent values are given relatively more weight in forecasting than the older observations" (Makridakis et al., 1998, p.147). In contrast, the moving average method depends on equal weights being incorporated into the average, and requires large space for running the historical data (Jarrett, 1987; Makridakis and Wheelwright, 1989). To develop this model, the following equation is formulated (Render and Stair, 2000, p.165):

$$F_t = F_{t-1} + \boldsymbol{\alpha}\,(A_{t-1} - F_{t-1}) \qquad \text{Eq. 3.11}$$

Where:
F_t = New forecast at time t
F_{t-1} = Last period's forecast
α = a weight or smoothing constant ($0<\alpha\leq 1$)
A_{t-1} = Last period's actual value (fiscal item)

3.6.1.3 Trend projection method

Trend analysis, or projection, is a time-series forecasting method that analyses historical data to predict future events (Render and Stair, 2000). The purpose of this technique is to produce a fit between the trend model and historical data (Turner 1974). The trend may be short, medium or long-range forecasting. In literature there are several mathematical trend models, such as linear, exponential, and quadratic equations. Turner (1974) discusses the method's limitations stating that the trend projection technique does not analyse causal relationships between variables. The linear trend equation can be formulated as follows:

$$\hat{\mathbf{Y}} \mathbf{= a + bX} \text{ (called the least squares equation)} \qquad \text{Eq. 3.12}$$

Where:
$\hat{Y}$ (Y-hat) = Estimated value of the variable to be forecasted (dependent variable)
a = Y-axis intercept
b = Slope of the least squares line ($\Delta Y/\Delta X$)
X = Independent variable (time)

3.6.2 Causal forecasting methods (regression analysis models)

The philosophy of causal techniques focuses on the relationship between independent and dependent variables (cause-and-effect). Causal forecasting techniques scrutinize the factors affecting the predictable variable. When these factors are discovered, the statistical model will be built to forecast the future values of an observed variable (Render and Stair, 2000). For example, the sales forecast is affected by competitors' plans/prices, advertising budget and general economic conditions. Regression analysis is commonly used in both the manufacturing and service sectors (Dalrymple 1987; Klassen and Flores, 2001; Sanders and Manrodt, 1994; Sparkes and McHugh, 1984).

However, the simple regression analysis technique is similar to the trend projection technique (least squares equation 3-13) where the independent variable is not time, as in trend analysis. In contrast, the multi-regression analysis model incorporates more than one independent variable to explore future events, whereas the simple regression analysis model has only one independent variable. The multiple regression model can be represented as follows:

$$\hat{Y} = a + b_1X_1 + b_2X_2 + \ldots\ldots.. + b_nX_n \qquad \text{Eq. 3.13}$$

Where:
$\hat{Y}$ = dependent variable (sales forecast)
a = Y-axis intercept
X_1, X_2,…Xn= Independent variables.
b_1, b_2,…. b_n = slopes for X_1 X_2,…..X_n, respectively.
n= the number of independent variables, where n=1,2,3,…..N.

For more details about the other quantitative techniques used in forecasting, the Box-Jenkins model is discussed by Makridakis and Wheelwright (1989) and econometric modelling is explained by Pindyck and Rubinfeld (1991). Furthermore, a number of software programs

(SAS, SPSS, BIOMED and SYSTAB) can be applied to the time-series and casual models of forecasting (Render and Stair, 2000).

3.6.3 Qualitative methods

Qualitative techniques take a subjective approach, which deals with factors which cannot be quantified. Whereas quantitative methods (time-series and causal models) interpret data which can be represented numerically (Render and Stair, 2000; Turner, 1974). In literature, jury of executive opinion, the Delphi method, and sales force composite are judgmental/qualitative techniques commonly used in industrial and service fields (Mentzer and Cox, 1984).

3.6.3.1 Jury of executive opinion

This method is based on the opinions of executive managers within a company. These opinions are usually partially formed by engaging with statistical methods to predict future events, such as sales, production quantity, and operating expenses etc. The jury of executive opinion technique is commonly used in forecasting (Dalrymple, 1987; Mentzer and Cox, 1984), whereby individual forecasters (typically CEOs) use their experience and judgment to estimate predictable variables (Makridakis and Wheelwright, 1989).

3.6.3.2 Delphi method

The Delphi method is a systematic and interactive technique which takes advice from a panel of experts. It is based on the principle that collective judgments are more accurate than individual ones (Nash and Nash, 2001). When quantitative methods fail to account for and analyse subjective or behavioural factors in the forecasting process, or when these factors cannot be quantified, the opinions of internal or external expert groups can be useful. Moreover, the executive opinion and Delphi methods generally apply expert skills and personal judgments in collaboration with statistical results to produce accurate forecasts (Render and Stair, 2000).

3.6.3.3 Sales force composite method

This technique is typically referred to as the sales force estimate, and is more commonly used in practice (Makridakis et al., 1998; Turner, 1974). In addition, marketing managers may use this technique to forecast future sales. Thus, sales force estimates depend on salesmen forecasts. For instance, the salesman estimates the goods sold in their region to use in forecasting overall sales (Render and Stair, 2000).

3.7 The weaknesses and limitations of the forecasting methods

As has been discussed in the prior section, forecasting methods are divided into three main categories: smoothing & time-series, causal, and qualitative methods, where the first and second are quantitative methods. The use of forecasting methods in empirical practices can range from the simplistic to the sophisticated or complex, depending on the ability of forecasters to use these techniques (Makridakis et al., 1998). This section examines the weaknesses and limitations of the forecasting methods used in practice.

In terms of smoothing and time-series methods, this chapter has adopted three models of time-series which are commonly used in forecasting: moving average, exponential smoothing and trend projection. The time-series method considers time as the key factor for data analysis and uses historical data to forecast future events. In fact, the weighted and moving average methods are considered similar techniques and potentially more accessible to most users (Mentzer and Cox, 1984), because they calculate arithmetic averages. Exponential smoothing and trend projection methods are slightly complex and required to understand algebra equations (Makridakis et al., 1998). Apparently, most time-series methods deal with linear models, while, nonlinear relations are more commonly used in global economics. In empirical literature, Mentzer and Cox (1984) argue that most time-series methods devote little attention to criteria relating to forecast accuracy. In terms of forecasting horizon, the moving average and exponential smoothing models are usually associated with short-term horizons that are only used in operational activities (Dalrymple, 1987; Mentzer and Cox, 1984).

Secondly, the causal forecasting methods involved in this thesis are the simple and multiple regression models. As emphasized above, most time-series and regression models operate under a linear assumption (Makridakis and Wheelwright, 1989). Mathematically, the simple regression models assume that the dependent variable is a function of one independent variable, but these models may fail to address the factors related to the changes in global competitive market. For example, sales forecast is affected by product quality, competitive circumstances and customer satisfaction. Additionally, multiple regression analysis requires an understanding of the relationships among the independent variables affecting the dependent variable (predictor). However, the users ranked the regression models (RMs) with “the highest level of satisfaction” and RMs are often employed for medium-term horizon (Makridakis et al., 1998, p. 517); while econometric and operations research techniques can be used with long-term forecasts. Nevertheless, econometric models are not easy to understand and not more effective than time-series methods (Armstrong, 1978). Moreover, multicollinearity is "a real and frequent problem" in multiple regression models (Makridakis and Wheelwright, 1989, p.194). Regression and time-series methods do not account for subjective factors during the forecasting process.

Finally, judgmental methods deal with qualitative factors and adopt a subjective approach. In the case of asymmetrical and uncertain information, personal judgments are required to estimate qualitative factors relating to the forecasting process (Woudenberg, 1991). In empirical literature, executive opinion and sales force composite techniques are extremely common in forecasting practices (Mentzer and Cox, 1984). Judgmental methods fail to enhance forecasting accuracy than quantitative ones, because they are "often characterized by considerable biases and limitations" (Makridakis et al., 1998, p. 483). To address this, the Delphi method was developed, but there is "no evidence that the Delphi method is more accurate than other judgment methods" (Woudenberg, 1991, p.131). However, forecasting accuracy is not the only dominant criterion for selecting a specific forecasting method (Makridakis et al., 1998, p. 517).

In summary, this thesis seeks to explore the procedures and methods used in forecasting. Forecasting techniques are not evaluated in this thesis, as will be stated as a limitation of this study. For more details, Armstrong (2001) determined key principles used as a guide to evaluate and select the forecasting methods.

3.8 Chapter Summary

This chapter presented the CB process in terms of the concepts of CB and CFF. Obviously, CB is a process for planning and control of investment expenditures. Most US studies determined four stages in the CB process (Burns and Walker, 2009), whereas UK studies identified five stages (Pike, Neale and Linsley, 2012). Apparently, the important phases in CB processes are screening the CFF and the investment appraisal stage, which evaluates various investment alternatives in order to identify the best one.

However, forecasting has potential for extensive usage in different areas, whether in business or in the state. Forecasting is a set of actions used to predict future events, where good forecasts lead to optimal plans. In addition, the CFF in CB decision-making is the estimation of cash flow generated by investment projects. In this part of the study, the forecasting methods addressed included time-series, causal and qualitative methods, where the time-series and causal models are understood as quantitative techniques. Subsequently, the weaknesses and limitations of the CBT and forecasting methods were discussed. The following chapter will address the theoretical approach related to the capital budgeting process.

4 CHAPTER FOUR: THEORETICAL APPROACHES: CONTINGENCY AND INSTITUTIONAL THEORIES

4.1 Introduction

The theoretical framework in this study is based on contingency and institutional theories. This chapter examines these theories and the differences between them, asserting that both are paradigmatically consistent with the research framework. The congruence between the two theories is addressed by comparing their outcomes. Their differences between them will be examined with respect to three aspects: organizational structures, the concept of fit, and results from the adoption of specific structures. Moreover, this chapter links the second and third chapters with the fifth chapter, which discusses empirical literature. Accordingly, this chapter consists of three main elements: contingency and institutional theories, and the comparison between them.

4.2 Contingency theory

The first works on contingency theory appeared in the late 1950s, firstly by Dill (1958), and then Burns and Stalker (1961). This study employs contingency theory as a major CB paradigm. Covaleski et al. (1996, p.4) defined contingency theory as “a theoretical perspective of organizational behaviour” that asserts the role of contingent factors, such as size, firm strategy and environmental uncertainty, in formulating organizational structure. According to Haka (1987), the analytical developments in financial and organizational theories contribute primarily to construct and test contingency theory for CB. In other words, contingency theory for CB is derived from organizational and financial theories in the context of the wider environmental conditions external to the organization.

Subsequently, contingency theory has become an important organizational theory which considers that there is no an optimal management accounting (MA) system to be applied in all organizations (Chenhall, 2003). Thus, the appropriate MA system is determined by contextual factors such as size, technology and competitive strategy (Burkert et al., 2014). MA techniques are not uniform in all organizations (Otley, 1980, 1999), and contingency theory is applied by management accounting researchers in different structures and situations (Reid & Smith, 2000). Most management accounting researchers rely on contingency theory (Burkert et al.

2014; Chenhall, 2003; Franco-Santos et al., 2012; Fisher, 1995). The same can be said of the CB process, where no universal appraisal technique is used in all organizations (Anuar, 2005).

In this regard, the applicability of certain appraisal techniques in CB is dependent on specific contingencies (Haka, 1987). Contingent factors can be divided into five categories used to describe the differences in selecting appraisal techniques: environmental uncertainty, strategic priorities, manufacturing technology, firm and industrial characteristics, and knowledge and personal abilities (Drury, 2012). This thesis is concerned with the first, second and fourth factors. Put simply, contingency theory considers that "an organization's structure is contingent upon contextual factors such as environmental uncertainty, strategy and firm size" (Gerdin and Greve, 2004, p.307).

The most important recent development in contingency theory concerns the contribution of management control systems, particularly quality control. Jayaram, et al. (2010, p.346) examined the impact of contingent factors (firm size, total quality management (TQM) duration, unionization and industry context) on TQM implementation. These factors moderate the total effects of "quality system design (design management, training, empowerment, supplier quality management, quality information usage and process quality management)" on outcomes. This study found that the industry type, size and TQM duration have a positive impact on the outcomes of TQM implementation, and to a lesser extent, unionization. Indeed, this study made a strong contribution in the application of contingency theory to TQM implementation.

There are two main approaches to contingency theory: congruence and contingency. A congruence approach considers that the organizational structure depends on the corporate context, without any consideration of performance (Gerdin and Greve, 2004). It is applied according to natural selection principles, whereby most companies could be categorized into a relatively small number of groups, each of which has similar structures and processes (Miller et al., 1984). In contrast, the contingency approach is used where "a conditional association of two or more independent variables with a dependent outcome is hypothesized" (Drazin and Van de Ven, 1985, p.514).

However, the congruence and contingency approaches depend on the concept of contingency fit, which is an important determinant in most MA research (Burkert et al., 2014; Gerdin &

Greve, 2004, 2008). In this regard, moderation and mediation forms of contingency fit are commonly used (see Figure 4.1). In the contingency approach, fit is perceived to have a positive impact on performance with certain combinations of context and structure. The task is then to explain the interactive effects between context and structure on corporate performance.

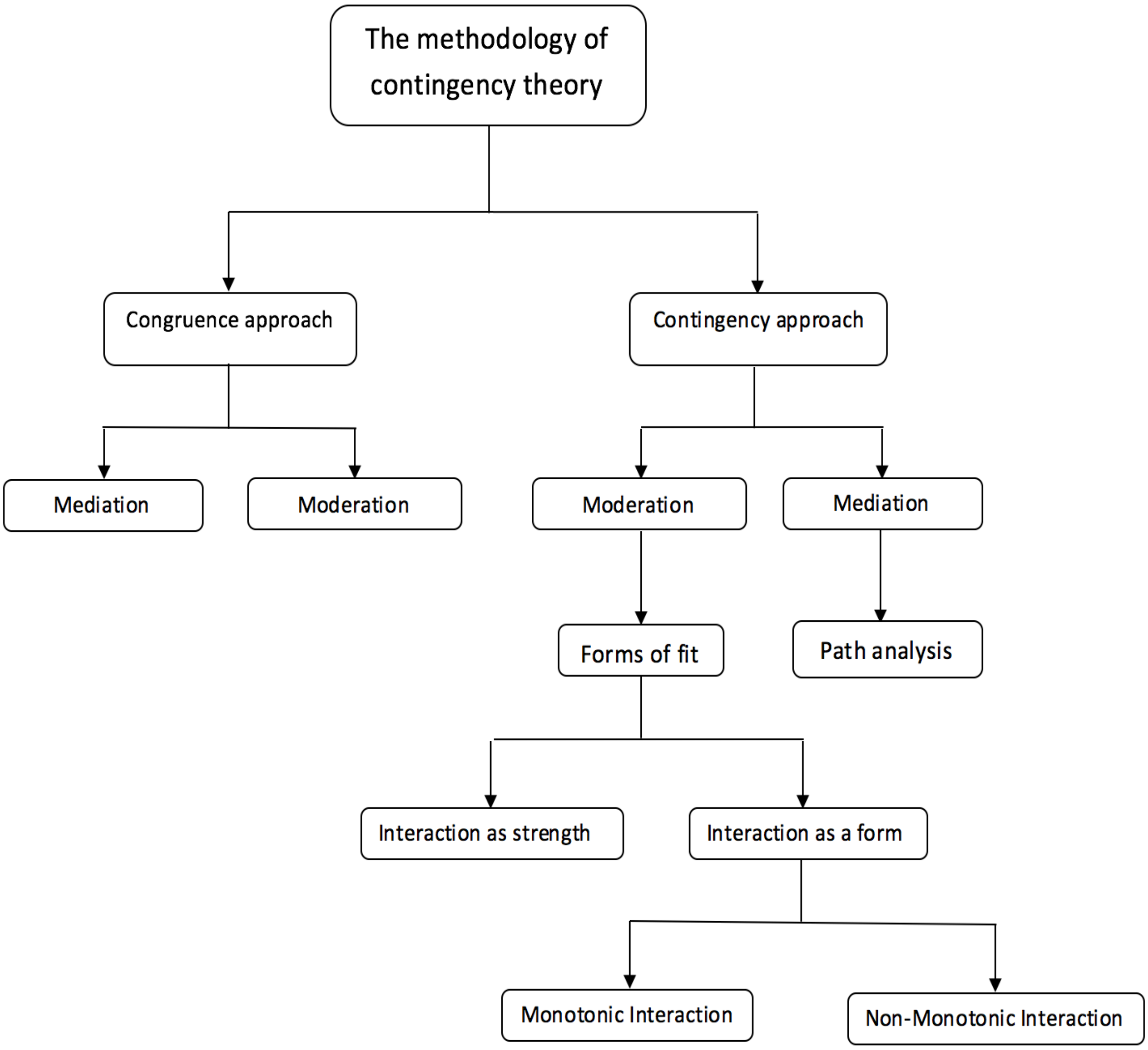


Figure 4.1: Forms of fit and models used in MA research based on the methodology of contingency theory.

Adapted from Gerdin & Greve (2004, 2008) and Burkert et al. (2014)

On the other hand, contingency fit is divided into three forms: matching, moderation and mediation (Burkert et al., 2014). Firstly, matching is the conventional form of fit with performance (Donaldson, 2001; Schoonhoven, 1981). Here, the relationship between the management control system (MCS) and performance is represented as a curved line, so “there is only one optimal MCS given a certain level of the contingency variable” (Burkert et al., 2014, p.9). Therefore, the classical matching form of fit predicts several optimal MCS-contingency combinations (matches), each of which produces the same level of performance (Burkert et al., 2014). Similarly, Donaldson (2001) established other forms, which are an extension of the classical contingency theory's matching form of fit.

Secondly, a moderate form of fit changes the relationships between the independent and dependent variables based on the levels of the moderator variable. It is believed that the interaction between the moderator variable and independent variable plays a major role in the determination of the dependent variable (Gerdin and Greve, 2004). Conversely, the moderated form of fit considers that the relationship between the MCS variable and performance is linear, whereas the matching form of fit is non-linear (Drazin and Van de Ven, 1985).

Subsequently, the relationships between variables in a moderated model are based on their strength and form of fit (Moers & Hartmann, 1999; Venkatraman, 1989). In this regard, interaction implies that the relationship between independent and dependent variables is contingent upon different contexts. According to Gerdin and Greve (2004, p.311), "the impact of the management accounting system (MAS) on performance differs across strategic priorities". In contrast, strength of interaction refers to the differences in predictive power between subgroups.

Consequently, there are two types of moderated forms of fit used in management accounting literature: monotonic and non-monotonic interaction. Monotonic interaction exists when the relationship between "the MCS variable and performance is always positive; nevertheless, the effect of the MCS variable on performance depends on the levels of the contingency variable" (Donaldson, 2001, p.191). Non-monotonic interaction appears when "the relationship between MCS and performance is positive for one value of the contingency variable, but negative for another" (Burkert et al., 2014, p.11). Recently, Zatzick et al. (2012) found that the relationship between TQM and performance is affected by the differentiation strategy taken. Accordingly, two statistical methods apply to the moderate form of fit: moderated regression analysis and sub-group correlation analysis. These methods are used alternatively as forms of interaction and interaction strength (Gerdin and Greve, 2004). As mentioned above, the same principles can be applied to a congruence approach to contingency theory.

Thirdly, mediation is the final form of fit highlighted by Gerdin and Greve (2004). In this form, the impact of independent variables on the dependent variable is based on an endogenous mediating variable, whereby the relationship between the independent and the outcome variable is partially or fully mediated. Mediation analysis supposes that the relationship between the independent and dependent variables is conducted by the mediating variable (Preacher & Hayes, 2008). In literature, mediating models consist of the direct, indirect and total effects. In a simple mediation, the direct approach predicts the effect of X on Y when the mediator variable M is introduced into the path model. The indirect effect consists of two relationships: the effect of X on M and the effect of M on Y. Accordingly, the total effect of X on Y can be calculated by gathering the direct and indirect effects (Hayes & Preacher, 2014).

However, this research utilises the path models to examine the causal relationships among the forecasting process variables and the use of CBT. In this regard, the path analysis models consist of sequential and causal forms, which allow testing of the relationship between the research variables and examination of the direct and indirect effects on the outcomes or dependent variable (Hair et al., 2011b; Hair et al., 2014).

4.3 Institutional theories

Institutional theories focus on the study of formal and legal issues in state institutions and their impact on the diffusion of innovation throughout the organization’s surrounding environment (Chua & Petty, 1999; Haunschild & Miner, 1997; Howorth et al., 2002; Michael & Scott, 2007; Scott, 1995). In other words, institutional theory emphasizes the role of social rules in the diffusion of innovation (Scott, 2008). Subsequently, the diffusion of innovation is affected by government regulations and organizational procedures in a social environment. In this case, the government can diffuse the new management procedures rapidly, even though these procedures are not required (Tolbert and Zucker, 1983). Accordingly, “institutional theory is a sociological theory of organizations that explains the processes through which organizational structure is adopted” (Donaldson, 2008a, p.6).

There are three branches of institutional theory used in management accounting research: original institutional economics (OIE), new institutional economics (NIE) and new institutional sociology (NIS) (Burns & Scapens, 2000; Hussain & Hoque, 2002; Moll et al., 2006; Scapens, 2006).

OIE emphasises the traditional approach emphasizes managerial routines and organizational rules in the development of human resources. Thus, routines and organizational rules have an essential role in reforming organizational structures. For instance, improvements in organizations' structures are affected by changes in organizational and accounting routines. Organizational institutions are considered a form of social coherence that impose specific forms based on the social activities, which are affected by institutional rules (Burns and Scapens, 2000; Strang and Sine 2002).

NIE is an extension of neoclassical theory, which uses the optimal choice approach in making decisions to maximize the productivity index (North, 1990; Spicer, 1988; Spicer & Ballew, 1983). NIE employs the individual rational approach in economic transactions, which depends on an individual paradigm, where institutions interact with singular behaviour (Parada, 2002). In addition, NIE can be applied in transaction cost analysis and property rights (North, 1990). In this theory, economic factors are considered the predominant concern in reforming organizational structures and MAS. Therefore, this approach links with MAPs (Burns and Scapens, 2000; Hussain and Hoque, 2002).

Subsequently, NIE and OIE examine institutions to study the interactions between them and organizational rules, and their reflection on human behaviour. Similarly, NIE and OIE incorporate economic theory in their analyses. Moreover, "OIE and NIE are chosen to develop the institutionalized transactions that can serve their particular niche of the human division of labour" (Stanfield, 1995, p.465). In contrast, "NIE is less formal than neoclassical economics, but NIE is more formal than OIE" (Parada 2002. P.45).

NIS assumes that organizations operate in uncertain situations associated with asymmetrical information (DiMaggio and Powell, 1983, 2012). This requires the identification of procedures that can improve organizational performance in different institutions. In other words, NIS seeks to determine the pressures and processes associated with organizational structure. These pressures may affect, and be affected by the social environment in which the organizations operate. Organizational performance is not only determined by maximizing the productivity index, but also depend on its homogeneity within a matrix of social rules, expectations and standards of accepted practice (DiMaggio and Powell, 1983, 2012; Meyer and Rowen 1977). In this case, homogeneity equates to isomorphism, which was classified into three types by Liang et al. (2007, p.68): "coercive, normative and mimetic". Subsequently, organizations seek to apply optimal processes and structures for dealing with social rules and values (Burns et al., 2006).

However, the pressures within the organization are completely associated with OIE theory, which may create significant changes in organizational structure and MAS, whereas the pressures and processes deriving from outside the organization are closely linked with NIE and NIS (Scapens, 2006). According to NIS theory, the diffusion of processes and organizational forms within organizations plays an important role in shaping the organizations' structures with similar procedures (DiMaggio and Powell, 1983; Meyer and Rowan, 1977). This means that organizations have become more homogenous. According to DiMaggio and Powell (1983, p.148), "homogeneity" is defined as an isomorphism. They define organizational isomorphism as the similarities of a specific local organization to other organizations in its environment or field. From this perspective, institutional theory assumes that the organization seeks to conform its structure to the external environment. Thus, institutional isomorphism arises when an organization is profoundly affected by pressures emanating from other organizations operating in the same field. Institutional isomorphism can be divided into three types of pressures: coercive, mimetic and normative pressures (DiMaggio and Powell 1983, 2012; Liang et al. 2007), as described below.

Coercive isomorphism concerns the influence of external pressures on the organization by other organizations, whether state-owned or not, and the impact of social pressures on an organization to conform to cultural rules/norms, which specific regard to a community (Johnston, 2013; Edwards et al., 2009). These pressures are considered as official forms or specific methods imposed by regulatory agencies in the state or adopted by other organizations operating in the same field. For example, manufacturing companies may use discounted cash flow (DCF) methods in their CB decisions, depending on government regulations, or DCF methods adopted by the oil companies operating in the same environment.

Mimetic pressures related to uncertain environmental conditions, which arise when organizations are faced with asymmetrical information about changes in the economic, organizational and environmental contexts. Thus they seek to utilize practices employed by other organizations to attain high productivity or economic benefits. In this regard, copying the best practices used by other organizations is required to identify the factors that reflect on the environmental situation surrounding the organization (Brignall, 1997). Accordingly, DiMaggio and Powell (1983) argue that mimetic isomorphism leads to increased convergence of organizational structures in an institutional environment.

Normative isomorphism is expressed “as a consequence of professionalism”, which is the particular vocation that includes a group of individuals who can undertake a specific job with a high degree of professional skill (Johnston, 2013, p.40). Obviously, normative isomorphism comes in two forms: formal education produced by educational and professional institutions, and individual professional associations (DiMaggio and Powell, 1983; Mizruchi and Fein, 1999). University members and professional individuals hired from other organizations to perform in similar positions, play an important role in creating more homogeneity among the organizations engaging in the same activity. Moreover, normative pressures arise when organizations search to attain more legitimacy for their activities (DiMaggio and Powell, 1983, 2012). Organizations achieve legitimacy and efficiency when they are consistent with social values and norms.

However, researchers may face difficulty in applying NIS theory to private sector organizations in situations of conflict between institutional and market pressures due to differing objectives, including competitive market constraints, and institutions operating under precarious conditions. In accounting literature, institutional theory is more commonly adopted in accounting and management accounting research (Arroyo, 2012; Burns and Scapens, 2000; Moll et al., 2006; Brignall and Modell, 2000; Johansson and Siverbo, 2009; Robalo, 2014; Scapens, 2006; Siti-Nabiha and Scapens, 2005; Tsamenyi, Cullen and Gonzalez, 2006).

Studying MA systems and practices is the basis for forming and reproducing “organizational rules and routines” (Burns and Scapens, 2000, p.3). Burns and Scapens (2000) offer a framework as a starting point for researchers to study changes in management accounting systems, highlighting the relationship between actions and institutions, and determining the role of organizational routines and institutions in management accounting systems changes.

In terms of the change in MAPs, Wanderley et al. (2011, p.113) employed new institutional sociology and old institutional economics to explain changes and contradictions of MAPs using the principles of structural theory, where “action is changed” according to the structure adopted by the organization; this change, then leads to a recursive institutionalization process. In addition, the study conducted by Wanderley et al. (2011) employs three different research frameworks posited by Dillard et al. (2004), Seo and Creed (2002) and Burns and Scapens (2000). Similarly, Dillard et al. (2004, p.512) conceptualized three levels: political and economic situation (PES), organizational field, and organizational practices. The norms and criteria related to the PES level influence the organizational criteria and normative organizational practices in the wider field and are influenced by organizational criteria (Ibid). The practices in organizations (innovators) are affected by practices in the organizational field and influence the adoption of similar structures applied in other organizations (Wanderley et al. 2011). Figure 4.3 illustrates the hierarchy and retrieval of the institutionalization process and its impact on an organization.

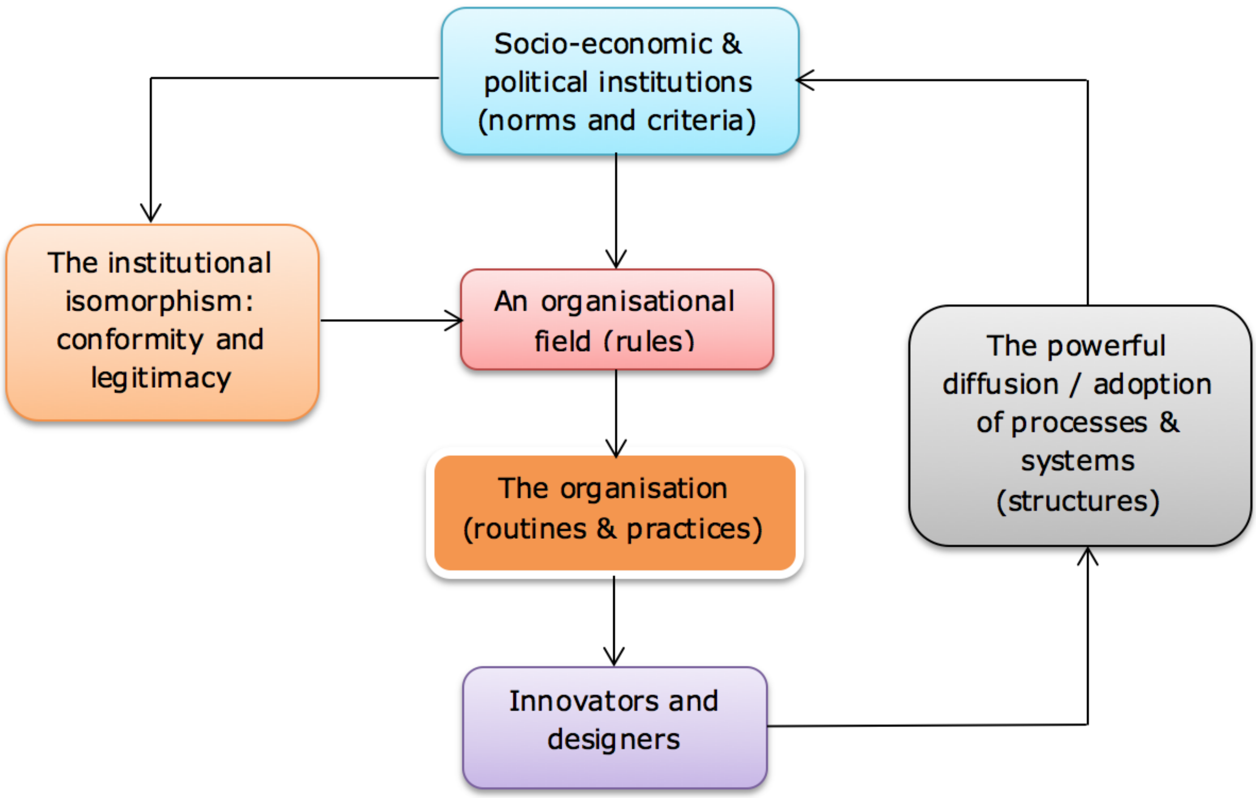


Figure 4.2: The hierarchy and retrieval of the institutionalization process and its impact on an organization

Adapted from Dillard (2004) and Wanderley et al. (2011)

Obviously, the structural development of organizations depends on the economic and political standards, which create and form accepted practices. For example, the Generally Accepted Accounting Principles (GAAP) are commonly used in most organizations (Wanderley et al., 2011). These accepted practices and models are influenced by changes in international and professional institutions. Moreover, Dillard et al. (2004) assert that the adoption of the new practices and changes relies on innovators within organizations and on the way these are applied in the wider industry. This means that the adoption and application of new forms and practices are the function of innovators' practices and the criteria applied in the wider field.

Accordingly, innovators can reinforce and evaluate organizations' current practices to improve their systems. This procedure is largely determined by the practices and criteria used in the organizational field within the same industry (Dillard et al., 2004; Hopper and Major, 2007). After all, the diffusion of MA systems or techniques is contingent upon the legitimacy and the compatibility of the accepted practices supported by the organizational field.

The institutional factors affecting the CB process are empirically examined in the following chapter. This thesis employs contingency theory along with NIS theory, where the outcomes are compared by studying the factors associated with each theory and their impact on the CB process, as explained in the next section.

4.4 Comparison between contingency and institutional theories

Institutional and contingency theories study organizational behaviour and design (Donaldson, 2008a), which pertains to human actions within organizations (McGinnis, 2007). Organizational behaviour systems can be created by communicating and operating systems in organizations, which play an important role in managerial effectiveness. A number of studies have addressed the conflict between contingency and institutional theories in terms of explaining and describing organizational structures, the concept of fit, and results from the adoption of specific organizational structures (Cohen & Sims, 2007; Donaldson, 2008a, 2008b; Tucker, 2010).

Firstly, the main purpose of using contingency and institutional theories is to describe the different structures in organizations, whereby contingency theory (CT) aims to explain the differences in organizational structures (Reid & Smith, 2000). In respect of this, the contingency theory approach assumes that adopting an optimal organizational structure is subject to specific contingencies, such as organizational size and environmental uncertainty (Pfeffer, 1982; Donaldson, 2008a). In other words, contingency theory asserts that there is a relationship between organizational structure, contextual factors and firm performance (Burrell & Morgan, 1979). Accordingly, CT deals with the contextual factors relating to the internal organizational fit for improving organizational performance (Donaldson, 2008a). There is no universally optimal organizational structure for all organizations. The most effective organizational structure will be informed by the organization's particular situation.

Subsequently, structural contingency theory (SCT) presents a systemic framework for studying organizational design (Donaldson, 2001). In literature, SCT is employed to offer prescriptions for organizational structures (Khandwalla, 1972; Burton and Obel, 2004). Conventionally, the study of organizational design is affected by SCT (Burton and Obel, 2004; Burton et al., 2006; Pfeffer, 1982). The design of effective organizational structures occurs when the structure fits with issues observed in the organization’s environment and where this fit encourages high performance (Donaldson, 2006). An effective organizational structure will adapt to the changes in the environment surrounding the organization’s work (Parsons, 1961). This is the major challenge of SCT and unsuccessful organizational structures result from a failure to deal with this issue (Galunic and Eisenhardt, 1994). According to Donaldson (2006), the process of structural adaptation to regain fit (SARFIT) in SCT, allows organizations to deal with changes in their surrounding environment. Thus, the dynamics in the global economy can be combined with the analysis of the SARFIT approach, where contingency fit and misfit may occur due to interchangeable issues. Indeed, SCT is more popular because it is compatible with the social purposes of the structures adopted within organizations. Consequently, SCT can be understood as an equilibrium theory (Ibid).

Ultimately, SCT describes why the adoption of organizational structures (OS) differs from an organization to another. This depends on the degree to which specific contingencies affect them. For example, the use of forecasting and capital budgeting techniques in manufacturing and oil firms is different, because it depends on the levels of specific contingencies, such as firm size, strategic priorities and environmental uncertainty. SCT can explain why some firms must select specific techniques. The reasons for adopting the CBT (specific structure) in manufacturing firms can be interpreted in light of the influence of contingency factors, where large firms used DCF methods and smaller ones used the non-DCF methods. The firms with larger investment expenditures rely more upon quantitative forecasting methods than qualitative ones. It is important to understand how the fit between structure and environmental factors leads to improved performance.

In contrast, institutional theory (INST) focuses on explaining the processes used in producing appropriate organizational structures. In general, the use of INST is primarily affected by two factors: sociological norms and institutional forms "that thereby leads to legitimacy and support from external organizations" (Donaldson, 2008a, p.5). Subsequently, institutional theory aims to attain a high degree of congruence among organizations. This conformity occurs in accordance with an "organization's external fit" (Donaldson, 2008a, P.XIII).

In employing INST, a researcher attempts to specify the external effects, which do or do not lead to increased conformity with other organizations. INST explains the causes for adopting specific structures and describes the consequences of having such structures (Ibid). INST offers explanations as to why organizations adopt specific structures. For instance, one reason for adopting an organizational structure is due to top executives, who prefer a particular structure within its organizational field. INST describes the conditions that allow organizations to adopt homogeneous organizational structures. This conformity is often called institutional isomorphism, whereupon the "organizations become more similar to other organizations within their organizational field, through mimetic, normative and coercive isomorphism" (Donaldson, 2008a, p.6; DiMaggio and Powell, 1983).

Mimetic isomorphism posits that the adoption of a specific structure by other organizations may be a cause for adopting the same structure in an organization (DiMaggio & Powell, 1983; Fligstein, 1985, 1991). In terms of normative isomorphism, the role of professional organizations in selecting the structure helps the organization to select the appropriate structure relative to its organizational field (DiMaggio and Powell, 1983). Moreover, government might impose structures according to the legal framework of the state in which the organizations operate. These legal pressures are defined as coercive isomorphism (DiMaggio and Powell, 1983). Furthermore, the adopted structure may be affected by social and cultural norms, which shape the organization's work within the community. Obviously, INST assumes that there is no consensus regarding an effective organizational design for most organizations (a point of agreement between institutional and contingency theories). As mentioned above, INST describes the consequences from adopting an organizational structure, where a suitable structure leads to positive consequences. The adoption of an effective structure should be compatible with organizations operating in the same field, because the organization aims to acquire "legitimacy and support from external organizations" (Donaldson, 2008a, p.7).

However, some organizations cannot adapt to their external environment. Where an adopted structure does not conform to current legislation and government regulations, an additional legal penalty may be applied to the organization (DiMaggio and Powell, 1983). These criteria can be beneficial “as another kind of external support” (Donaldson, 2008a, p.7). In general, institutional theory considers that conformity or congruence approaches constitute the main issue to consider in managing structural and institutional fit, where the adopted structure fits “the institutional environment of an organization” (Ibid, p.7).

Secondly, the concept of fit is an essential parameter in explaining the consequences or outcomes of the organizational structures. Both contingency and institutional theories assert that suitable fit produces beneficial outcomes. According to Gerdin and Greve (2004, 2008) and Burkert et al. (2014), the concept of contingent fit is an important determinant in most management accounting studies. In other words, contingent fit derives from the fit between the organizational structure and the variability of contingencies, and ultimately helps to maximize organizational effectiveness (Donaldson, 2001). On the other hand, institutional fit refers to the appropriate structure that must be approved as legitimate within the same organizational field, whereby the institutional fit obtains perceptions of legitimacy and hence external support for the organization. Consequently, “contingency fit leads to profitability”, whereas institutional fit maximizes external conformity to the structural model adopted by other organizations (Donaldson, 2008b, p.23).

Finally, the benefits of adopting specific structures differ between contingency and institutional theories. Structural contingency theory claims that the fit between the structure and contingent factors helps to maximize internal effectiveness. An effective structure plays an important role in the attainment of managerial goals. In contrast, institutional fit depends on conformity between the approved structure and institutional factors, and this increases the organization’s legal conformity and creates new investment opportunities for shareholders, thereby increasing the organization’s financial returns. Accordingly, the beneficial outcomes from the two theories fall under external support and internal effectiveness (Donaldson, 2008a).

Contingency theory takes into account the internal organizational environment, while institutional theory emphasizes the institutional environment from an external perspective (Scott, 1987). Both contingency and institutional theories complement each other, where the structural fit deriving from both theories is the same. Both institutional and contingency paradigms are fully compatible as theoretical frameworks from which to develop organizational effectiveness (Tucker, 2010). The organization may adopt a specific structure to account for contingent factors in order to achieve high internal effectiveness. Organizational design favours the external structural model, which accounts for structures adopted by other organizations. This process is related to external conformity, as discussed above. This means the organization seeks to attain the best external support. In other words, according to either theory, the optimal structure is the same (Donaldson, 2008b). Indeed, both the contingency and institutional theories apply “to different aspects of structure; even so, they make predictions about the same structural variable” (Ibid, p.15). Although the views of institutional and contingency theory vary in explaining the structures in organizational design, the designer can combine the different outcomes of both theories to build an optimal organizational structure. Thus, institutional theory complements contingency theory.

In relation to previous research, Ibrahim (2007, p.28) applied institutional and contingency theories, which are used to explore the influence of “coercive institutional pressures, competitive technical pressure and intra-organizational factors on the practice of standard costing systems in Syrian manufacturing public companies”. Ibrahim’s study (2007) relied on suggestions from previous studies regarding the limitations and usefulness of institutional theory. The contingency factors addressed include the extent of a firm's willingness and ability to achieve congruence with the external institutional environment (Oliver, 1991).

In terms of limitations of INST, Ibrahim’s study (2007) demonstrated two important limitations of new institutional sociology (NIS) theory. These limitations have been studied in previous research as follows:

First, NIS focuses on the macroeconomic factors relating to regulations imposed by the external institutional environment rather than the global economy, which has interests in the private sector. NIS emphasizes the role of homogeneity in organizational structures to improve organizational efficiency (Burns and Scapens, 2000; Clemens and Douglas, 2005, 2006; Modell, 2002; Oliver, 1991; Zucker, 1987). Accordingly, NIS theory ignores the technical and competitive conditions associated with operational activities within organizations, as well as other contingencies that affect firms’ internal operating systems (Modell, 2002; Oliver, 1991; Tsamenyi et al, 2006; Zucker, 1987).

Second, NIS theory applies the congruence approach to attain legitimacy and external support (Oliver, 1991). It assumes that conformity is the basis for change, rather than improving organizational effectiveness. Accordingly, NIS theory reinforces the conformity approach rather than resisting the adoption of specific techniques. In specific cases, the organization's structure may be resistant to change and does not conform to institutional pressures. However, maintaining legitimacy “doesn't necessarily conflict with the achievement of economic efficiency through adjustment to competitive conditions and the other technical prerequisites” (Modell, 2002, p.655).

Similarly, Sila (2007) also used the institutional and contingency theory to investigate the influence of contextual factors on the implementation of total quality management (TQM), which in turn affects organizational performance. The contextual factors consist of three institutional factors and two contingency factors. Institutional factors include TQM implementation, ISO registration and country of origin, while contingencies involve company size and scope of operations (Ibid). Sila’s study (2007) utilised multi-group analysis to test the similarities/differences in TQM practices based upon contextual factors. Similar to Ibrahim and Sila’s studies discussed above, Tucker (2010) employed institutional and contingency theories to conceptualize organizational performance in the Not-for-Profit sector. By comparing organizational performance in this way, Tucker’s study (2010, p.27) provides robust evidence that contradictory findings about these theoretical perspectives may be slightly different, but these differences present vital information to decision makers who must account for all factors relating to the observed phenomenon.

4.5 Chapter summary

This chapter addressed contingency and institutional theories. The former focuses on differences in organizational structures, whereas the latter emphasizes the similarities between structures and intends to homogenize structures in organizations. Generally, contingency theory considers that no optimal structure/process is available for application in all organizations. Thus, the optimal structure depends on contingent factors such as firm size, strategic priorities and environmental uncertainty. Recently, most researchers have adopted the contingency approach rather than the congruence approach in using contingency theory.

On the other hand, institutional theory is commonly used in research focused on the study of formal and legal issues in the public sector. Of the three branches of institutional theory (OIE, NIE and NIS), this thesis employs NIS theory, which seeks to determine the coercive, mimetic and normative pressures that affect organizations and which are affected by the social environment in which they operate.

However, the benefits deriving from the application of contingency and institutional theories are established according to the concept of fit. Contingency fit maximizes organizational effectiveness, whereas institutional fit leads to useful external perceptions of legitimacy and external support for the organization. Both theories conceptualize organizational effectiveness differently, but the organization designer can combine the conclusions from both theoretical perspectives to build an optimal organizational structure. As with previous studies, several researchers have applied contingency and institutional theories in management accounting research (Ibrahim, 2007; Sila, 2007; Tucker, 2010). The following chapter presents further details on applying contingency and institutional theories in management accounting and CB research.

5 CHAPTER FIVE: EMPIRICAL LITERATURE AND HYPOTHESES DEVELOPMENT

5.1 Introduction

Most theoretical management accounting researchers employ institutional and contingency theories, while empirical literature uses surveys and case studies to undertake CB research. This research adopts the CB process as its main topic, particularly the CFF stage and the evaluation of investment projects in CB decisions.

CB has been widely used in the planning and control of investment expenditure. This thesis seeks to apply contingency and institutional theories used in explaining the differences between manufacturing and oil firms in terms of forecasting processes in CB decisions. It also presents an extensive review of CB processes, whereby the factors related to the CFFP in CB decisions are explored, including structural and strategic factors, and firms' performance, particularly regarding non-financial factors affecting CB decisions (Arnold and Hatzopoulos, 2000).

In existing literature, most surveys have focused on the evaluation/selection stage in the CB process, where a comparison between investment alternatives is the main objective (Burns and Walker 2009). On the contrary, there is little interest in the CFF stage (Batra and Verma, 2014). Most studies focus on enumerating the methods used in selecting investment projects, whereas there are only four studies related to CFFP in CB decisions (Lazaridis, 2002, 2006; Pohlman et al., 1988; Pruitt and Gitman, 1987). The factors related to forecasting practises in investment decisions have not been studied sufficiently. None of these studies have addressed the impact of CFFP on the evaluation of investment projects in CB decisions. Discussing the factors affecting the criteria for selecting investment projects, it can be seen that the CFF is "a significant determinant of investment for all firms and has the highest impact on the large and new firms" (Devereux, 1990, p.138). Moreover, forecasting variables are perceived to be more important factors in improving firms' performance (Aviv, 2001; Danese and Kalchschmidt, 2011; Helms et al., 2000; McCarthy and Golicic, 2002; Lapide, 2002).

The remainder of this chapter is divided into five main sections. Firstly, the relationships between the forecasting process variables and the extent of use of CBT are demonstrated. One of these is the direct relationship between the procedures and methods used in forecasting (PMUF) and the components of cash flow, which are identified as financial, marketing and production factors (FMPF). Then, the relationship between the PMUF, FMPF and the extent of use of CBT are addressed. Secondly, the effect of key factors (DS, FH, QUA and POS) on the PMUF are also discussed. Subsequently, the influence of contingent and institutional variables on procedures and methods used in forecasting (PMUF) are studied in two separate sections. Finally, the relationship between the PMUF, the extent of use of CBT and the firms' financial performance (PERF) are addressed.

5.2 The relationships between the forecasting process variables and the extent of use of capital budgeting techniques (CBT)

This study focuses on the cash flow forecasting process (CFFP) and its impact on the extent to which investment appraisal techniques are used in CB decisions. The forecasting process in capital investment decisions depends on the procedures and methods used to forecast the components of cash flow. There are also important factors related to the forecasting process, such as information collected from different sources, the forecasting horizon, and the demographic characteristics of forecasters responsible for preparing cash flow estimates (Danese and Kalchschmidt, 2011a, 2011b; Pohlman et al., 1988; Zotteri and Kalchschmidt, 2007). This division depends on the hierarchy of the role of CFF in CB decisions as shown in figure 3.2. In general, the forecasting process in CB starts by identifying the procedures and methods used in forecasting and concludes by estimating the components of cash flow (FMPF). Therefore, PMUF is identified as the first stage of the forecasting process because this phase is authorized to generate the cash flow items.

5.2.1 Procedures and methods used in forecasting (PMUF)

This section demonstrates how the philosophy of forecasting depends on which method can be applied in forecasting, regardless of whether its approach is subjective or objective. In this thesis, "the forecasting procedures and methods" (FPM) are often used as a synonym of the procedures and methods used in forecasting (PMUF).

The forecasting procedures and methods (FPM) are segmented into three categories. Firstly, forecasting procedures include personal estimates, standard procedures for estimating CF and the official forms/worksheets used to collect CF data. Secondly, the forecasting methods consist of judgmental and quantitative methods. Thirdly, the software package used in forecasting is determined in terms of software developed by firms and the commercial software package e.g. Excel.

Pohlman et al. (1988) and Lazaridis (2002, 2006) examined the procedures used in forecasting and found that more than two-thirds of respondents in US firms and about 37% of respondents in both Greek and Cypriot firms have standard procedures for forecasting future cash flow, rather than using forecasting models. These studies explored seven methods used in creating CF estimates, where the majority of respondents (90% of the US firms, 59.17% of Cypriot firms and 48.17% of Greek firms) rely on judgmental methods to estimate cash flow (Ibid). These methods have developed from having been subjective estimates, to the use of computers and sophisticated mathematical models. 69% of respondents in US firms used sensitivity analysis (Pohlman et al., 1988), as opposed to 3.3% of respondents in both Greek and Cypriot firms (Lazaridis, 2002, 2006). Moreover, approximately 50% of respondents from US firms used computer simulation and sophisticated mathematical models for forecasting (Pohlman et al., 1988). By contrast, only 3.3% of respondents in both Greek and Cypriot firms used sophisticated mathematical models and about 15% of respondents in both Greek and Cypriot firms applied computer simulation techniques in CFF (Lazaridis, 2002, 2006). Furthermore, two-thirds of US firms applied three or more techniques in CFFP. In this respect, Greek and Cypriot firms with larger capital projects and longer forecasting periods use various forecasting methods (Ibid).

This has led to a variety of methods being used by businesses. In theoretical literature, the differences between these techniques depend on the methodology used in forecasting, whether it is subjective or objective (Turner, 1974). Similarly, Makridakis et al. (1998) differentiated between quantitative and qualitative forecasting methods, as discussed in chapter three. Quantitative methods are commonly used in businesses when there is sufficient information available about the past, and where these techniques can be applied in planning. Accordingly, the application of forecasting methods varies from one activity to another and depends on the firm's objectives. However, since the mid-1970s there has been marked progression towards judgmental techniques in forecasting (Lawrence et al., 2006). Judgmental methods are commonly used in Australian, US and UK firms (Dalrymple, 1987; Lim and O'Connor, 1996; Sanders and Manrodt, 1994; Sparkes and McHugh, 1984). According to Winklhofer, et al. (1996, p.204), the procedures and methods used in forecasting are influenced by several key factors: “the purpose of forecasting, forecast level, time horizon, resources committed to forecasting, data sources and forecast users”.

However, the selection of an appropriate forecasting method depends on several factors, such as objectivity, the potential for quantified measurement, and cost savings. Yokum and Armstrong (1995) conducted two studies in the USA, addressing many of the factors that relate to the criteria used to select the forecasting methods. The first study explored expert opinions regarding relevant criteria to be considered when selecting appropriate forecasting methods. The experts comprised researchers, practitioners, educators and decision makers, all of whom agreed that ‘accuracy’ is the most important factor, and timeliness in providing forecasts was rated as the second most important (Ibid). Moreover, flexibility, ease of interpretation, ease of implementation and ease of use were also identified as necessary criteria to consider in evaluating forecasting methods (Ibid). Furthermore, other criteria are used in the selection of forecasting methods such as: time horizon, cost savings, ease of using available data and reliability. In the second study, the previous criteria were examined in a different way, using six items involving the number of forecasts, forecasting horizon (short vs. long-term) and extrapolation or econometric forecasting models (Ibid).

The most important criterion in most institutions was cash flow accuracy. Hence, when the economist applies relatively few forecasts for long-term planning, the “ease of interpretation” would seem to be appropriate for econometric models and the comparison between forecasting techniques requires using “a variety of criteria” to select the best one (Yokum and Armstrong, 1995, p.596).

In a different approach, the researcher suggests personal estimates as a part of the forecasting procedures that are studied in literature (Bierman and Smidt, 2007; Alhouderi, 1997). Indeed, most Canadian firms employed a subjective approach to estimate the key components in the capital budgeting process (Jog and Srivastava, 1995). Consistent with previous research, the findings reported that the management’s subjective estimates were the most popular qualitative method used in forecasting future cash flow generated by investment projects in South African firms (Hall and Millard, 2010; Hall and Mutshutshu, 2013). Similarly, Malaysian firms used personal judgement to evaluate investment projects (Anuar, 2005).

Empirical literature pays little attention to the software used in forecasting. Sanders (1997, p.33) surveyed the applications of computer/software in forecasting and found that "69.9% and 14.2% of US manufacturing companies used software developed by their own company and commercial software packages" respectively, whereas 6.5% of US manufacturing firms did not use a computer for forecasting. Indeed, most software used by US manufacturing firms is commercially available, particularly Microsoft Excel.

Most researchers employed forecasting methods in operating activities such as marketing areas (Klassen and Flores, 2001; Lawrence et al., 2000; Watson, 1996), whereby the forecasting horizon only relates to short-term forecasts.

As discussed in chapter three, the most important stage of the capital budgeting process is to estimate future cash flow generated by investment opportunities (Hall, 2000), which in turn is directly associated with the investment appraisal stage. This section discussed the procedures and methods used to forecast future cash flow.

The studies addressed previously in this section focused on the forecasting procedures and methods used in forecasting practices, particularly in CB decisions, and none of these studies investigated the relationship between the PMUF and the extent of CBT usage. The application of CBT is affected by the selection of PMUF. For example, the use of quantitative methods in forecasting relates to the application of DCF methods. Contrarily, subjective approaches may suit the use of payback period or personal judgment. The researcher aims to examine the extent of this relationship to establish the role of forecasting processes in CB decisions.

Consequently, this thesis seeks to identify and understand forecasting processes used in manufacturing and oil firms, but it does not attempt to evaluate the procedures and methods used in forecasting. This study also aims to examine the role of forecasting procedures and methods in generating the components of cash flow, which, in turn, may affect the use of CBT. In doing so, the researcher suggests two hypotheses.

Firstly, the researcher attempts to test the relationship between the use of forecasting procedures and methods (FPM), and the three main components of cash flow, namely the financial, marketing and production factors (FMPF). This will be addressed in the next subsection. Secondly, the direct relationship between the forecasting procedures and methods and the extent of CBT usage will be tested. The two hypotheses are formulated as follows.

H1: There is a positive association between the use of forecasting procedures and methods (FPM) and the financial, marketing and production factors (FMPF) observed in both manufacturing and oil firms.

H2: The use of forecasting procedures and methods (FPM) are positively associated with the extent of CBT usage in manufacturing and oil firms.

5.2.2 The components of cash flow: financial, marketing and production factors

The second key factor affecting the forecasting process concerns the components of cash flow, which are financial, marketing and production factors (FMPF). As discussed in the previous sub-section, the first hypothesis tests the extent of association of FMPF with the use of forecasting procedures and methods (FPM). This thesis also aims to explore the extent of association of FMPF with the extent of use of CBT, to examine the role of CFFP in capital budgeting decisions. Accordingly, the researcher attempts to answer the following question: To what extent are financial, marketing and production factors significantly associated with the extent of use of CB processes (PMUF and CBT)?

Regarding the financial variables related to the CFFP, more than two-thirds of Greek and Cypriot firms considered the borrowing and repayment of funds (external financing) as significant factors in CFF (Lazaridis, 2002, 2006). More than two-thirds of US firms ranked project risk and tax considerations as the most important factors in forecasting cash flow (Pohlman et al. 1988). Similarly, about two-thirds of US, Greek and Cypriot firms stated that working capital requirements have a significant impact on CFF (Lazaridis, 2002, 2006; Pohlman et al., 1988).

Furthermore, there is a significant correlation between financial factors and financial ratios, whereby working capital requirements are perceived as being more important when the debt ratio is high (Pohlman et al., 1988). Subsequently, most respondents from Greek, Cypriot and US firms considered the administrative overhead, project evaluation and investigation costs, salvage values and project abandonment values to be less important than other factors (Lazaridis, 2002, 2006; Pohlman et al., 1988).

Hovakimian (2009, p.181) investigated the influence of financing constraints on investment cash flow sensitivity, and found that “firms classified as negative cash flow-sensitive have the lowest levels of internal liquidity”. In other words, firms cannot adopt internal funding if there is perceived negative cash flow sensitivity. Investment cash flow sensitivity may lead to higher borrowing costs and negatively affect CF (Fazzari et al., 1988; Hovakimian, 2009). However, Devereux (1990, p.138) used econometric models to assess the “impact of taxation and financial factors, such as cash flow, debt and stock measures of liquidity on the investment decisions”; this study explored the significant role of tax in determining the appropriate investment level for fixed assets. Devereux’s study (1990) focused on financial factors in the UK corporate tax system but did not test their impact on CB. Cash flow was considered one of the financial factors, but the financial factors related to CFF in CB were not surveyed.

Tateishi and Mizumoto (2011) examined the influence of seven factors on cash flow in international companies: foreign exchange rates, depreciation costs, material costs, tax rate, working capital, operating income and labour wages. Results indicated that depreciation costs and exchange rates have a significant impact on the cash flow of international companies in Japan (Ibid). However, the analytical approach of this study was based on short-term planning and all factors were related to operational activity. Similarly, Soares et al. (2007, p.25) referred to factors affecting the evaluation of forecast accuracy in CB. They determined that forecast accuracy depends on the components of operating cash flow, which are sales, cost of goods sold, raw materials, labour and supply payments, and personnel expenses (Ibid).

These studies addressed the role of financial, marketing and production factors (FMPF) in CFFP, but ignored the extent to which the financial, marketing and production factors are associated with the capital budgeting process, particularly the CBT, which is used as an essential criterion for selecting the investment projects.

In terms of marketing variables, approximately 90% of respondents in US, Greek and Cypriot firms stated that sales forecasting is the most important factor (Lazaridis, 2002, 2006; Pohlman et al., 1988). Additionally, respondents from US firms ranked product life as the third most important factor, while selling expenditures are ranked as the third most important factor in Greek and Cypriot firms (Ibid). Moreover, competitive advantages and disadvantages, and promotional expenditures are equally evaluated in US, Greek and Cypriot firms (Ibid). Similarly, most studies focused on sales forecast as an important market factor, whether it is considered in the short or long term, because “sales forecast is a common activity in most companies affecting operations, marketing and planning” (Fildes et al., 2003, p.27). This forecast can be used to predict new product sales or to estimate both domestic and export sales (Orbach and Fruchter, 2011; Tanaka, 2010; Winklhofer and Diamantopoulos, 2003). On the other hand, the impact of market testing costs, discount policy and transportation costs on CFF, are considered to be less important among US, Greek and Cypriot firms (Lazaridis, 2002, 2006; Pohlman et al., 1988). However, there is less interest in sales forecast from long term investment projects, than there is in those from short term projects (Turner and Guilding, 2012).

Finally, production indicators are the third most important set of variables affecting CFFP, where more than 80% of respondents from US, Greek and Cypriot firms stated that the operating expenses are the most important factor, followed by manufacturing overhead expenses, and material and supply costs (Lazaridis, 2002, 2006; Pohlman et al., 1988). Shutdown costs, maintenance costs, capacity utilization research and development expense are of less interest in US, Greek and Cypriot firms (Ibid). Conversely, start-up costs are more important in US firms than in Greek or Cypriot firms, whereas repair costs are observed to be more important in Greek and Cypriot firms than in US firms (Ibid).

There are other significant production factors which are not mentioned above, such as depreciation and labour production costs. According to Tateishi and Mizumoto (2011), depreciation costs significantly affect the CF of international companies in Japan. As mentioned in the previous section, the components of CF are generated by PMUF, and the first hypothesis refers to the role of PMUF in creating the FMPF (i.e. concerning the linkage between PMUF and FMPF in affecting the use of CBT). Therefore, the positive relationship between PMUF and FMPF affects the relationship between the FMPF and the extent of CBT usage.

However, prior research focused on determining the importance of FMPF in CFF (Lazaridis, 2002, 2006; Pohlman et al., 1988). Nevertheless, no study has investigated the relationship between the FMPF and the extent of use of CBT. Hence, the aim of this part of the study is to test the extent of the association of financial, marketing and production factors with the extent of use of CBT. In doing so, the researcher formulates the following hypothesis:

H3: The financial, marketing and production factors (FMPF), which are created by the PMUF, are positively associated with the extent of CBT usage in manufacturing and oil firms.

5.3 The key factors (DS, FH, QUA & POS) related to cash flow forecasting process

5.3.1 Data sources (DS)

Data sources are one of the factors related to the CFFP. This consists of internal and external data sources, depending on the type and quality of data. In management accounting literature, the sources of management accounting information are often collected internally from firm departments and external business processes. According to Arens et al. (1993, p.1), "the current explosion of data, retrieving and integrating information from various sources is a critical problem". In this regard, Danese and Kalchschmidt (2011a, 2011b) stated that information collected from multiple sources is an essential determinant in influencing forecast accuracy. Therefore, the identification of reliable and appropriate data sources related to CFF is crucial.

Several studies focus on external and internal information sources used in collecting data relating to the preparation of forecasts (Winklhofer, et al., 1996). According to Wotruba and Thurlow (1976, p.11), sales force is an important source of market forecasting information, "especially under unique economic conditions which make historical data unreliable". In multinational companies, "the sales force, historical data and the marketing research department are regularly used; whereas, the management of other subsidiaries, trade sources and commercial suppliers are less important" (Hulbert et al., 1980, p.10). Management guidelines issued by holding companies are considered to be the external data sources of subsidiaries, especially for companies with headquarters located outside of the host country (McHugh and Sparkes, 1983).

Regarding external information needed for forecasting, the National Institute of Economic and Social Research in the UK was considered a common source of macroeconomic data for forecasting (Simister and Turner, 1973). 90% of respondents in US firms incorporated national macroeconomic variables in econometric forecasting models (Naylor, 1981). According to Cerullo and Avila (1975), two-thirds of US firms using causal forecasting models included external data in their forecasts. Rothe (1978) stated that 55% of US firms (mainly larger ones) also used macroeconomic data in their quantitative models. However, Fildes and Hastings

(1994) explored the effectiveness of information sources and found a degree of dissatisfaction among respondents about the scarcity of market research data, as an essential determinant in forecast accuracy.

Most petrochemical and oil investment projects in Libya depended on feasibility studies that were required to be undertaken by Libyan oil firms (e.g. the NOC and subsidiaries such as Ras Lanuf Oil company). In the Libyan oil sector, feasibility studies are conducting by foreign consulting firms using information based on global oil markets (Franlap, 1997; Brown and Root, 1979, 1984). Therefore, external data sources were applied to acquire data for CFF in Libyan oil companies.

However, Ochs and Parkinson (2006) stated that several companies have difficulty in determining internal data sources for forecasting, because of the diversity of available data sources; this paper refers to factors that are important for forecasting, such as transaction size, and the frequencies and methods associated with CFF. To improve CFF, the various tasks of forecasting have to be considered as follows (Ibid).

Firstly, the level of satisfaction regarding the data sources used in forecasting, the extent to which data sources are mutually compatible, and the development of current estimates by using relevant sources, and the potential to understand them (Ibid). Data received from appropriate sources must be cohesive.

Secondly, the extent of the accuracy and reliability of the data required in forecasting should also be considered. Ochs and Parkinson's paper (2006) considers that forecast horizon is a vital parameter in determining the accuracy of CFF, where daily and weekly forecasts are more accurate than monthly or quarterly forecasting. In this regard, sources can be improved or altered when information is insufficient.

Thirdly, historical data related to liquidity is an important factor in CFF. Moreover, seasonal trend analysis is a method, which helps to forecast the cash flow required in short-term investments. In other words, this method allows comparing cash movements among different periods and estimates the rates of borrowing when a cash shortage exists. In this case, the researchers used spreadsheets (Microsoft Excel) to forecast these factors. Finally, analysts should assess the regular variances between sources and test the outcomes from data sources.

Consequently, these tasks/procedures lead to identifying appropriate data sources and understanding why individual forecasts have to be eliminated from the forecasting process. Therefore, the identification of reliable data sources is a hard task when forecasting future cash flow. However, Ochs and Parkinson (2006) did not refer to external data sources and did not specify appropriate forecasting methods for when data sources are completely different from one industry to the next. This study did not test and measure the impact of the diversity of data sources on the use of appraisal techniques in CB decisions. Nevertheless, the selection and use of appropriate data sources in forecasting is not an ordinary task, which leads to the identification of the type and quality of data used in forecasting future cash flow.

Subsequently, Kalchschmidt et al. (2010) consider that the forecasting process consists of forecasting techniques and information collected from different sources. According to Danese and Kalchschmidt (2011a, p.208), the data sources used in forecasting are “current economic conditions, customers’ sales plans, supplier information and market research”. The information collected from reliable sources has a positive impact on the Italian firms’ performances (Kalchschmidt et al., 2010). Accordingly, the data used in the forecasting process can be collected from the following sources:

- Firm’s departments.
- Traders and suppliers.
- Research centres.
- Customer/distributor’s sales plans for company products.
- Local analysts (e.g. chartered accountants).
- Foreign consultants and companies.

In summary, this thesis seeks to test the influence of using multiple data sources on forecasting procedures and methods as the main task in the forecasting process, which, in turn, reflects on the extent of CBT usage. To test this, the researcher formulates the following hypothesis:

> *H4: The use of multiple data sources in forecasting processes is positively associated with the use of forecasting procedures and methods for capital budgeting decisions made by top management in manufacturing and oil firms.*

5.3.2 Forecasting horizon (FH)

Forecasting horizon is the length of a forecasting period. This factor is also referred to as "the average economic life of a project" (Pohlman et al., 1988, p.74). More than a third of respondents in US firms stated that their forecasting horizon in investment projects is more than ten years (Pohlman et al., 1988). Canadian managers divided the forecasting horizon into four periods: the shortest term "1-3 months", medium-shorter term (4-12 months), medium term "12-24 months", and longest term "more than 24 months" (Klassen and Flores, 2001). McHugh and Sparkes (1983) established that a short-term forecast is considered more important in firms operating in highly competitive markets. According to Winklhofer, et al. (1996, p.217), there is a strong link between short-term forecasts and the number of forecasts needed to assess the accuracy of forecasting. Sanders and Manrodt (1994) found that US managers used various techniques for multiple forecast horizons. According to Klassen and Flores (2001), judgmental methods are more commonly used with different time horizons. In this regard, Naylor (1981) stated that a long forecast horizon is associated with the use of econometric forecast models. In the same way, US firms use multiple forecasting methods with different forecasting horizons (Sanders & Manrodt, 1994).

However, none of these studies evaluated the impact of the length of the forecasting horizon on the use of forecasting procedures and methods (FPM). This thesis seeks to assess the relationship between the forecasting horizon and PMUF, which may affect the extent of use of investment appraisal techniques in CB. Therefore, the following hypothesis was posited:

> *H5: The long-term forecast is positively associated with the use of forecasting procedures and methods (FPM) for capital budgeting decisions made by top management in manufacturing and oil firms.*

5.3.3 Qualifications and position of forecasters.

Forecasters are the official persons who are responsible for estimating future cash flow generated by the investment projects. With regard to the responsibility of the forecasting process, Pohlman et al. (1988) and Lazaridis (2002, 2006) found that Greek, Cypriot and US firms had one or more official persons preparing and coordinating cash flow estimates, including financial analyst, accountant, treasurer, department manager, controller, vice-president and president. These studies found that the responsibility for coordination and supervision of the CFFP is considered less important with low capital intensity and debt ratios. Similarly, 52% of respondents confirm that the controller or vice president in American companies is responsible for forecasting (Drury, 1990). In this regard, the larger organizations in British manufacturing relied on dedicated planning staff for preparing new forecasts during the 1970s (Simister and Turner, 1973; Wheelwright and Clarke, 1976). Financial teams were more commonly responsible for forecasting operations relating to budgets and financial plans from the 1980s onwards (Drury, 1990). Indeed, most organizations depend on top management in supervising and control of the forecasting process (West, 1994). Therefore, it must also be admitted that the responsibility for forecasting is conducted by the CEO who is authorized by a company to overrule other managers in Canadian firms (Klassen and Flores, 2001). In contrast, a top-down approach is more commonly used in smaller companies than larger ones. Nevertheless, the decision makers are responsible for the forecasting process of bottom management (Peterson, 1993). Therefore, the CEO or president is the person responsible for the forecasting process in small firms (Peterson, 1993; White, 1984).

This study tests the role of the qualifications (QUA) and position (POS) of the forecasters[3] in the forecasting process, specifically examining the relationship between these factors (QUA and POS) and the use of forecasting procedures and methods; therefore, the researcher attempts to test the following hypotheses:

> *H6: The presence of qualified forecasters is positively associated with the use of forecasting procedures and methods for capital budgeting decisions made by top management in manufacturing and oil firms.*
>
> *H7: The presence of official persons responsible for the forecasting process (position of forecasters) is positively associated with the use of forecasting procedures and methods for capital budgeting decisions made by top management in manufacturing and oil firms.*

[3] Forecaster: The official persons who are responsible for preparing the cash flow estimates.

5.4 The influence of the combined contingent variables on the procedures and methods used in forecasting (PMUF)

As discussed in chapters two and three, most studies of CB focus on the factors affecting the criteria for evaluating and selecting investment projects (the third stage of CBP). To support the importance of the CFF stage, this thesis reinforces the role of the CFF in CB decisions, where estimating the CF is a significant indicator in appraising investment projects (Batra & Verma, 2014). Additionally, some factors are related to the CFFP in CB decisions. According to Pike (1986), contingent factors have an effective role in the CB process. Thus, this thesis aims to ascertain the influence of such contingent factors on the CFFP, as in the second stage of the CB decision.

In empirical literature, several contingent variables have been suggested for management control systems (Fisher, 1995; Merchant, 1998). On the one hand, most management accounting studies have faced difficulty in classifying the contingency variables (Chenhall et al., 1981). However, some researchers have classified these variables. Pike (1984, 1986) considers contextual characteristics as being contingent variables which affect the sophistication of capital budgeting, as well as its effectiveness. These characteristics include firm size, environmental risk, capital intensity, industry classification, manager style and the organization's financial position. Similarly, contingent factors can be divided into five categories to describe the differences in selecting/using appraisal techniques, as follows: perceived environmental uncertainty, strategic priorities, technology, firm and industry characteristics, cognitive ability and observability (Drury, 2012).

Similarly, Anuar (2005, p.45) argued that the applicability of appraisal techniques in CB is "contingent on the specific circumstances surrounding the firm and its investment". Pike (1984) examined the influence of the degree of sophistication in the CB process, and the contingent variables (size, capital intensity and industry classifications) on the performance of UK firms. A scoring method was used to measure the degree of sophistication in the CB process for each firm, and the level of sophistication in CBT was found to be affected by environmental uncertainty. Pike's study (1984) stated that the contingency variables (size, project risk and capital intensity) are positively correlated with organizational performance. Similarly, Pike (1986) later research model determined the following variables:

- Contextual characteristics (specific contingencies as the independent variables): firm size, capital intensity, environmental risk, manager style, financial status and control strategy (administration and inter-personality).
- Capital budgeting behaviour: formalization, sophistication, complexity and specialization.

According to Pike (1986, P.187), an optimally designed CB system is determined by the fit between the organization's structure and contextual factors. The organizational structure is a function of contextual characteristics, as mentioned above. Thus, Pike's study (1986) examined the impact of these variables on the sophistication and effectiveness of CB, which, in turn, affects organizational performance, as measured by using the operating rate of return (ORR). Pike's framework is similar to the path model, focusing on the causal relationship between interrelated variables. This is also similar to the research model applied in this thesis, which aims to investigate the influence of contingent variables on the forecasting process as the second stage of CBP, instead of the third stage of CBP as understood by Pike (1986) that concentrates on the level of sophistication in capital budgeting techniques.

In the same way, Haka (1987) tested the impact of contingency variables on the effectiveness of discounted cash flow technique (DCFT) usage in CB decisions, where the contingent variables were divided into internal and external variables. Internal contingent variables include the degree of decentralization, information systems, reward structure and tools, while external ones are the firms' strategy, organizational stability and environmental predictability and diversity. Accordingly, this study contributed to the use of contingency theory in CB (Ibid).

Afonso and Cunha (2009) established the determinants of employing investment appraisal techniques (IAT); these include internal and external contingent variables, which consist of environmental uncertainty, industry, age, size, investment expenditures, competition, production technology and the firm's strategy. A multiple regression model with factor analysis, was used as a statistical method to analyse this data. The use of IAT was found to be affected by the internal and external contingency variables (Ibid).

With regard to the relationship between the forecasting process factors and firm characteristics, a variety of factors are addressed as part of this research, but these differ from one corporation to another. The components of cash flow are perceived to be more closely correlated with contingent variables, including financial, marketing and production factors, which are considered to be the essential determinants of CFF (Pohlman et al., 1988).

Most studies focus on organizational contextual factors and their impact on the extent of use of CBT, and the degree of sophistication in CB (Pike, 1984, 1986; Afonso and Cunha, 2009; Anuar, 2005; Eljelly and AbuIdris, 2001; Holmen and Pramborg, 2009; Alzoubi & Alazawi, 2010). In management accounting research, Al-Sayed and Dugdale (2016) employed contingency theory to examine the influence of organizational and contextual factors on the adoption of activity-based innovations in the UK manufacturing sector. These contingencies include top management and internal support, firm size, level of overheads, product complexity and diversity and perceived environmental uncertainty (PEU).

Accordingly, this thesis examines the influence of contingent variables (firm size, the type of ownership and industry, firm strategy and environmental uncertainty) on the use of forecasting procedures and methods (FPM), as this represents the main task in the forecasting process. It is well known that the components of cash flow (FMPF) are generated by PMUF. In turn, the use of forecasting procedures and methods positively reflects on the extent of use of CBT. In line with prior studies, the combined contingent variables are addressed as one factor (Anuar, 2005).

5.4.1 Firm size (FS)

In empirical literature, several studies address the relationship between CBT and firm characteristics as contingent variables. Klammer (1973) suggested that the firm's characteristics have an impact on the success of use of DCF methods. These characteristics differ from one activity to another, and firm size, age, ownership and the type of industry are more commonly used in empirical literature. In this regard, Verma et al., (2009) revealed that larger Indian companies prefer to use the NPV method more so than smaller ones. Pike (1983) stated that sophisticated CBT are only applied in the largest UK firms. In contrast, the payback period method is more popular among smaller US firms (Block, 1997). The sophistication in CB requires "a clearer understanding of the important relationships between size, organizational structure, commitment and bias in the design and operation of CB processes" (Pike, 1983, p.208).

Accordingly, firm size is a vital variable in determining the sophistication of the CB process. The application of contingency theory in CB research is perceived as the main element in identifying any misfit between context and CB process, and therefore, improves the effectiveness of CB (Pike, 1986).

The most important constraint is the size of capital investment expenditure. This factor affects the CFF in CB decisions, because the equations of CBT depend on this factor. To prove this, the NPV equals present value of cash flows minus capital investment outlays. According to Schall and Sundem (1980), the use of sophisticated CBT is associated with high investment outlays. In respect of this, the payback and NPV techniques are commonly used in Sudanese companies with high investment outlays (Eljelly and AbuIdris, 2001). In the USA, the majority of investment projects exceeding $40,000 require cash flow estimates (Pohlman et al., 1988). Similarly, 45.37% of Greek firms and 55.86% of Cypriot firms require detailed cash flow estimates (Lazaridis, 2002, 2006). Moreover, the use of multiple forecasting methods in large US firms is associated with high capital expenditures (Pohlman et al., 1988). According to Lazaridis (2002, 2006), the borrowing and repayment of funds has a significant impact on CFFP in small Greek and Cypriot firms. The largest US firms consider tax considerations to be the most important financial factor. In most cases, the investment projects with high capital intensity lead to the extensive usage of forecasting methods in large US firms, and responsibility for the forecasting process is perceived to be less important with low capital intensity (Pohlman et al., 1988). Subsequently, sales forecasts in the largest US firms lead to extensive usage of forecasting methods (Pohlman et al., 1988). As mentioned above, small and medium sized firms in Cyprus "require detailed cash flow estimated mostly for all types of investments" (Lazaridis, 2002, p.67). Indeed, the CFFP is "a significant determinant of investment for all firms and has the highest impact on large and new firms" (Devereux, 1990, p.138). Furthermore, the largest forecasting period (>10 years) is positively related to US firm size (Pohlman et al., 1988).

Kadapakkam et al., (1998, p.293) examined the effects of firm size and cash flow on investments in six OECD countries (Canada, France, Germany, the UK, Japan and the USA), where the market value of equity, total assets and overall sales were used to measure firm size. More simply, Aoun and Hwang (2008) measured firm size by net value of total assets, categorizing firms into three groups: small firms, with total assets of less than $13 million; medium-sized firms with assets of $13-59.9 million; and large firms with over $60 million in assets. Kadapakkam et al., (1998) stated that the highest sensitivity of cash flow-investment is positively related to the large ICT firms, whereas the smallest sensitivity is associated with small firms. Moreover, Zotteri and Kalchschmidt (2007) identify a relationship between firm size and its forecasting practice, using the number of employees and overall sales to measure firm size.

5.4.2 The perceived environmental uncertainty (PEU)

The most effective factor in CB decisions is environmental uncertainty. According to Haka (1987), environmental uncertainty and centralization in making CB decisions are mitigating factors in utilizing discounted cash flow techniques (DCFT).

There are two general environmental paradigms: environmental predictability, and diversity (Lawrence and Lorsch, 1967; Thompson, 1967; Waterhouse and Tiessen, 1978). Environmental predictability often arises when uncertain events change approximately in accordance with changes in competitor's actions, financial and technological developments, and governmental policies (Miles & Snow, 1978). Environmental diversity is associated with firm's consumer characteristics, production technologies, raw materials and product markets (Lawrence and Lorsch, 1967; Khandwalla, 1972; Thompson, 1967). Heka (1987) confirmed that financial and marketing factors, which are more predictable within a company, are perceived to be increasingly correlated with the use of DCFT. Nevertheless, firms operating in heterogeneous environments have faced difficulty in predicting such factors. At this point, the use of DCFT is "not likely to lead to as a successful result as firms in homogeneous environments" (Haka, 1987, p.35). As such, the real options approach is the appropriate technique to use under conditions of uncertainty for Malaysian firms (Anuar, 2005).

In empirical literature, Hoque (2004, p.485) investigated the influence of environmental uncertainty on organizational performance "through the management's choice of nonfinancial measures of performance". This study specified eight items to measure the PEU. These measures are "suppliers' actions, customer demands & preferences, deregulation and globalization, market activities of competitors, production and information technologies, government regulations, economic environment and industrial relations" (Ibid, p. 499). Indeed, the items adopted by Hoque (2004) were discussed by Gordon and Narayanan (1984), Govindarajan (1984) and Hoque and Hopper (1997). Hoque's study (2004) did not find evidence for any relationship between the PEU and performance, through the use of non-financial performance measures.

Similarly, Ekholm and Wallin (2011) addressed the impact of perceived environmental uncertainty (PEU) on the benefits of fixed and flexible budgets; this study offered fourteen indicators to measure PEU. In addition, it is observed that there is a significant negative relationship between PEU and the perceived usefulness of traditional annual budgets. Nevertheless, no relationship between the PEU and the utility of flexible budgets was ascertained (Ibid, p.145). Abdel-Kader and Luther (2008) and Abugalia (2011) also investigated the influence of PEU on management accounting practices.

Consistent with previous studies, Anuar (2005) examined the effect of predictability and diversity of external environment on the selection of investment appraisal techniques among Malaysian firms. Organizations operating in unpredictable external environments cannot rely on financial performance measures to improve organizational performance (Chong and Chong, 1997; Gul and Chia, 1994; Hoque and Hopper, 1997; Mia and Chenhall, 1994).

Accordingly, the procedures and methods used in forecasting future cash flow should account for uncertainty in aiming to identify optimal investment opportunities.

5.4.3 The strategic priorities of firm (SPF)

The firm's strategy is the most important contingent factor related to management accounting research, particularly in the CB process. CB decisions are associated with the long-term strategy of the organization. Therefore, investment decisions are highly significant in all organizations. According to Grossman and Lindhe (1984, p.103), "decisions on capital investments at both the program and the specific asset level should be made in the context of the objectives of an organization as a whole". The going concern principle should be related to appropriate strategic priorities undertaken in organizations (Miles and Snow, 1978; Porter, 1980). Subsequently, CB decisions can be implemented in different activities, depending on the type of investment. Pohlman et al. (1988) indicated the types of investment projects requiring cash flow estimates, as mentioned in the previous section. These investments are part of long-term strategy, and the organization's strategy is different from one activity to another, where several strategic business units (SBUs) assign different strategies to individual SBUs (Henderson, 1979; Porter, 1980; Rothschild, 2002). Govindarajan (1988, p.828) recognized that "different business units within the same corporation often pursue different strategies", using low cost and differentiation strategies to measure organizational strategies including product selling price, percentage of sales spent on research and development, percentage of sales spent on marketing expenses, product quality, brand image and product features. Govindarajan's study (1988) employed the contingency approach as the basis for the theoretical argument.

Subsequently, Chenhall and Langfield-Smith (1998) used the same measurements mentioned above to evaluate strategic policies in Australian firms. Similarly, the use of differentiation and low cost strategies were found to be the basis for measuring strategies in UK and Australian firms (Abdel-Kader and Luther, 2008; King et al., 2010). Haka (1987) categorised US firm strategies according to three criteria: those which focus on new production lines, those which select investment projects with high return and risk, and those which emphasise research and development. Similarly, Abugalia (2011, p.216) determined the strategic policies in Libyan industrial firms in terms of three tasks: "mission strategy, competitive advantage strategy and product and market change strategy".

In terms of the relationship between forecasting processes and firm's strategy, Zotteri and Kalchschmidt (2007, p.84) examined the "contingent variables such as firm size, type of sector, strategic priorities and demand characteristics (number of products) and their relationship with forecasting practices". They found that forecasting processes in Italian companies are contingent upon their competitive strategies, and this factor certainly has a positive correlation with the forecasting horizon (Ibid). From this perspective, McHugh and Sparkes (1983) established that short-term forecasting is considered to be more important in firms operating in highly competitive markets.

In empirical literature, Ekholm and Wallin (2011) addressed the influence of strategic priorities (SP) on the benefits of fixed and flexible budgets. Ekholm and Wallin's study identified a positive relationship between SP and the preparation of fixed and flexible budgets. In line with the CB process, Anuar (2005) applied prospector, defender and analysers' policies to determine the appropriate strategy related to investment processes. Anuar's study (2005) adopted the strategic policies deriving from previous studies (Miles & Snow, 1978; Porter, 1985; Govindarajan, 1984; Haka, 1987; Chenhall and Langfield-Smith, 1998). In this regard, Anuar (2005, p.119) divided the cooperative strategies into six components, which can be implemented in Malaysian firms. Firstly, a firm focuses on product development, or market penetration. Secondly, a firm's strategy concentrates on product differentiation, or achieves low costs. Thirdly, the strategic policy of a firm involves searching for investments yielding high profits, based on either high or low risk. Fourthly, a firm's strategy also draws attention to its competitive position in short or long-term activity. Fifthly, firms support their strategy based on innovation and research development. Finally, a firm's strategy relies on technological flexibility. The strategic priorities (SP) adopted in this thesis are partly similar to those addressed by Anuar (2005), Abugalia (2011), Ekholm and Wallin (2011), Hyvonen, (2007) and Haka (1987). Similarly, Büchner et al. (2013, p.7) identified the strategic policies in German hospitals based on the influence of the "governing board on strategy planning for social, employment, market-related and innovation-oriented objectives".

In line with the previous studies, this thesis applies investment-focused strategies to adopt most, or part of the strategic priorities, as mentioned above. Libyan government intervention in determining the firm's strategy for general economic considerations is one such strategy.

5.4.4 The type of industry (IND)

CB processes can be applied in different activities and industries. Pohlman et al. (1988, p.72) illustrated the types of investment projects requiring cash flow estimates, including: "new equipment, replacement of equipment, facilities expansion, facilities modernization and acquisition of on-going concern". Moreover, Small (1980, p.21) stated that the industry type and forecasting techniques have a positive correlation with the forecasting horizon. Similarly, Sanders (1992) considers that the industry type is more strongly correlated with sophisticated forecasting techniques in manufacturing firms than in service firms.

Anuar (2005) also understood industry type as being similar to the firm's major products. This study examines the relationship between the firm's major products and the use of sophisticated CBT in Malaysian manufacturing companies. According to Verbeeten (2006), the use of sophisticated CB is associated with firm size and industry type. Verma et al. (2009) found that younger companies in India preferred to use the payback period (PB) method rather than DCFT.

As per the previous discussion, the researcher attempts to assess the influence of firms' contingent variables (CV) on the procedures and methods used in forecasting (PMUF). The reason for testing the effect of contingent variables on PMUF relates to the main research objective – to highlight the importance of forecasting process, which in turn reflects on the extent to which CBT are used. The preparation of CB is a hierarchal process, where it is impossible to use investment appraisal techniques (CBT) before specifying future cash flow generated by the investment opportunities. Consequently, testing the influence of contingent variables (CV) on the extent to which CBT are used is a different topic, as addressed in previous studies (Afonso and Cunha, 2009; Anuar, 2005; Pike, 1986).

Following this, the researcher tested the influence of combined contingent variables (CV) on the forecasting procedures and methods used by manufacturing and oil firms operating in Libya. The combined contingent variables (CV) are determined as follows:

- Average of annual sales (AAS)
- Average of investment expenditures (AIE)
- Number of employees (NEM)
- Type of industry (IND)
- Strategic priorities (SP)
- Perceived environmental uncertainty (PEU)

Subsequently, the researcher formulates the following hypothesis:

> *H8: The combined contingent variables (AAS, AIE, NEM, IND, SP and PEU) have a strong effect on the use of forecasting procedures and methods for capital budgeting decisions made by top management in manufacturing and oil firms.*

This study sought to investigate the significance of contingency theory in explaining the differences between public and private companies in their use of FPM. In this regard, the researcher attempts to test the role of ownership in enhancing the relationship between contingent variables and the use of forecasting procedures and methods. In causality theory, the relationship between the independent and dependent variable is made possible by the mediating variable. Conversely, the moderating effect indicates that the relationship between two variables depends on the levels of another variable (Hair et al., 2014; Lowry and Gaskin, 2014).

In empirical literature, Eljelly and AbuIdris (2001) examine the differences between Sudanese public and private enterprises in terms of their applications of CBT, and sought to determine the factors which may have impacted their choices of CBT; they found that public sector managers were more active in CB than their private sector peers. The NPV method was perceived to be more important in the public sector, while PB was most widely used across both sectors (Ibid). Similarly, Al Ani (2015) examined the influence of specific contingencies on the use of the payback period method in both groups working in the Omani energy and oil sectors. Al Ani's study revealed that the use of PB methods by both managers and investors is not significantly different, according to the specific contingent variables of "risk, liquidity, profitability, market obstacles, management compensation and firm size". Consequently, discounted cash flow methods are more commonly used in foreign-owned firms than Malaysian-owned firms (Sri-International, 1994, cited in Anuar, 2005).

In terms of multi-group analysis, the influence of contingency variables on the use of forecasting procedures and methods may differ between public and private companies. Therefore, the researcher formulates the following hypothesis:

> *$H8_a$: The effect of combined contingency variables (AAS, AIE, NEM, IND, SP and PEU) on the use of forecasting procedures and methods is significantly stronger in public companies than in private ones.*

The researcher offers another case for multi-group analysis to investigate the significance of contingency theory in explaining the differences between manufacturing and oil companies in terms of the use of FPM. In this case, industry type (IND) has been excluded from the combined contingent variables, which are AAS, AIE, NEM, SP and PEU. Therefore, the influence of the contingency variables on the use of forecasting procedures and methods may differ between manufacturing and oil companies. In doing so, the researcher formulates the following hypothesis:

> *$H8_b$: The effect of combined contingency variables (AAS, AIE, NEM, SP and PEU) on the use of forecasting procedures and methods is significantly stronger in manufacturing companies than in oil ones.*

5.5 The influence of institutional variables on the procedures and methods used in forecasting (PMUF)

In empirical literature, most MA researchers have different views on institutional theories (OIE, NIE and NIS). Nevertheless, all are widely used in management accounting research (Burns and Scapens, 2000; De Araújo Wanderley et al., 2011; Dillard et al., 2004). As mentioned in Chapter 4, this study focuses on NIS theory, whereby institutional isomorphism is considered the most powerful indicator that leads to the diffusion of MA practices in Libyan firms (Leftesi, 2008). Institutional requirements, such as political and economic pressures, play an important role in CB processes in the Libyan business environment (Mohammed, 2013). In this regard, external institutional factors have a direct impact on the adoption of new MA systems (Moll et al., 2006). "NIS theory argues that organizations operate and exist within a network of rules, beliefs, policies, cultural norms and social values", which lead to organizational homogeneity and legitimacy (Mohammed, 2013, pp.109-110).

Recently, increased attention has been paid to organizational performance measurement related to MAPs (Ittner and Larcker, 1998; Moll et al., 2006; Tucker, 2010). According to Hussain and Hogue (2002), organizations have mostly depended on the traditional concept of profit and return on investment for performance measurement. Organizations usually dismissed non-financial factors such as market competition, customer satisfaction, efficiency and quality control in performance measurement. In literature, several researchers have addressed performance measurement practices. Hussain and Hogue (2002) used NIS theory to investigate the economic constraints affecting the non-financial performance measurement systems in Japanese banks. They demonstrated four different dimensions associated with non-financial performance measurement practices: economic constraints, and coercive, mimetic, and normative pressures.

In terms of coercive isomorphism, there are four factors tested in this study, "central bank regulatory control, accounting standards and financial legislation, socioeconomic-political institutions' pressures" (Hussain and Hogue 2002, p.163). These aspects describe the dimensions in which organizations are affected by legislation and state institutions in terms of their adoption of accounting practices required by the state. For example, Japanese banks operate under guidelines and accounting principles issued by the Central Bank of Japan (Ibid). In this regard, the generally accepted accounting principles (GAAP) and international accounting standards (IAS) applied by organizations may impose legislation and constraints on management accounting systems, such as "cost calculation and performance measurement"; even though, the effect of international accounting standards on performance measurement in Japanese banks is limited (Ibid, p.166). Similarly, socioeconomic-political institutions' pressures have a limited impact on performance measurement, while 68% of respondents stated that central bank regulations significantly affect performance measurement in Japanese banks (Hussain and Hogue, 2002).

Similarly, Liang et al. (2007, p.59) investigated the influence of "external institutional pressures on the degree of usage of enterprise resource planning (ERP) systems". Considered as an evolutionary tool in management accounting procedures, ERP systems such as SAP help to develop management accountants' work by reducing routine processes (Scapens and Jazayeri, 2003). According to Scapens and Jazayeri (2003, p.225), the use of SAP has had a significant impact on changes in MA practices related to "the specific characteristics of SAP, which are integration, standardization, routinisation and centralization". According to Granlund and Malmi (2002), the SAP system has less effect on the degree of change in management accounting systems, such as budgeting systems, which are separated. Consequently, changes in MAPs must be implemented to improve information systems instead of addressing administrative routine, by developing managers' cognitive abilities and highlighting the role of management accountants (Ibid).

Liang et al. (2007) state that the diffusion of ERP systems in US firms is affected by institutional pressures and the ability of top management to assimilate and understand these systems (Liang et al., 2007). In other words, this study explains the role of top management in mediating between institutional pressures (coercive, mimetic and normative pressures) and the use of ERP systems in US firms. The results indicate that there is a direct relationship between top management participation, which is the adoption of ERP processes, and coercive pressures such as those from the government and/or industrial regulations (Ibid).

In line with prior research, Ibrahim (2007) employed NIS theory along with contingency theory to test the influence of coercive pressures and internal contingent factors on the extent of use of standard costing systems (SCS) in Syrian manufacturing public companies. Coercive pressures include supervisory authority and competitive pressures. Ibrahim's study (2007) reported that coercive pressure and cognitive capacity are the most important factors associated with the extent of use of standard costing systems in Syrian manufacturing public companies.

Additionally, Mohammed (2013) used NIS and post-colonial theories to explain the theoretical framework of the investment appraisal process in Libyan companies. NIS theory underpins the role of social rules/norms and the adoption of best practice from other organizations in achieving more legitimacy within the organization (Moll et al., 2006). Mohammed (2013) investigated the impact of financial and non-financial factors on the CB process in Libyan firms, whereby non-financial factors used to evaluate investment projects include the influence of Libyan government policies, banking sector regulations, the influence of Islamic finance, development plans, accounting practitioners, and personal experience. Subsequently, the findings of Mohammed's study (2013) confirm that government policies, banking sector regulations, personal experience, social rules, competitor behaviour and state development plans are significant factors affecting the CB process in the Libyan firms. For instance, the Libyan Central Bank has a direct effect in determining the interest rate as the discount rate used in appraising investment projects in Libyan firms (Ibid). Furthermore, feasibility studies are a legal requirement in implementing investment projects in Libya (Central Bank of Libya).

In terms of the legal requirements of investment, Fight (2006) noted that most investors and analysts investigate the effects of government policy on investment processes in each type of industry. This requires knowledge of the effect of commercial transactions, competition and industrial associations in the host state where the investment occurs. Accordingly, the adoption of an investment appraisal process in industrial companies depends on determining the political risks and the extent of their potential impact on future cash flow.

Political and economic instability are two environmental risks affecting investment projects. Holmen and Pramborg (2009) examined the relationship between CBT and political fluctuations; they argue that political risk is a significant factor influencing a country's economic environment. This study also found that about two-thirds of Swedish firms used a risk-adjusted discount rate, adjusted-cash flow estimations, and payback period to adjust country-specific political risks (Ibid). Moreover, 43% of Swedish firms used different decision criteria for FDIs in countries with high political risk (i.e. developing countries) (Ibid, p.127). Accordingly, most managers used the NPV method to manage political risk in the host country, whereas the managers adjust the payback period as based on the political risk (Holmen and

Pramborg, 2009). Eljelly and AbuIdris (2001, p.91) also investigated the influence of political factors on CB practice and found a major difference between private and public enterprises, depending on the perspectives of decision makers towards political factors in CB decisions. Therefore, the perception of political risks is an important indicator.

Consequently, the adoption of the investment appraisal process in manufacturing firms is affected by legislation and the economic-political situation in developing countries – particularly in the case of Libya. In this thesis, the CFFP occurring in the presence of political and economic instability may undermine/restrict the adoption of CB processes in Libyan manufacturing and oil companies. In other words, the relationship between CFFP and the extent of use of CBT in Libyan manufacturing and oil firms is affected by legislation in Libya.

However, none of these studies examined the influence of coercive pressures on the CFFP, as it is considered the central phase in the CB decision. This thesis aims to understand how, and to what extent the influence of coercive pressures affects the CFFP, particularly in forecasting procedures and methods. This part of the study seeks to test the influence of coercive pressures on the use of forecasting procedures and methods in Libyan manufacturing and oil firms. It focuses on the two main stages in the CB process: estimating (i.e. forecasting) the cash flow resulting from investment opportunities, and evaluating/selecting investment projects by using CBT.

As mentioned in the previous chapter, mimicry in the use of systems and other similar processes occurs mostly because of the existence of uncertainty throughout the environment external to the organization. This is due to asymmetrical information and the difficulty in implementing the organization's objectives. Thus, organizations seek to imitate each other to attain a high level of homogeneity and legitimacy (DiMaggio and Powell, 1983; Herman and Renz, 1999, 2008; Liang et al., 2007). Several researchers examine the influence of mimetic isomorphism on MA practices (Carpenter and Feroz, 2001; Hussain and Hogue 2002; Moll et al., 2006; Tucker, 2010). Mimetic isomorphism is explained as the reason for adopting the best performance measurement systems and successful management practices in non-profitable organizations (Herman and Renz, 1999, 2008; Tucker, 2010). Hence, organizations are unable to implement their strategy in operating activities, which is why the best practices of performance measurement systems from other organizations are eventually copied (Fligstein, 1985). In practice, two of four Japanese banks showed that copying the best costing and performance measurement systems from other organizations only has a moderate impact on performance measurement systems (Hussain and Hogue 2002). In a similar way, Liang et al. (2007) indicate that the adoption of the ERP process is affected by competing companies (mimetic pressures), through the considerations of top management in US firms.

With regard to normative isomorphism, it occurs as a result of professional practices or the influence of accounting practitioners on the business environment within the organizations. The influence of "professionals, management's strategic priorities, top management/corporate culture and bank characteristics" were understood as normative pressures on performance measurement systems in a Japanese case study (Hussain and Hogue, 2002). Where, 75% of the respondents in four Japanese banks perceive that the management's strategic priorities and bank characteristics, such as size of revenue, number of employees and average growth rate, have a significant impact on PMS (Ibid, p.163). Likewise, approximately half of the respondents in four Japanese banks state that top management/corporate culture and professionals have a moderate impact on PMS (Ibid).

Subsequently, the adoption of the ERP process by suppliers and customers (normative pressures) has a direct impact on the degree of usage of ERP systems in US firms without mediation by top management (Liang et al., 2007). Moreover, the results from this study emphasize the mediating role of top management between institutional pressures and the use of IT in US firms (Ibid). The cognitive ability and experience gained by executives was considered a major impact on the CB process. However, financier characteristics, accounting education and practitioners have less influence on the CB process in Libyan firms (Mohammed, 2013).

The adoption of the CB process by educational, professional, local and foreign organizations in Libya may impact the uses of CFFP and CBT in Libyan manufacturing and oil firms. In empirical literature, no study in Libya has analysed the influence of mimetic and normative pressures on the CFFP. Consequently, it is reasonable to suppose that the use of forecasting procedures and methods are affected by the existence of coercive, mimetic and normative pressures within the Libyan institutional environment. In turn, this may affect the adoption of CBT in the Libyan manufacturing and oil firms. Thus, the following hypothesis is posited:

H9: The coercive, mimetic and normative pressures within the Libyan institutions have a strong impact on the use of forecasting procedures and methods for capital budgeting decisions made by top management in manufacturing and oil firms.

This study assumes that the institutional theory explains why organizations adopt specific forecasting procedures and methods in CB processes. Accordingly, the influence of coercive, mimetic and normative pressures on the adoption of forecasting procedures and methods may differ from private companies to those in public ones, leading to the following hypothesis:

$H9_a$: The effect of the coercive, mimetic and normative pressures on the use of forecasting procedures and methods is significantly stronger in public companies than in private ones.

5.6 The relationship between the procedures and methods used in forecasting (PMUF) and the financial performance of firms

This part of the study investigates the relationship between forecasting process variables, in particular, the forecasting procedures and methods, and firms' financial performance. Danese and Kalchschmidt (2008, 2011a, 2011b) examined the impact of the forecasting process on the organisational performance. According to Liu et al. (2010), the forecast accuracy of CF strengthens confidence in the use of discounted cash flow methods in CB decisions. While it is certain that forecast accuracy is not the only essential determinant affecting operational performance, there are also contextual and forecasting variables that should be studied and managed by decision makers (Danese and Kalchschmidt, 2008; Småros, 2007).

Several studies investigated the relationship between forecasting practices and performance. According to Kalchschmidt et al. (2010), the forecasting process consists of forecasting techniques and information collected from different sources. Danese and Kalchschmidt (2011a, 2011b) examined the influence of forecasting process variables on operational performance through forecast errors. The forecasting process variables include the data sources, the role of forecasting in decision making, and forecasting techniques (Ibid). Hence, it was found that the collection of information from multiple sources is an essential determinant in influencing forecast accuracy (Ibid). In terms of forecasting methods, the use of sophisticated methods did not increase forecast accuracy (Dalrymple, 1987; Lawrence et al., 2000; Mentzer and Cox, 1984; Sanders, 1997; Sanders and Manrodt, 1994). In fact, the reason for utilizing qualitative or quantitative methods in forecasting is to limit personal judgments or bias, and the effects of asymmetrical information having been collected from different sources (Makridakis et al., 1998). There is also consistency between the aims of forecasting and the methods used in forecasting, whereby the purpose of the forecasting process is to minimize production and delivery costs instead of focusing on forecast accuracy (Danese and Kalchschmidt, 2008). According to this review, forecasting accuracy can be improved by combining forecasting methods, which can then improve firms' performance (Armstrong, 1989; Clemen, 1989; Sanders and Ritzman, 2001).

Danese and Kalchschmidt (2011b) examined the impact of forecasting variables on firms' performance. The findings indicate that there is no statistical significance between forecasting process variables and forecast accuracy. Conversely, the direct relationship between forecasting variables and cost and delivery performance is positively correlated (Danese and Kalchschmidt, 2011a). In this regard, interaction effects among forecasting process variables occur when the effect of forecasting variable(s) depends on the levels of contingent variables (Gove, 1986). Cost performance is significantly associated with the interaction between the forecasting methods, data sources, and the importance of forecasting processes in supporting decision makers (Danese and Kalchschmidt, 2011b). On the other hand, the interaction between forecasting methods and the role of forecasting is negatively associated with delivery performance (Ibid).

Similarly, Zotteri and Kalchschmidt (2007) examined the relationship between forecasting practices and performance; the factors in this study are divided into three main categories: forecasting practices, and structural and contingent factors, where forecasting practices consist of forecasting aims and methods. In this case, forecasting practices were considered as the mediating variable affecting Italian firms' performance (Ibid). Results showed that Italian firms' performance is affected by forecasting practices, depending on their aims and utilization. These findings suggest that there must be homogeneity or matching between the forecasting process and the organizational structure to improve firms' performance (Ibid).

Ultimately, most studies examine forecasting processes in short-term application, such as production and sales planning, whereas capital investment decisions receive little attention. Furthermore, the effectiveness of forecasting methods with particular attention to forecasting accuracy is contingent upon contextual factors. Consequently, future research should address the potential contingent factors relating to the forecasting process (Danese and Kalchschmidt, 2011b, p.467).

In finance and accounting literature, some studies examine the relationship between CFF errors in CB decisions and their impact on organizational performance. Soares et al. (2007) investigated the CFF errors in CB; they examined the differences between investment projects both before and after implementation to evaluate the CFFP in Portuguese enterprises. In this regard, the forecasting errors are associated with operational cash flow, investment expenditures, and working capital (Ibid). The findings of Soares et al.'s study (2007) revealed that issues affecting cash flow in CB are significantly correlated with forecast accuracy, whereby forecasting errors in CB are perceived to be more volatile than sales and operating costs.

However, the mediating role of CBT between forecasting processes and firms' financial performance is more appropriate in this case. As discussed in the first chapter, the gap in existing literature is such that existing research has not addressed the relationship between the forecasting process (PMUF&FMPF) and the extent to which CBT are used. This relationship represents the second and third stages of the CB process, respectively. As such, the logical procedures in the CB process can be categorised into four stages: identifying investment opportunities (IOs), estimating CF, evaluating and selecting IOs (including the use of CBT), and monitoring the investment projects. That is the reason for which CBT mediate the relationship between the PMUF and financial performance of firms.

On the other hand, several studies assert that the effectiveness of CBT usage is more closely related to corporate performance (Haka, 1987; Pike, 1984, 1986). In terms of the measurement of the financial performance of firms, the effective use of the DCFT is measured by the comparison between the firm's returns resulting from the use, and their non-use of DCFT (Haka, 1987). Conversely, ORR was used to measure the financial performance of firms using CBT (Pike, 1984, 1986).

Having examined the forecasting process variables and hypotheses in the previous section, this section provides further discussion regarding the influence of the use of forecasting procedures and methods (FPM) on the financial performance of firms. The purpose of this study is to investigate the mediating role of CBT between the use of forecasting procedures and methods

(FPM), and the financial performance of firms. To test this effect, the following hypothesis was formulated:

> *H10: The relationship between the use of forecasting procedures and methods (FPM) and the financial performance is mediated by the extent of CBT usage in manufacturing and oil firms.*

5.7 The direct relationship between the extent of use of CBT and the financial performance of firms

Investment expenditure decisions are extremely important in corporate management, and are the key contributors to a company's success or failure. Successful investment decisions are based on the investment appraisal process (IAP). Capital investment decisions are decisions that include current capital outlays and future cash flow resulting from investment projects (Drury, 2012). Investment expenditure decisions are associated with several factors which affect firms' performance (Pike, 1984). Additionally, the degree of risk and uncertainty associated with these decisions is relatively high, because these decisions are required to make long term forecasts. Therefore, most firms plan these decisions in the form of capital budgets (Pike and Dobbins, 1986). While CB is used in the planning and control of investment expenditure, it also plays an essential role in the optimal allocation of resources between limited alternatives. Thus, the CB decision is concerned only with decisions that have significant future consequences. Hence, the responsibility for making CB decision belongs to top management.

In empirical literature, there is a tendency towards the examination of the relationship between CBT and corporate performance, with CB effectiveness being understood to equate to performance outcomes (Haka, 1987; Pike, 1984, 1986). Klammer (1973) studied the relationship between the use of CBT and performance (PERF). This study found that the use of sophisticated CBT was negatively correlated with performance (PERF). This does not mean that the use of sophisticated CBT is not beneficial, and in this study other factors were found to affect firms' profitability. Firm's characteristics are clearly related to the use of CBT and PERF. Klammer's study (1973) suggested a number of factors which enhance the fit between CBT usage and PERF, including creating effective investment opportunities, and real estimates of cash flows resulting from these opportunities, in addition to management ability to effectively use of quantitative techniques, particularly operations research models.

Haka et al. (1985, p.652) examined the influence of the use of financial appraisal techniques on corporate performance "switching from naive to sophisticated CB selection procedures". They found that the adoption of sophisticated CBT is a strategy used to improve performance, and several policies affect the latter, particularly contextual factors. Therefore, sophisticated techniques should be combined with other policies to improve economic growth within companies. Thus, DCF methods need to be developed and extended beyond the direct application of the net present value (NPV) and IRR. In terms of sophistication, Pike (1984, p.92) stated that sophistication in CBT "refers to the use of theoretically superior methods". Therefore, sophistication does not mean effectiveness of CB. Pike (1986) used a scoring method to measure the degree of sophistication in the CB process for each firm. No evidence was found that sophisticated CB processes leads to higher levels of performance (Farragher et al., 2001; Pike, 1984, 1986). This finding corroborates the pioneering work of Klammer (1973, p.359), who observed that "the more sophisticated techniques generally have negative signs".

Jakovicka et al. (2003) and Alzoubi and Alazawi (2010) also asserted that the application of sophisticated CBT is not necessarily linked to optimum performance. This was reiterated by (Irungu, 2014), who emphasized that the relationship between the use of CBT and financial performance in Nairobi listed firms was insignificant. Nevertheless, such outcomes are not static, and CBT usage is related to the structural and contextual factors with which the selection of CBT should be compatible, such as firm size, uncertainty, and the CFFP (Klammer, 1973). In line with this trend, senior finance executives have confidence in sophisticated uses of CBT, which play an important role in improving the effective implementation of large investment projects (Pike, 1988). Therefore, a closer fit between the CB process, structural characteristics, and contextual factors may lead to better performance (Klammer, 1973; Pike 1984, 1986).

Ultimately, this thesis attempts to investigate the direct relationship between the extent of use of CBT and financial performance. Therefore, the following hypothesis is posited:

> *H11: There is a positive relationship between the extent of use of capital budgeting techniques (CBT) and the financial performance (PERF) of manufacturing and oil firms.*

5.8 Chapter summary

This chapter has explained the gap in knowledge addressed by this research. Decision makers in manufacturing and oil firms have faced difficulty in forecasting future cash flow resulting from investment opportunities, because of the length of forecasting period and the powerful impact of other factors associated with forecasting process. In literature, the CFF stage of the CB process is perceived to be less important than the evaluation and selection stage (Batra and Verma, 2014). In reality, cash flow forecasting is the basis for investment appraisal process in any type of investment. This chapter addressed the relationship between the research variables, which are six main variables: forecasting process (PMUF & FMPF), contingency and institutional factors, key factors related to the forecasting process, the extent of CBT usage, and firms' financial performance.

Sections 5.2 and 5.3 reviewed empirical literature to explain the relationship between the CFFP and the extent of CBT usage. In management accounting literature, particularly regarding CB, there are few studies related to the CFFP, the components of cash flow (financial, marketing and production factors) and the forecasting procedures and methods used in forecasting (PMUF). Additionally, the key factors influencing the CFFP have been addressed in terms of data sources used in forecasting, the forecasting period and the qualifications and position of forecasters.

Subsequently, contingency variables are divided into four categories: firm size, strategic priorities, industry type, and perceived environmental uncertainty. These variables were explained as discussed in literature in section 5.4.

The influence of institutional factors on the CB process (CFF and CBT) was explored in section 5.5. Institutional factors include coercive, mimetic and normative pressures, according to the NIS perspective. Legislative and economic-political influences were conceptualized as coercive pressures. Conversely, educational, professional, local and foreign organizations have been considered as normative and mimetic pressures.

This thesis employs contingency and institutional theories. Management accounting researchers have different views of the Libyan business environment, and two main theories have been applied to explore the change of MAPs in Libyan firms (Abugalia 2011; Alkizza, 2006; Leftesi, 2008; Zoubi, 2011). Therefore, to create a comprehensive approach and understand the Libyan environment the researcher adopted contingency and institutional theories. In support of this, economic reality requires the incorporation of both institutional and microeconomic dynamics involved in regulations. This enables an understanding of the similarities and dissimilarities in the economic-political system.

Furthermore, the influence of the PMUF on the firms' financial performance (PERF) was understood as a mediating force in section 5.6. Subsequently, the direct relationship between CBT usage and PERF was addressed in section 5.7. In finance and MA literature, ORR is used to measure the PERF related to the CB process. Finally, the research framework exposes the relationships among the research variables. These relations have been formulated in eleven hypotheses that will be tested in chapter seven. The following chapter will outline the research design.

6 CHAPTER SIX: THE RESEARCH DESIGN

6.1 Introduction

The purpose of this chapter is to outline the structure of the research design. According to Saunders et al. (2012), the research design is a general plan exploring how the researcher answers the research questions. In this part of the study, the researcher attempts to achieve six main objectives. Firstly, it aims to convey the philosophy of the research and the methodology used for data collection. This leads to identifying the research population and sample. Secondly, it outlines the appropriate survey tool chosen for data collection, where the researcher seeks to design a relevant research strategy, which is reflected in the research methodology. Thirdly, the research framework determines the main research variables and illuminates the extent of interdependence and relationships among these variables. Fourthly, it explains how the research variables are measured in empirical literature. Fifthly data analysis techniques will be proposed. Finally, the reliability and validity of indicators will be assessed in terms of their internal consistency reliability, indicator reliability, convergent and discriminant validity and multicollinearity issues.

There are three types of research design: exploratory, descriptive and explanatory. Exploratory studies explore phenomena surrounding the research environment. Descriptive research focuses on the interpretation of observed phenomena. Explanatory research aims to study the relationship between research variables, and as such, this thesis ascertains the causal relationships between the factors affecting the forecasting process and PMUF, which in turn reflects on the extent of use of CBT. This chapter is divided into eleven sections: research philosophy, research methodology, population and sample of the study, data and their sources, questionnaire design (questionnaire structure and piloting and administration of the questionnaire), respondent profile and response rate, research model, measurement of research variables, link between research objectives, questions and hypotheses, data analysis techniques, and reliability and validity assessment.

6.2 Research philosophy

The research process mainly derives from the philosophical paradigm that underpins it, pertaining to ontology and epistemology (Saunders et al., 2012), which rationalizes the search for patterns and facts that support the research objectives. The concept of epistemology is defined as “the theory of knowledge” determining the research philosophy and identifying the research methodology (Crotty, 1998, p.3). Additionally, the research philosophy is also known as the theoretical perspective. It is the process that determines the criteria and logical foundations for the research methodology (Ibid). Hence, understanding philosophical assumptions is essential in choosing an appropriate research design, and to create homogeneity between the constraints imposed on knowledge and the research design (Easterby-Smith et al., 2012).

The two prevailing research paradigms are positivism and interpretivism. Positivism is associated with the scientific method, and quantitative research seeks to attain the objective knowledge (Saunders et al., 2012). In line with this approach, the positivist paradigm predicts the relationships between events/factors and then develops hypotheses to test relations that subsequently lead to attain knowledge. Conversely, the interpretivist approach focuses on observed phenomena instead of searching for objective facts, whereby the researcher seeks to understand human behaviour and the interaction between people, which leads to subjective knowledge production rather than objectivity (Creswell, 2013; Easterby-Smith et al., 2012; Moustakas, 1994). Consequently, the interpretivist paradigm is associated with qualitative methods, such as interviews (Saunders et al., 2012).

Furthermore, there is another category for the research philosophy, which includes four paradigms: “positivism, interpretivism, realism and pragmatism” (Ibid, p.128), as shown in the first layer of the ‘research onion’ (Figure 6.1).

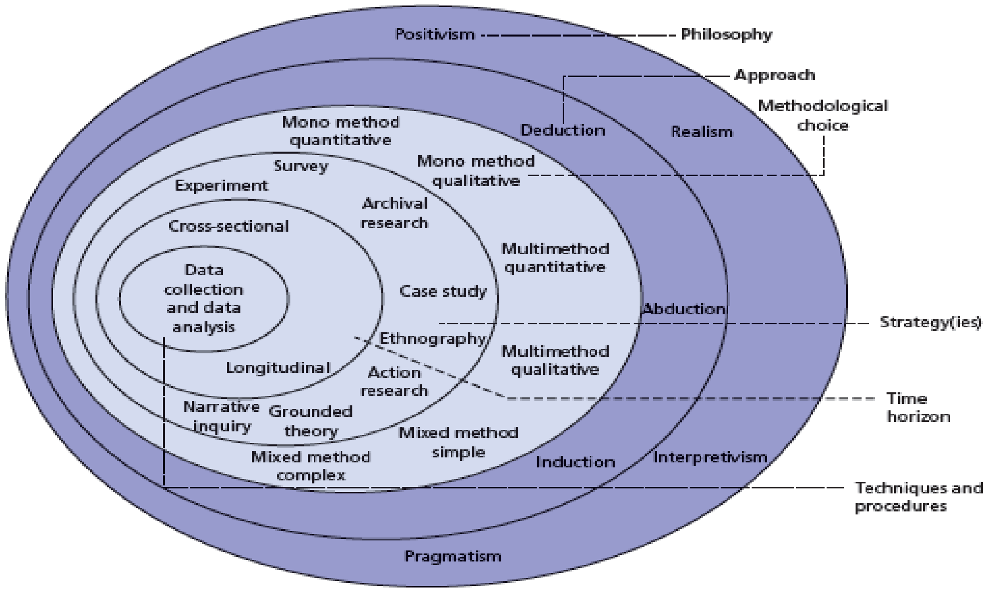


Figure 6.1: The Research 'Onion'

Adopted from: Saunders et al. (2012)

Subsequently, realism consists of both positivism and interpretivism (Healy & Perry, 2000). Realism is also identified as critical realism or post-positivism (Guba and Lincoln, 1994; Hunt, 1991). Realism derives from thoughts and individual objects, which rely upon patterns and ideas in the social world. As a post-positivist research philosophy, it assumes that the relationship between concepts or variables is not deterministic (nonlinear relations). For instance, nominalism affirms that this reality only occurs in particular situations. Creswell (2013) presented the pragmatic paradigm as an alternative approach to other philosophies. Pragmatism posits that concepts/factors should support action (Kelemen and Rumens, 2008). This means that this approach does not focus on a specific philosophy, but that any adopted philosophy must support the procedures employed to solve the research problem. In focusing on research problems in social science research, pragmatism requires the use of different philosophies to obtain knowledge about the problem (Creswell, 2013). Hence, the pragmatist approach is more associated with mixed methods researchers. Leftesi (2008) used quantitative and qualitative methods as a pragmatist approach to study the diffusion of MAPs in Libyan manufacturing firms.

In designing a research plan, Crotty (1998) suggests that effective research design requires knowledge of four main elements: the epistemological position (the theory of knowledge), philosophy of research (the theoretical perspective), the research methodology (strategy), and methods (See Table 6.1).

Table 6.1: Epistemological positions, philosophical stances, methodologies and methods used in research design

Epistemology	*Theoretical perspective*	*Methodology*	*Methods*
Objectivism Constructionism Subjectivism (and their variants)	Positivism (post-positivism) Interpretivism • Symbolic interactionism • Phenomenology • Hermeneutics Critical inquiry Feminism Postmodernism etc.	Experimental research Survey research Ethnography Phenomenological research Grounded theory Heuristic inquiry Action research Discourse analysis Feminist standpoint research etc.	Sampling Measurement and scaling Questionnaire Observation: • participant • nonparticipant Interview Focus group Case study Life history Narrative Visual ethnographic methods Statistical analysis Data reduction Theme identification Comparative analysis Cognitive mapping Interpretative methods Document analysis Content analysis Conversation analysis etc.

Source: Adopted from Crotty (1998, p.5).

Table 6.1 illustrates several epistemological positions, philosophical stances, methodologies and methods used in designing research plans. It enumerates the basic elements of the research process as detailed in empirical literature.

This thesis adopts the positivist philosophy, which is generally associated with quantitative methods and a deductive approach. Additionally, this approach employs an objective epistemology in data collection and analysis. The purpose of positivist research is to study the affective facts or concepts in certain conditions and describe the interactions among research variables to address the research gap. In business research, authors use the positivist philosophy to bridge the knowledge gap in literature. Much research has employed the positivist paradigm to explore the relationships among concepts, techniques and procedures related to the capital budgeting processes (Afonso and Cunha, 2009; Anuar, 2005; Pike, 1986). Consistent with positivism, this thesis applied contingency theory to explain the conditional relationships between the cash flow forecasting process and the contextual factors across a large number of firms. The reasons for selecting positivism in this thesis can be determined as follows:

- After reviewing a broad range of literature, the researcher can specify the research variables to be measured (Creswell, 2003), whereupon the researcher derives empirical observations that help to build the research hypotheses.
- The existence of causal relationship between the research variables is a determining factor in adopting a positivism paradigm (Bryman, 1993; Eldabi et al., 2002).
- This thesis employed a questionnaire survey to collect data objectively. Therefore, the research findings can be generalized to other sectors. This would not be possible in case studies for instance, which cannot be generalized (Hussey and Hussey, 1997).
- Large-scale surveys can be used in accordance with the positivist philosophy in quantitative research (Hussey and Hussey, 1997).
- The positivist paradigm is commonly used in business and management accounting research, particularly in capital budgeting research (Pike, 1986, 1996; Anuar, 2005).

6.3 Research methodology

According to Creswell (2013), there are three main research methodologies: quantitative, qualitative and mixed methods research, or multiple methods research. Quantitative research is associated with the positivist paradigm, whereas qualitative research is related to the phenomenological paradigm. Qualitative research is used to discover or generate theories. In quantitative research, the researcher develops facts or theories from a comprehensive literature review, and testing their findings accordingly (Cook & Reichardt, 1979). A mixed approach uses quantitative, qualitative or multiple quantitative/qualitative methods (Denzin, 1978; Johnson et al., 2007; Saunders et al., 2012). Hence, the research method is associated with the mode of data collection used. For example, quantitative data is collected about observed phenomena or concepts which occur frequently, but data collected about the meaning of a phenomenon relates to qualitative data (Collis and Hussey, 2013).

The choice of research strategy depends on the research questions and should test developed hypotheses. This strategy consists of “experiment, survey, case study, mixed methods research, grounded theory, ethnography, action research, narrative enquiry and archival research” (Saunders et al. 2012, p.160). No specific methods are applied in all types of research. Methodological choices depend on several criteria used in the selection of research methods. One such criterion is the nature and type of research. For instance, explanatory research identifies the relationship between a set of variables, which requires the use of a quantitative approach, while descriptive and exploratory research focus on clarifying and exploring the observed phenomenon or variables of the study, with little or no attention paid to the relationship between these variables.

In line with the preferred research strategy, this thesis applied a cross-sectional survey to save time and financial resources. This methodology is compatible with positivist philosophy. On the other hand, longitudinal and case studies require significant resources and intensive research efforts (Creswell, 2003).

Based on the research objectives, this thesis conducts descriptive, exploratory and explanatory research. In this part of the study, the application of the CB process in Libyan manufacturing and oil firms is described and explored in terms of the CFFP and CBT. In addition, this thesis investigates the relationship between the two stages of CB process: the CFF and appraisal stages. Moreover, this thesis aims to examine the indirect effect of an interaction between forecasting, contingency and institutional variables on firm performance through the extent of CBT usage. Therefore, research framework examining the causal relationship between interactive variables, is defined as causal research model.

In social science literature, multiple research methods are called "multiple operationalism" (Johnson et al. 2007, P.113), and refer to the use of more than one research method in a single study. The multiple-operational research framework introduced by Campbell and Fiske (1959) was a precursor to research triangulation (Driessen et al., 2005). According to Denzin (1978, p.291), triangulation is defined as "the combination of methodologies in the study of the same phenomenon". The application of this approach is contingent on philosophical and methodological triangulation, as defined by simultaneous and sequential research methods (Morse, 1991).

Most studies conducted in the capital budgeting field use a survey strategy, particularly questionnaires (Arnold and Hatzopoulos, 2000; Drury and Tayles, 1997; Graham and Harvey, 2001; Pike, 1996; Sangster, 1993; Verma et al., 2009). Burns and Walker (2009) assert that most CB studies apply comprehensive questionnaire surveys to collect data.

This thesis also used a survey questionnaire as a tool for collecting data. Meanwhile, by piloting the questionnaire, the researcher was able to test and improve the ability of respondents to answer its questions. The steps in constructing a questionnaire can be distinguished in three sections: the population and sample of the study, data and their sources and questionnaire design (questionnaire structure and piloting and administration of the questionnaire).

6.4 Population and sample of the study

6.4.1 Population of the study

The population of this study is identified as all Libyan manufacturing and oil firms with total assets exceeding 200 thousand Libyan Dinar (TLD). These companies can be divided into three categories: state-owned companies, private companies, and joint ventures. The respondents for this study are the financial directors or official persons who participate in CB decision-making. As discussed in chapter two, the manufacturing and oil companies are supervised by the ministry of industry and National Oil Corporation (NOC), all represent the population of the study, where privatised companies are part of manufacturing companies, which are followed by the PIB. In addition, most of the private companies/factories are referred to as the small and medium enterprises (SMEs), which are supervised by the SMEs board in Libya. Tables 6.2 and 6.3 show the population of the study.

Table 6.2: Libyan manufacturing and oil companies (population of the study)

No	Companies and the supervisory foundation	*No. of companies*
1	Companies supervised by the Ministry of Industry	9
2	Companies supervised by the Economic and Social Development Fund	17
3	Companies supervised by the PIB (required for privatization)	7
4	Companies supervised by the Ministry of transportation and Municipality	3
5	Companies supervised by the PIB (public companies required for privatization)	16
6	Privatized companies (See: table 6.3)	90
7	Private companies/factories (small and medium enterprises*).	94
8	Oil, petrochemical and gas processing companies supervised by NOC.	3
9	Oil operation and production companies supervised by NOC.	14
10	Oil marketing companies supervised by NOC.	4
	Total	257

Sources: Ministry of Industry (2014); NOC (2014); PIB (2011/2012); Ministry of transportation and Municipality
* Small and medium enterprises (SMEs) supervised by the SMEs Board in LIbya

Table 6.3: Regional distribution of privatized companies according to Industrial activity

No	*Industrial activity*	*West*	*East*	*Middle*	*South*	*Total*	*%*
1	Food industries	12	6	5	2	25	27.78%
2	Engineering industries	9	4	4	0	17	18.89%
3	Chemical industries	8	4	3	0	15	16.67%
4	Textile and carpet industries	1	2	3	0	6	6.67%
5	Furniture industries	1	4	1	0	6	6.67%
6	Leather and footwear industries	3	2	1	1	7	7.78%
7	Raw material industries.	3	1	1	1	6	6.67%
8	Electrical and household tools	3	2	1	0	6	6.67%
9	Paper and cardboard industries	1	0	0	0	1	1.11%
10	Tobacco industry	1	0	0	0	1	1.11%
	Total	42	25	19	4	90	100%

Source: PIB (2011/2012).

6.4.2 The sample of the study

A sample can be defined as a subgroup of the population (Sekaran & Bougie, 2013). The sample can be selected randomly or systematically. According to Etikan et al., (2016), "convenience sampling (CS) is a non-probability sampling technique". CS is commonly used in Libyan research (Alfetasy, 2010).

A researcher uses CS to construct a sample of different subjects for specific purposes. CS is especially beneficial when the population of study is very large and distributed throughout an extensive geographical area (Etikan et al., 2016, p.1). Hence, it becomes impossible to collect data from the entire population or to apply randomization to select the sample of the study due to limited resources and time constraints. In management accounting research, this technique can be applied to collect sensitive data for specific issues such as capital budgeting decisions. In convenience sampling, the target sample may be selected based on "certain practical criteria, such as easy accessibility, geographical proximity, availability at a given time, or the willingness to participate" (Etikan et al., 2016, p.2; Dörnyei, 2007). Moreover, CS is compatible with a pilot study where the purpose of pilot data collection is to redesign the questionnaire (Farrokhi and Mahmoudi-Hamidabad, 2012). The most important benefit from using CS is to allow the researcher to build research hypotheses.

As discussed above, this thesis applied convenience sampling to collect data for several reasons:

- The territory of the Libyan state comprises approximately 1,775,500 sq km. Therefore, it is not easy to distribute the questionnaire to all regions of the state.

- The researcher distributed the questionnaires to financial directors or officials[4] operating in the western and middle regions of Libya because of proximity and ease of movement.
- The civil war in the East and South of Libya undermined the researcher's ability to distribute his survey safely. Accordingly, the researcher concentrated on accessible and safe regions as mentioned above.
- The regulations and legislation imposed by the Libyan government are the same in most of the manufacturing and oil firms operating in Libya. As a result, the findings of this thesis can be generalized to other firms, which are excluded from this survey.
- The manufacturing and oil firms operating in Libya have similar accounting procedures. In fact, most Libyan companies have applied income tax law and financial regulations to document their financial statements (El-Sharif, 1981), and the preparation of financial reports should be compatible with the GAAP (Faraj and El-Firjani, 2014).

In this research, the financial directors are the respondents belonging to the population group. The participants in this research are personnel from Libyan manufacturing and oil firms. As mentioned in table 6.2, the population of this study involved 257 Libyan manufacturing and oil companies, which are all located in different areas (Eastern, western, middle and southern areas). The sample was selected as to be representative of the population. Table 6.4 shows the final sample selected and is based on safer regions situated in Misurata, Alkhums, Algarbuli, Tripoli, and Azzawiya cities (Western and Middle regions).

[4] Officials: the official persons who supervise or coordinate the procedures related to CB decisions.

Table 6.4: Final sample: the Libyan manufacturing and oil companies (total)

No	*Companies and supervisory foundation*	*Target number*	*% of target sample*
1	Companies supervised by the Ministry of Industry	9	9
2	Companies supervised by the Economic and Social Development Fund	5	5
3	Companies supervised by the PIB (required for privatization)	3	3
4	Companies supervised by Electricity Board/foundation.	1	1
5	Companies supervised by the Ministry of transportation & Municipality	3	3
6	Oil operations/production/industries/marketing companies supervised by NOC	14	14
7	Privatized companies whose capital exceeds 5 MLD (Table 6.6)	26	26
8	Private companies whose capital exceeds 1TMLD *.	39	39
	Total	100	100%

Sources: Ministry of Industry (2014); NOC (2014); PIB (2011/2012); Electricity Board; Ministry of transportation and Municipality. *supervised by SMEs Board.

To collect data for a representative final sample, the researcher has divided this sample accordance with the industrial sector, and ownership (public, privatized and private companies). Table 6.4 includes 39 small and medium private companies whose capital ranged from 1MLD to 5MLD. These companies are supervised by the SMEs Board in Libya. Tables 6.5, 6.6 and 6.7 illustrate the number of companies in each industrial sector.

Table 6.5: Final sample 1 – State-owned manufacturing and oil companies

No	*Type of industry*	Target sample	%	East	*West*	*Middle*
1	Food production and beverages	5	14	0	4	1
2	Sponge, plastic and chemical industries	5	14	0	4	1
3	Metals, steel and iron industries	3	8.5	0	1	2
4	Engineering, electricity & electronic industries	2	6	1*	1	0
5	Cement and building materials	1	3	0		1
6	Oil & gas industries/production/operations/marketing**	14	40	2**	12	0
7	Trucks, vehicles and tractors industries	2	6	0	2	0
8	Communication and Industrial constructions	3	8.5	0	2	1
	Total	35	100	3	26	6

**Including 7 joint ventures. **Two questionnaires sent by post and email. *The questionnaire was received by the official manager who settled in Misurata city.

Table 6.6: Final sample 2 - privatized manufacturing companies

No	*Type of industry*	Target sample of companies	%	*West*	*Middle*
1	Food production and beverages	7	27	5	2
2	Engineering, electricity & electronic industries	4*	15.3	3	1
3	Sponge, plastic and chemical industries	7*	27	6	1
4	Textile and carpet industries	2	7.7	1	1
5	Furniture industries	2	7.7	1	1
6	Footwear industries	2	7.7	1	1
7	Building material industries	1	3.8	1	0
8	Tobacco industries (joint venture).	1	3.8	1	0
	Total	26	100%	19	7

Source: PIB (2011/2012). * Including 2 joint ventures. * Including 2 joint ventures.

Table 6.7: final sample 3 - private manufacturing companies

No	*Type of industry*	Target sample of companies	%	*West*	*Middle*
1	Food production and beverages.	6	15.4	0	6
2	Sponge, plastic and chemical industries	10	25.6	0	10
3	Textile and carpet industries	1	2.6	0	1
4	Engineering, electricity & electronic industries	3	7.7	1	2
5	Metals, steel and related industries	8	20.5	0	8
6	Cement and building materials*	8	20.5	1	7
7	Printing and packaging.	3	7.7	1	2
	Total	39	100%	3	36

* Including 1 joint venture (shared between the private, state and foreign partner)

From Table 6.5, the target sample of public companies was divided into eight industrial sectors: petrochemical, oil and gas (which represented 40% of the total of owned-state companies), metals, steel, engineering, electronic, trucks, vehicles, tractors (all of which collectively represented 6% of public companies). The researcher sent two questionnaires to the oil companies operating in the eastern region. One was sent by post whereby the researcher did not receive any response. The second one was sent by email, but was an unusable questionnaire. Another questionnaire was received by the operations manager (manufacturing company) who settled in Misurata city.

Table 6.6 illustrates that only 26 privatized manufacturing companies were selected, while 64 privatized companies were excluded from the final sample because they were located in unsafe areas of Libya during the period of study, or were otherwise non-operational due to privatization processes. Indeed, most privatized manufacturing companies were closed or at-risk of plant shut down (PIB, 2011/2012). In this research, the privatized companies will be understood as private companies. On the other hand, private manufacturing companies represent 39% of the target sample (see the Table 6.7).

For more details, Table 6.8 illustrates a summary of the population and sample of the study, where private manufacturing companies represented 41% of all private companies, because the selection method focused on the western and middle regions. The final sample comprised 100 companies affiliated to the Ministry of Industry, NOC, PIB, SMEs board and other sectors as shown in Table 6.2. In this regard, privatized and private companies are synonymous.

Table 6.8: A summary of the population and sample of the study

No	*Type of companies*	*Population*	*Target sample*	*Percentage %*
1	State-owned manufacturing companies.	52	21	40%
2	Petrochemical, oil & gas companies.	21	14	67%
3	Privatized manufacturing companies	90	26	29%
4	Private manufacturing companies	94	39	41%
	Total	257	100	39%

6.5 Data and their sources (Data sources used in collecting data).

The primary and secondary sources of data are determined by the choice of research strategy and methodology. Primary data is collected directly by researchers, such as surveys and experiments (Collis & Hussey, 2013), whereas secondary data is generally published by others and disclosed in annual reports, journals and textbooks.

The researcher can collect three main types of data. The first is related to firm's characteristics from financial statements, such as total operating assets, annual sales and firm profitability, as well as ownership, the number of employees, and the industry type (manufacturing and oil sectors). This is collected from the financial department within a company. Moreover, the strategic priorities implemented by top management in manufacturing and oil firms are collected from the management and financial department. Furthermore, environmental uncertainty surrounding the financial operations of Libyan firms is important data obtained from the financial department.

Secondly, data concerning with the CB decisions can be obtained from top management or financial departments. In this case, the procedures used in the CB process, such as the types of investment projects, the financial resources used to fund these investments, the size of investment expenditures and appraisal techniques used in CB decisions are often the most substantial data obtained from financial departments (or top management) in manufacturing and oil firms operating in Libya. Mohammed (2013) examined the CB processes in Libyan firms and found that 60% of respondents were accountants working in the financial department, whereas CFOs represented 31% (14 firms) of respondents. In terms of the influence of legislation and Libyan government regulations on the adoption of the CB process, the financial department can provide this information because the influence of institutional factors over finances only affects financial transactions. This also applies to the influence of accounting practices over the adoption of CB processes.

Finally, the data relating to CFFPs in CB decisions comprise the most important information obtained from financial departments, which is often responsible for preparing cash flow estimates. In previous research, the CFFP was not addressed in the Libyan business environment. In this case, the CFF variables are specified in five main ways: forecasting procedures and methods, components of cash flow (financial, marketing and production factors), data sources used in forecasting, forecasting horizon, and the qualifications and position of forecasters who are responsible for preparing cash flow estimates.

6.6 Questionnaire design:

6.6.1 Questionnaire structure

The questionnaire is structured as a list of questions and/or a set of attitudinal/personal statements presented in various forms (Franklin and Osborne, 1971), whereas a survey is "a general methodology for gathering, describing and explaining information from sample(s) to construct a quantitative description of a population" (Slattery et al., 2011, p.831). The questionnaire is a survey technique employed for collecting data (Fink, 2009; Groves, 2009), commonly used in many areas, such as health, social, economic and business research (Easterby-Smith et al., 2012; Marshall, 2005; Murray, 1999; Oppenheim, 1992; Sekaran and Bougie, 2013; Slattery et al., 2011).

In empirical research, there are two main types of questionnaire: descriptive questionnaires and analytical questionnaires (Saunders et al., 2012). Thus, the questionnaire may describe observed phenomena and quantitative factors. In this regard, the questionnaire may be constructed with closed and/or opened-closed questions, whereas in a phenomenological approach, the questionnaire can have open-ended questions (Collis and Hussey, 2013). Subsequently, questions are constructed to account for the following criteria:

- Use simple questions with a specific meaning.
- Use closed and open-ended questions.
- Select short and sequential questions to provide consistency and gradual flow of information.
- Account for similarities between questions and put them into a common context.
- Determine an appropriate font to print the questionnaire.
- Identify the number of questionnaire pages (7-9 pages)
- Divide the questionnaire into five sections, as mentioned above.
- Prepare a practical guide to assist respondents in answering the questions.

To achieve the research objectives, different types of closed questions were formulated, which can be categorised as five types of questions (Saunders et al., 2012):

- Categorical/optional question: Offer the respondent the choice of one answer/category from a list of responses/categories.
- Ordinal question: Ask the respondent to rank methods/procedures/opinions depending on their relative importance.
- Ranking question: Allow the respondent to use Likert-style rating.
- Quantitative question: The respondent is asked to provide a number/quantity regarding a specific financial situation.
- Grid question: enables the respondent to record two or more similar questions at the same time.

This thesis adopted the first, second and third types of questions mentioned above. Accordingly, a rigorous explanation of the purpose of the questionnaire, pre-testing, and questionnaire planning lead to a good questionnaire with a fit between data sought and the theoretical framework (Ibid).

Subsequently, a Likert scale (LS) is one of the main measurements used in this study. LS is a parametric method (Norman, 2010) and can be categorised by different scoring ranges: 4-point LS, 5-point LS, 7-point LS, etc. (Vagias, 2006). LS is an ordinal scale, where the respondent's attitude can be determined by their degree of agreement with specific situation (from "1" completely disagree to "5" completely agree). The Likert scale survey is an inexpensive method for data collection. With LS, respondents' answers can be quantified and data can be transferred to a dichotomous scale, but not revised.

Moreover, most of the indicators used to measure the research variables are selected based on prior research that have employed the same measures. The strategic priorities SP4 and SP7 are carefully chosen based on the following sources:

- The strategy SP4, which is related to industrial future depending on general economic considerations, was selected based on economic development plans implemented in Libya (the ministry of planning, Libya).
- The strategy SP7 (training of human resources) was offered based on the empirical literature (Aragón-Sánchez, Barba-Aragón & Sanz-Valle, 2003) and suggested by one of the participants in a pilot study.

However, the reasons for adopting ordinal measures (e.g. Likert Scale) instead of single items can be summarised as follows (McIver and Carmines, 1981; Nunnally and Bernstein 1994; Spector, 1992). First, single measures contain random errors (Nunnally and Bernstein, 1994). Second, binary categories can only deal with couplets of information. Third, individual items are considered to be "less reliable, less accurate and less valid" (McIver and Carmines, 1981, p.15). Accordingly, the Likert Scale has been applied widely in the management accounting field, particularly in capital budgeting research (Daunfeldt and Hartwig 2014; Verbeeten, 2006; Brunzell et al., 2013; Holmen and Pramborg, 2009; Pike, 1988, 1989, 1996).

6.6.2 Piloting the Questionnaire

To test the validity of the questionnaire and its compatibility with academic work ethics, the researcher conducted a series of preventive procedures before distributing the final survey. This allowed the researcher to check the extent of consistency and uniformity in the questionnaire. This required that the items were written simply and easily understood, and questions must be unambiguous and sequential (Easterby-Smith et al., 2012). Therefore, piloting the questionnaire provided the researcher with an appropriate assessment tool to identify the validity of the questionnaire. Piloting was implemented through the review and examination of the questionnaire by academicians and PhD students. According to Saunders et al. (2012), the pre-testing stage of the questionnaire by a group of experts plays a vital role in determining content validity and the reliability of data. In this context, pre-testing may be conducted by friends, colleagues and people of different opinions. This enables the researcher to obtain different comments and new ideas (Collis and Hussey, 2013; De Vaus, 2001; Oppenheim, 1992; Saunders et al., 2012; Sekaran and Bougie, 2013). Accordingly, the final draft of the questionnaire was launched after pre-testing, subject to the following procedures:

- Review of the first questionnaire draft by two PhD students at Huddersfield Business School (BS) and obtaining their comments concerning the consistency, clarity and format of the questionnaire.
- The second draft of the questionnaire was passed to three BS academicians, who work as lecturers in the department of strategy and marketing. Valuable comments were obtained from them regarding the meaning, form, and sensitivity of items, and the final draft was formulated following this feedback.
- The questionnaire was then sent to fifteen Libyan manufacturing companies in January 2015. Twelve were personally distributed to participants by hand by the researcher, two were distributed by the Bristol Online Survey, and one was sent by email. 80% of respondents reported that they faced difficulty in completing the questionnaire. Thus, the researcher prepared a guide for answering the questions, particularly in Appendix C. This guide was written in Arabic (Appendix F) to assist participants in completing the questionnaire.
- On 22nd June 2015, the Chair of the Business School Ethics Committee at the University of Huddersfield offered further comments about the questionnaire. These comments issued by two reviewers can be summarised as follows:
    - The first comment related to the right to withdraw from the survey. It was adjusted in the final questionnaire whereby the respondent has the right to withdraw from the survey at any time until the collected data is analysed.
    - Secondly, the possibility of anonymity is granted to all respondents, whereas the final questionnaire is designed to give more flexibility.
    - The risk of participating in the survey is minimised, and the responsibility for completing the questionnaire was distributed between the concerned authorities in Libya and participants.

Subsequently, data storage methods were related to the last stage of data collection procedures, whereby the researcher personally collected the questionnaires. Moreover, section 6.12 will provide the statistics used to assess the reliability and validity of indicators used to measure the research variables.

6.6.3 Administration of the Questionnaires

This section explains the procedures used in data collection relating to the questionnaire survey. A number of methods can be used in distributing questionnaires. Online survey, postage, email, telephone and individual/personal-distribution are some options. In this research, most of the questionnaires were distributed by the self-administered method. According to Sekaran and Bougie (2013), and Saunders et al. (2012), self-administering the questionnaire allows the researcher to introduce the research topic and objectives, and to help respondents answer questions in a short period of time. The reasons for selecting the self-distribution method can be summarised as follows:

- The poor efficiency of Libyan postal services due to the length of time and high mailing costs for this type of service.
- The researcher experienced great difficulty in obtaining the correct respondents' addresses in Libyan manufacturing and oil firms (region, telephones and emails), which makes it generally impossible to use email or telephone questionnaires.
- This type of questionnaire is very sensitive, because it deals with financial decisions that have an impact on firms' futures. Therefore, the researcher attempted to reduce the degree of concern and associated risk, leaving no negative consequences.

The main purpose of the questionnaire is to measure the variables of study within its theoretical framework and in addressing the research objectives. The research model constructed depends on the research objectives and hypotheses, which are associated with the main research questions. Each of the questions included in the questionnaire was linked to the overall research model. Therefore, the questionnaire consists of the following five sections:

Section A: General information about the respondents
Section B: Firm characteristics and external environment
Section C: Capital budgeting process
Section D: Institutional pressures.

Section E: Cash flow forecasting process

The questionnaire is concerned with manufacturing and oil firms sharing a similar operational nature in terms of industrial and general organizational factors. Due to the aims of this study, the information from the survey should include the factors affecting the CFFP and the appraisal techniques used in CB. These factors encompassed forecasting, contingency and institutional variables and their relationship with CBT. Therefore, the questionnaire was built to cover all of the main research questions. For example, sections B and C elaborate the contingent variables understood as the firms' characteristics, such as firm size, the type of industry, ownership and investment, strategic priorities and environmental uncertainty. In other words, the questions posed in the questionnaire were linked to the main research questions (See table 6.9).

Table 6.9: Linkage between research and questionnaire questions

No	*Research questions*	*Section*	*Questionnaire's questions*
1	To what extent can the capital budgeting techniques be used as an essential priority in the investment appraisal process?	C	C4
2	What are the forecasting procedures and methods (FPM*) often/always used in estimating future cash flow generated by the investment projects?	E	E5
3	What is the relationship between the use of forecasting procedures and methods (FPM) and the financial, marketing and production factors (FMPF)?	E	E5 and E3
4	What is the relationship between the use of forecasting procedures and methods (FPM) and the extent of use of CBT?	C+E	E5 and C4
5	What is the relationship between FMPF and the extent of CBT usage?	C+E	E3 and C4
6	What is the relationship between the use of forecasting procedures and methods and the key factors (DS, FH, QUA & POS) related to the forecasting process?	E	E1, E2, E4.1, E4.2 + E5
7	What is the influence of combined contingency variables on the use of forecasting procedures and methods (FPM)?	B,C	B1, B2, B3, B4, B5 and C1, C2, C3, C5.3
8	What is the influence of institutional variables on the use of forecasting procedures and methods (FPM)?	D	D1,D2
9	What is the indirect relationship between the use of forecasting procedures and methods (FPM) and the firms' financial performance (PERF) which occurs across the extent of CBT usage?	C+E	E5 and C4+ C5.4
10	What is the direct relationship between the extent of use of CBT and the firms' financial performance (PERF)?	C	C4+C5.4

*FPM is used as a synonym of procedures and methods used in forecasting (PMUF).

Furthermore, the procedures (stages) used in collecting data will ensure confidentiality. These procedures began with the letter issued by the supervisory committee to the Libyan Cultural Affairs Department in London, which subsequently issued a letter to the Head of the

Scholarship Department of the Ministry of Higher Education in Libya, to assist the researcher in completing the questionnaire survey. In the third stage of data collection, the Head of the Scholarship Department issued a letter to the National Oil Corporation, Industrial Research Centre, Privatization and Investment Board and Corporate Management in the Ministry of Industry. Subsequently, the relevant authorities in Libya (i.e. four bodies) helped the researcher to distribute the questionnaires to financial directors (CFOs) or other officials who participated in preparing the capital budgeting process in manufacturing and oil firms operating in Libya. The final stage of the data collection procedure was to collect the questionnaires handled by the researcher during the data collection period. The researcher helped the respondents, who work in the private and privatized manufacturing companies, to complete the questionnaires, while most respondents affiliated to the oil companies could complete the questionnaires by themselves.

In terms of how data will be stored, a copy of the completed questionnaires will be kept in a locked filing cabinet accessible only to the researcher, electronic copies of data will be stored in SPSS software under password protection.

6.7 Respondent's profile and response rate.

This section presents general information about the respondents, which are demonstrated in the questionnaire items A1, A2, A3 and A4 (Section A). Tables 6.10-6.13 display the respondents' characteristics in terms of position, qualification, area of study and work experience.

Table 6.10: Respondent's job title

Job title	*Frequency*	*Percentage*	*Cumulative percentage*
Financial director	37	53.65	53.65
General manager or executives	23	33.30	86.95
Production/operational manager	1	1.45	88.40
Planning manager	1	1.45	89.85
Accounting manager	4	5.80	95.65
Vice president or president	1	1.45	97.10
Charted accountant	1	1.45	98.55
Others	1	1.45	100.0
Total	69	100	

Table 6.11: Respondent qualification

Qualification	Frequency	Percentage	Cumulative percentage
PhD	1	1.45	1.45
MA/MSc	20	29.0	30.45
BA/BSc	36	52.2	82.65
Professional qualification	1	1.45	84.10
High School or College	11	15.9	100.0
Total	69	100.0	

From Table 6.10, it can be observed that most respondents are financial directors (53.6%) and general managers or executives (33.3%). Table 6.11 indicates that 52.2% of respondents held a Bachelor's degree, and approximately 15.9% had less than a Bachelor's degree.

Table 6.12: Area of study of respondent (AREA)

Area of study	*Frequency*	*Percentage*	*Cumulative percentage*
Accounting	42	61.0	61.0
Management	6	8.7	69.7
Finance	3	4.3	74.0
Economy	2	2.9	76.9
Engineering	12	17.4	94.3
Sciences	3	4.3	98.6
Other	1	1.4	100.0
Total	69	100.0	

Table 6.13: Respondents' experience (EXP)

Period of experience	*Frequency*	*Percentage*	*Cumulative percentage*
1-5 years	2	2.9	2.9
6-10 years	8	11.6	14.5
11-15 years	11	15.9	30.4
over16 years	48	69.6	100.0
Total	69	100.0	2.9

Table 6.12 shows that most respondents studied accounting (61%), while the sciences ranked very low (4.3%). Approximately 70% of respondents have more than 16 years of employment experience (See table 6.13).

As discussed in section 6.4, there are about 257 manufacturing and oil companies supervised by the Ministry of industry, NOC, PIB and SMEs Board, and the researcher identified 100 companies as the sample size, excluding foreign companies. The researcher sought to distribute questionnaires by hand and relevant authorities in Libya assisted by providing official letters and appropriate information about the respondents. The questionnaires were collected over a period of two months (November-December, 2015).

In line with the procedures used to collect data, the researcher divided the data collected from the manufacturing and oil companies into three parts: data collected from public, privatized and private companies (see tables 6.14, 6.15 and 6.16)

Table 6.14: Data collected from state-owned companies

Type of industry	East	*West*	*Middle*	Total
Food production and beverages	0	4	1	5
Sponge, plastic and chemical industries	0	3	1	4
Metals, steel and iron industries	0	1	2	3
Engineering, electricity & electronic industries*	1*	1	0	2
Cement and building materials	0	0	1	1
Oil & gas industries/production/operations/ marketing**	1**	10	0	11
Trucks, vehicles and tractors industries	0	0	0	0
Communication and Industrial constructions	0	1	1	2
Total	2	20	6	28

*A questionnaire was completed by the official manager who settled in Misurata city. **A questionnaire completed by Oil Company was unusable (this questionnaire received by email).**Including 6 joint ventures.

Table 6.15: Data collected from privatized companies

Type of industry	*West*	*Middle*	Total
Food industries	0	0	0
Engineering, electricity & electronic industries*	2	0	2
Sponge, plastic, detergent and chemical industries **	1	1	2
Textile and carpet industries	0	1	1
Furniture industries	0	1	1
Footwear industries	0	1	1
Building material industries	0	0	0
Tobacco industries (joint venture)	1	0	1
Total	4	4	8

* Joint ventures (2) ; ** Including 1 joint ventures.

Table 6.16: Data collected from private companies

Type of industry	*West*	*Middle*	Total
Food production and beverages		5	5
Sponge, plastic and chemical industries	0	10	10
Textile and carpet industries		1	1
Engineering, electricity & electronic industries	1	1	2
Metals, steel and related industries.		7	7
Cement and building materials*		6	6
Printing and packaging industry	0	2	2
Total	1	32	33

* Including 1 joint venture.

Data collected from private companies represents approximately 48% of the sample and 21% of the total of population. This is due to the reasons discussed in section 6.4. Conversely, data collected from privatized companies represented 11.5% of the sample and 5% of population of the study. Privatized companies have been categorized to the private sector as based on the system of privatization implemented by Libyan government (PIB, 2011/2012). Thus, privatized companies are understood as private companies. Accordingly, the total number of the privatized and private companies are 35, excluding joint ventures, which totalled five companies. On the other hand, data collected from public companies were divided into two parts: data collected from state-owned companies and data collected from joint ventures (six companies). Moreover, there are two foreign companies, which are out of sample, participating to complete this suervey. Most of the joint ventures and foreign companies, which are related to the oil sector, are shared companies, where the public company owned more 50% of their capital. Even though, two questionnaires are unusable.

In terms of response rate, as mentioned in section 6.4, there are about 257 manufacturing and oil companies operating in Libya excluding foreign companies, and the researcher determined 100 companies as the sample size, due to the convenience sampling method used. Table 6.17 outlines the items used to calculate the response rate.

Table 6.17: The items used to calculate the Response rate.

No	*The items used to calculate response rate*	*Number or %*
1	Population size (Libyan manufacturing and oil companies)	257
2	The manufacturing and oil companies located in unreachable regions.	157
3	Target sample size (Libyan manufacturing and oil companies)	100
4	Companies not operating.	21
5	Refusals/no responses	5
6	Difficult to access.	4
7	Company policy (joint venture).	1
8	Questionnaires completed – main sample (Libyan companies)	69
9	Questionnaires completed – out of sample (foreign oil companies)	2
10	Total questionnaires completed	71
11	Unusable questionnaires (manufacturing and oil companies)	2
12	Usable questionnaires	69
13	Response rate = 69+2-2/[257-21-5-4-1]	31%

The researcher could not collect 31 questionnaires for four reasons. Firstly, 21 factories/companies are locked because of privatisation procedures in Libya (no production, or halted for non-regular maintenance). Secondly, five companies did not respond to the questionnaires that they received. Thirdly, the researcher had difficulty accessing four manufacturing companies. Finally, in some cases, sharing contracts for oil exploration and production may prohibit respondents from completing this survey. A total of 71 questionnaires were completed, two of which were not usable (see Table 6.17). In literature, the acceptable response rate adopted by the business surveys is between 30-50% (Saunders et al. 2012). Therefore, the response rate for the study (31%) is satisfactory.

6.8 The research model

The relationships among the research variables and the formulation of research hypotheses are presented in the previous chapter, where the theoretical framework is used to demonstrate the variables discussed in theoretical and empirical literature. In this regard, the research model consists of five main variables and one control variable, which include, forecasting variables (PMUF, FMPF, DS, FH, QUA and POS), contingency and institutional variables, CBT, the firms' financial performance, and the EBITDA (control variable).

Mediation analysis is used to explain the causal relationships between research variables. In a simple mediating effect, the effect of X on Y is mediated by M. In literature, mediation analysis assumes that the relationship between the independent and dependent variables may be conducted through one or more mediating variable (Preacher and Hayes, 2008). According to Cole and Maxwell (2003, p.558), the mediation or indirect effect can be defined as "the degree to which a change in an exogenous variable produces a change in an endogenous variable by means of an intervening variable". In this case, the terms "mediation and indirect effect" are interchangeable.

This research model elaborates the indirect/direct effect of CFFP on financial performance through the extent to which CBT are used, depending on contingencies levels (ie. firm size, strategic priorities, and perceived environmental uncertainty), institutional pressures, and the key factors associated with the CFFP. In general, the purpose of the research model is to explain the relationship between the interrelated variables within a conceptual framework linked with the research hypotheses.

The research approach depends on the path analysis to examine the casualty among the research variables. Hence, the path models allow the relationship between research variables (the hypotheses) to be tested and examine their direct and indirect effects on outcomes or dependent variables (Hair et al., 2011a, 2011b). Figure 6.4 presents the research model, which illustrates the relationships among the research variables. The overall research model can be divided into seven path models, as shown in section 6.11.

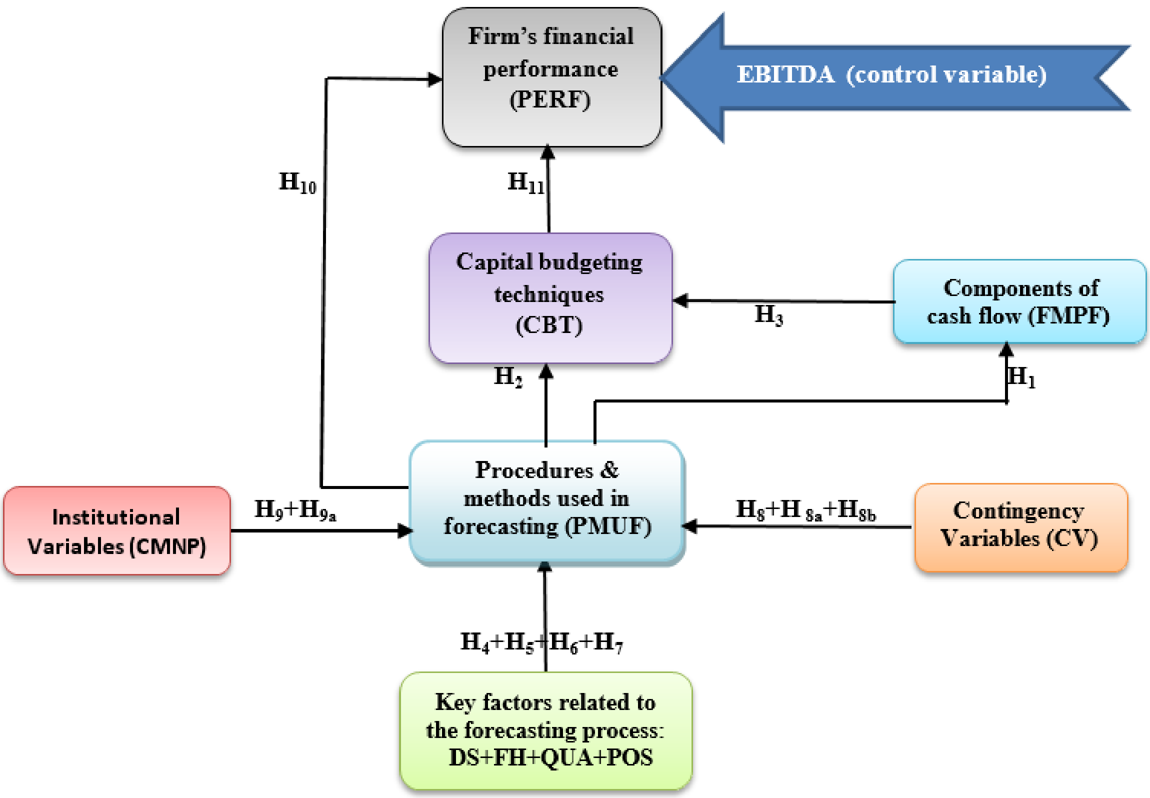


Figure 6.2: Research Model

Where:

PMUF: The procedures and methods used in forecasting
FMPF: The financial, marketing and production factors.
DS: The data sources used in forecasting
FH: Forecasting horizon
QUA: The qualifications of forecasters
POS: The position of forecasters (official's persons)
CV: The combined contingent variables
CMNP: The coercive, mimetic and normative pressures
CBT: The capital budgeting techniques.
PERF: Firms' financial performance.
EBITDA: Earnings before interest, taxes, depreciation and amortization

6.9 The measurement of research variables

The main research variables are the CFF variables, contingency and institutional variables, CBT, and the firms' financial performance. These variables are displayed in table 6.18.

Table 6.18: Research variables

Symbol	*Independent and mediated variables*	*Symbol*	*Independent, mediated and dependent variables*
PMUF	1- Procedures and methods used in forecasting.	CMNP	8- Coercive, mimetic & normative pressures
FMPF	2- Financial, marketing & production factors	CBT	9 - Capital budgeting techniques.
DS	3- Data sources[5] used in forecasting	PERF	10- Firms' financial performance.
FH	4- Forecasting horizon.	EBITDA	11- Earnings before interest, taxes, depreciation and amortization (control variable)
QUA	5- The qualification of forecaster[6]	TNF*	12- Total number of forecasters
POS	6- The position of forecaster	TWO IND	The variables used in multi-group analysis: - Type of ownership. - Type of industry.
CV	7- Combined contingent variables.		

* TNF variable has been excluded from the research model.

6.9.1 Cash flow forecasting variables

As mentioned in the questionnaire design, closed and open-closed questions were used in the final questionnaire. Respondents can answer these questions according to the available answering system, which provides a method for response measurement. Different types of measurement were used in this research to measure independent and mediated variables. In this research, the CFF variables were divided into seven variables summarised as follows.

6.9.1.1 Procedures and methods used in forecasting (PMUF)

The forecasting procedures and methods developed from subjective estimates to the use of sophisticated mathematical models and computer software. Pohlman et al. (1988, P.73) and Lazaridis (2002, 2006) specified the procedures and methods used in the CFFP. Respondents were asked to identify the standard procedures and forms or worksheets used for estimating the components of cash flow, such as "taxes, depreciation and salvage values". The researchers used a dichotomous scale of yes-or-no (Y/N) questions to measure the items of forecasting procedures (Ibid).

Several studies have investigated the qualitative and quantitative methods used in forecasting, as mentioned in theoretical and empirical literature. Pohlman et al. (1988, P.73) surveyed seven

[5] Internal data sources are the firm's departments, whereas external data sources include suppliers, local and foreign analysts etc.
[6] Forecaster: the person who is responsible for preparing the firm's cash flow estimates.

methods used in generating CF estimates in CB decisions. To measure the use of forecasting methods, they employed binary Y/N questions to indicate which of US firms used either qualitative or quantitative forecasting methods (Ibid). Furthermore, in the empirical literature, little attention is given to which software is used in forecasting (Sanders, 1997).

Hence, this thesis seeks to identify the forecasting procedures and methods used in manufacturing and oil firms, but it does not evaluate them. A five-point Likert scale ranging from "never used" to "always used" are applied to measure the procedures or methods used in forecasting future cash flow in manufacturing and oil firms. In this case, respondents were asked to select each of procedures and methods used in CFF, as shown in table 6.19.

Table 6.19: Measuring the procedures and methods used in forecasting

No	*The procedures and methods used in forecasting*	*Symbol*	*Question*	*Type of Measurement*
Procedures used in forecasting:		PUF	E5	Five-point Likert scale
1	Personal estimates*	PUF1	=	= =
2	Standard procedures for estimating items of CF	PUF2	=	= =
3	Official forms/worksheets used to collect CF data	PUF3	=	= =
Judgmental methods:		JM	=	= =
1	Top managers' judgments (executive's opinions)	JM1	=	= =
2	Delphi method (panel of experts' opinions)	JM2	=	= =
3	Sales force composite	JM3	=	= =
Quantitative methods		QM	=	= =
1	Time-series models*	QM1	=	= =
2	Regression analysis models**	QM2	=	= =
A software package used in forecasting:		SUF	=	= =
1	Software developed by company	SUF1	=	= =
2	Commercial software packages (e.g. Excel)	SUF2	=	= =

Sources: Fildes and Hastings, 1994; Hall and Millard, 2010; Mutshutshu, 2012; Lazaridis, 2002; Pohlman et al., 1988; Watson, 1996.
* Personal estimates: adopted from Bierman and Smidt, 2007; Alhouderi, 1997; Jog and Srivastava, 1995.
* Time-series models: Simple and weighted moving average models
* Regression analysis models: Simple and multiple regression models

6.9.1.2 Financial, marketing and production factors (FMPF).

In empirical literature, there is little interest in the field of cash flow forecasting process in capital budgeting decisions (Turner and Guilding, 2012), especially regarding the financial, marketing and production factors associated with the forecasting process in CB decisions. To measure these variables, respondents from US firms ranked the financial, marketing and production factors according to their importance (Pohlman et al., 1988). Respondents from Greek and Cypriot firms used the same procedure to measure these factors (Lazaridis, 2002, 2006). All employed five-point Likert scales (Pohlman et al., 1988; Lazaridis, 2002 and 2006).

In this thesis, respondents were also asked to indicate the extent of association of financial, marketing and production factors with the capital budgeting process (CFFP and CBTs). Using a five-point Likert scale, respondents had five choices (from 1 "not associated, to 5 "considerably associated") to identify the extent of association of financial, marketing and production factors with the capital budgeting process (Appendix B: The Research Questionnaire, section E question No. 3). Table 6.20 summarizes these Indicators/variables.

Table 6.20: Financial, marketing and production indicators

Symbol	Indicators	*Symbol*	Indicators
FF1	Borrowing and repayment of funds	PF1	Direct manufacturing costs or direct operating expenses
FF2	Foreign exchange rates*	PF2	Manufacturing overhead expenses
FF3	Tax considerations	PF3	Research and development expenses
FF4	Working capital requirements	PF4	Depreciation costs
FF5	The impact of investment expenditures on firm liquidity	MF1	Sales/revenue forecast.
FF6	Administrative overhead	MF2	Selling expenses
		MF3	Competitive and promotional expenses

Sources: Lazaridis, 2002; Pohlman et al., 1988.
* Foreign exchange rates: adopted from Tateishi & Mizumoto (2011).

6.9.1.3 Data sources (DS) used in forecasting

This variable refers to the data sources (DS) used in cash flow forecasting. In empirical literature, several studies address the data sources, which create diverse information for forecasting processes (Hulbert et al., 1980; Wotruba and Thurlow, 1976). These sources can be divided into internal and external data sources depending on the type and quality of data (McHugh and Sparkes, 1983; Ochs and Parkinson, 2006; Simister and Turner, 1973).

To measure the extent of use of DS, Hulbert et al. (1980) investigated which data sources are used for marketing planning in American, European and Japanese subsidiaries operating in Brazil. The various information sources identified included "distributors, sales force, and management of other subsidiaries, marketing research department, historical data, trade sources, commercial suppliers, official sources and home office" (Ibid, p.10).

Similarly, Danese and Kalchschmidt (2011a, pp.208-209) asked respondents from Italian firms to consider the sources "current economic conditions, customers' sales plans, supplier information and market research". These sources (variables) are measured in a seven-point Likert scale ranging "from 1 (not at all) to 7 (a great extent)". Kalchschmidt et al. (2010) used the same procedure to measure three of these sources.

In this thesis, respondents were asked to indicate the data sources used in the forecasting process in Libyan manufacturing and oil firms (Appendix B: The Research Questionnaire, section E - question No. 1). The sources determined were as follows:

- Firm departments (Hulbert et al., 1980; Zotteri and Kalchschmidt, 2007).
- Suppliers of raw materials, equipment and machinery (Hulbert et al., 1980; Danese and Kalchschmidt, 2011a, 2011b)
- Customers' sales plans (Wotruba & Thurlow, 1976; Danese & Kalchschmidt, 2011a).
- University research centres (General Planning Council in Libya & Ministry of Planning, Libya).
- Local analysts, such as chartered accountants (Central Bank of Libya).
- Foreign consultants and companies (NOC, Libya).

The researcher used a five-point Likert scale to measure the data sources used in manufacturing and oil firms, by offering five options (never used…always used) to determine the use of each source from the data sources listed above.

6.9.1.4 Forecasting horizon

To measure this, the forecasting horizon was divided into four periods by Canadian managers: shortest term (1-3 months), medium-shorter term (4-12 months), medium term (12-24) and the longest term (greater than 24 months) (Klassen and Flores, 2001). The length of the investment decision period was determined, according to five periods: 1-3, 4-6, 7-9, 10-12 and more than 12 years (Lazaridis, 2002, 2006; Pohlman et al., 1988).

In this thesis, the respondents were asked to indicate the period often used in forecasting future cash flow in capital budgeting decisions. Three periods (1-5 years, 6-10 years and over 10 years) were used in forecasting future cash flows. In the same way, the respondents used a five-point Likert scale (1 "never used" to 5 "always used") to indicate the period used in forecasting future cash flow resulting from the investment projects listed in capital budgeting (Appendix B: the Research Questionnaire, section E, question No. 2).

6.9.1.5 The qualifications and position of forecasters

The researcher determined the qualifications and position of forecasters who are responsible for preparing future cash flows, in addition to the total number of forecasters who estimate and prepare cash flows. In empirical literature, Brijlal and Quesada (2009) asked respondents in South African firms about the qualifications of personnel responsible for capital budgeting decisions; the qualifications were divided into five categorical levels, from less than grade 12 to postgraduate level. Similarly, Verma et al. (2009, p.5) categorized four items to measure the educational status of CEOs responsible for capital budgeting decisions in Indian firms: "Undergraduate, MBA, Non-MBA and more than Master level".

In terms of the employment status of forecasters, some researchers listed seven items to identify the position of forecasters who prepare and coordinate cash flow estimates: financial analyst, accountant, treasurer, department manager, controller, vice-president and president. In 52% of cases, the controller or vice-president in American companies is usually responsible for forecasting (Drury, 1990).

In this thesis, the educational and employment status of forecasters was measured by binary questioning, called a dichotomous or nominal scale (Brown, 2011). This type of measurement is used for two categories. In this case, respondents were offered a list of qualifications and positions (multiple choice questions) from which they could select answers applicable to their companies, where their response must be indicated as 0 or 1 (0= No or 1= Yes). Table 6.21 illustrates the qualifications and position of forecasters.

Table 6.21: Qualification and position of forecaster

Qualification (QUA)*	0 or 1*	Position (POS) or Job title**	0 or 1*
BA/BSc		Accountant	
MA/MSc		Accounting manager	
Ph.D.		Financial director	
Other (please specify):		Executive manager	
……………………………		Vice-president or president	
		Chartered accountant	
		Others	

Sources: *Verma et al., 2009; Brijlal & Quesada, 2009. **Pohlman et al., 1988; Lazaridis, 2002; Drury, 1990.
*0 = No, 1= Yes

6.9.1.6 Total number of forecasters (TNF).

Pohlman et al. (1988) and Lazaridis (2002, 2006) revealed that Greek, Cypriot and US firms have one or more persons who prepare and coordinate cash flow estimates. In this thesis, respondents were asked to specify the total number of forecasters who prepare cash flow estimates. This can be measured as an ordinal list of four options (1-3, 4-6, 7-9 and more than

10 forecasters). Even so, TNF has been excluded from the research model, because it has a weak relationship with the use of forecasting procedures and methods (FPM).

6.9.2 The combined contingent variables.

As mentioned in the questionnaire design, section B addressed the contingent variables, in addition to questions C3 and C5.3 (section C). To measure these variables, the researcher used different forms of measurement, such as five-point Likert scales, numerical options and typical categories.

6.9.2.1 Firm size (FS)

In empirical literature, several items are employed to measure firm size. Ntim (2009) used total assets to measure firm size and investigate its impact on financial performance (return on assets) in South African Listed Firms. Aoun and Hwang (2008) measured firm size by total assets, whereby firms were divided into three parts: small firms with total assets of less than $13M; medium-sized with $13-59.9M; and large firms with more than $60M. On the other hand, capital expenditures were measured to determine which projects require detailed cash flow estimates (Pohlman et al., 1988; Lazaridis, 2002, 2006).

This thesis utilised four variables to measure firm size: average of annual sales, number of employees, average total of operating assets and average of investment expenditures. The average total of operating assets has been excluded from the research model because of collinearity issues. The reasons for adopting three variables to measure firm size were due to previous studies which adopted a multi-variables approach, and the differences between the criteria used in devolving countries (e.g. Libya and Nigeria). In line with prior research, Pohlman et al. (1988) used sales size and total assets to measure firm size. For example, the small size of Cypriot firms was identified "not only from their low sales but also from their low level of total assets" (Lazaridis, 2002, p.63). Similarly, the number of employees and overall sales were used to measure firm size (Hyvonen, 2007; Zotteri and Kalchschmidt, 2007).

However, the criteria used to compare between small, medium and large companies are completely different from one country to another, whereby each content or country uses specific criteria to measure firm size. In Libya, the government issued Resolution No. 472/2009 to distinguish adequately between small and medium enterprises (SMEs), which are identified according to their capital or total fixed assets, with capital ranging from 10 TLD to 1MLD in small companies, and from 1MLD to 5MLD in medium ones (SGPC, 2009). Table 6.22 outlines the criteria used by the Libyan Government in distinguishing between Libyan enterprises.

Table 6.22: Micro, small and medium enterprises in Libya

Enterprise/firm	*Number of Employees (NEM)**	*Firm's capital or total fixed assets*
Micro	< 10	< 10 TLD
Small	< 50	10 TLD -< 1 MLD
Medium	< 80	1 MLD -< 5 MLD

Sources: 1- Resolution No. 472/2009, SGPC, Libya. 2- SMEs Board, Libya (2015).

Moreover, the Commission of the European Community issued recommendation number 2003/361/EC that defines the small and medium enterprises as listed below in table 6.23 (CEC, 2003).

Table 6.23: Micro, Small and Medium Enterprises in Western European Countries

Company category	*Employees*	*Sales*	*Total assets*
Micro	< 10	≤ € 2 M	≤ € 2 M
Small	< 50	≤ € 10 M	≤ € 10 M
Medium	< 250	≤ € 50 M	≤ € 43 M

Source: Commission of the European Community (CEC), 2003.

On the other hand, the Central Bank of Nigeria determined micro, small, medium and large-scale industries (CBN, 2005) as shown in table 6.24.

Table 6.24: Micro, Small, Medium and Large industries in Nigeria

Scale industry	*Employees*	*Total assets (excluding land) in millions of Nigerian Naira (MNGN)*
Micro-scale	<10	< 1.5 MNGN **
Small-scale	11-100	1.5-<50 MNGN
Medium-scale	101-300	50-<200 MNGN
Large-scale	Over 300	Over 200 MNGN

Source: Central Bank of Nigeria (CBN), 2005.

Hence, the numerical ordinal category (numerical scale) was used to measure the variables of firm size, because the criteria used to distinguish between small, medium and large companies in Libya are completely different from those deployed in EU and African countries. Table 6.25 shows the criteria used in this study to measure the variables of firm size.

Table 6.25: The main criteria used to measure the variables of firm size

No	*Average of annual sales (AAS)/ investment expenditures (AIE)*	*Average-total of operating assets*	*No. of employees*
0	0-<200TLD	200TLD-<1 MLD	------------
1	200TLD*-<1 MLD	1-<5 MLD	Less than 100
2	1-<5 MLD	5-<10 MLD	100-<200
3	5-<10 MLD	10-<20 MLD	200-<400
4	10-<20 MLD	20-<40 MLD	400-<800
5	20-<40 MLD	40-<80 MLD	800-<1600
6	40-<80 MLD	80-<160MLD	1600-<3200
7	80-<160MLD	160-< 320 MLD	Over 3200
8	160-< 320 MLD	320-<640 MLD	
9	320-<640 MLD	640-<1280 MLD	
10	Over 640 MLD	Over 1280MLD	

Table 6.26 summarizes the measurement of the variables of firm size and the sources where these measures are adopted.

Table 6.26: Measuring the variables of firm size

No	*The variables of firm size*	*Symbol*	*QS**	*Type of measurement*
1	Average* of annual sales	AAS	B1.1	From 0-<200TLD to >640MLD
2	Number of employees.	NEM	B1.2	From <100 to >3200 employee
3	Average total of operating assets	ATOA	C5.3	From 200TLD-<1MLD to >1280MLD
4	Average of investment expenditures	AIE	C3	From 0-<200TLD to >640MLD

Sources: Adapted from: Aoun and Hwang, 2008; Kadapakkam et al. 1998; Ntim, 2009; Pohlman et al., 1988; Bennouna et al. 2010; Hoque, 2004; Hyvonen, 2007; Zotteri and Kalchschmidt, 2007. *The average was calculated over the recent three years (2008-2010). *QS: The number of question was shown in the research questionnaire.

6.9.2.2 The type of industry (IND)

This study emphasizes the influence of industry type on the use of forecasting procedures and methods in CB decisions. To measure the type of industry, various industrial categories were used to identify the type of industry (Anuar, 2005; Leftesi, 2008). Consequently, the main products or industries are classified as:

- Food production and beverages.
- Sponge, plastic and chemical industries.
- Steel, iron, metal and related industries.
- Engineering, electricity, cement and building materials industries.
- Footwear, textiles, paper and packaging industries.
- Petrochemical, oil and gas production/operations/industries/marketing.
- Other.

In this thesis, the researcher used the industrial categories above to construct the type of industry. Respondents were asked to identify the single industrial type to which their firms most closely belonged (building materials, plastic, oil and gas industries etc.).

6.9.2.3 The type of ownership (TOW)

In empirical literature, the type of ownership can be divided into either public or private firms (Eljelly and AbuIdris, 2001). Firm ownership was outlined by three criteria: State-owned, private, and joint ventures operating in Libya (Abugalia, 2011). In this thesis, the TOW was used in multi-group analysis as explained in the empirical literature chapter. Similarly, the researcher employed binary choice questions (Yes or No) to measure the ownership type; it was categorized as follows (Ibid):

- Private company (100% owned).
- State-owned company (100% owned).
- Foreign company (100% owned).
- Joint venture (shared between the state and foreign partner).
- Joint venture (shared between the private sector and foreign partner).
- Joint venture (shared between the state and private sector).
- Joint venture (shared between the state, private and foreign partner[7]).

6.9.2.4 The types of investment projects (TIP).

Pohlman et al. (1988, P.72) considered that the types of investment projects may be more closely related to the CFFP in CB decisions; they enumerated several investment projects with "new equipment, replacement of equipment, facilities expansion, facilities modernization and acquisition of on-going concern". In this thesis, the researcher used similar investment categories as applied in empirical literature (Pohlman et al., 1988):

- New investment projects (new plant/production line).
- Renewal and development of existing project.
- Expansion of existing capacity.
- Replacement of equipment.

[7] This item is selected based on the participant's answer in a pilot study.

- Change in production or activity[8].
- Cases of non-regular maintenance.

In this study, respondents were asked to select one or more of each investment project applied in the industrial sector. TIP has been excluded from the contingency variables and research model, because its relationship with the use of forecasting procedures and methods (FPM) is very weak.

6.9.2.5 Strategic priorities (SP)

As discussed above, the investment project type is a long-term strategic decision. Govindarajan (1988, p.828) used cost leadership and differentiation strategies to measure an organization's strategy. This mechanism includes the following strategic priorities: product selling price, percent of sales spent on research and development, percent of sales spent on marketing expenses, product quality, brand image, and product features. Similarly, the use of differentiation and low cost strategies were also applied to measure firm strategy in UK and Australian firms (Abdel-Kader and Luther, 2008; King et al., 2010). The strategies suggested by the studies mentioned above are associated with operational decisions rather than investment ones. In contrast, the firm strategy was constructed according to three characteristics of the strategic priorities of US firms: focusing on new production lines, selecting investment projects with high return and risk, and emphasising technological development (Haka, 1987), all in complete association with investment decisions.

In this thesis, respondents were asked to identify top management strategic priorities in manufacturing and oil firms, where the firm strategy is constructed in accordance with seven options and respondents can identify one or more of these strategies used in their companies. To measure the seven strategic priorities, the researcher used a five-point Likert scale ranging from "strongly disagree" to "strongly agree". Table 6.27 specifies the strategic priorities implemented by top management in manufacturing and oil firms.

[8] Change in production or activity and cases of non-regular maintenance : these types of investment are applied by Libyan firms based on the information provided from PIB and the minstry of industry in Libya.

Table 6.27: Strategic priorities (SP)

No	*The items of strategic priorities (SP)**	*Symbol*	*QS*
1	The firm strategy aims to protect the existing primary activity which may be exposed to the risk of plant or project shutdown	SP1	B4
2	The firm strategy has a strong tendency towards investments associated with high return	SP2	B4
3	The firm strategy depends on feasibility studies for making investment decisions	SP3	B4
4	The firm strategy towards the industrial future depends on general economic considerations linked to the state*.	SP4	B4
5	The firm strategy aims to improve market share and competitive position rather than to maximize short-term profit	SP5	B4
6	Firm strategy relies on a flexible manufacturing system rather than automated systems*	SP6	B4
7	The firm strategy is based on the training of human resources for planning and evaluating investment projects*.	SP7	B4

Sources: Adapted from Abugalia (2011); Anuar (2005); Davis and Schul (1993); Ekholm and Wallin (2011); Haka (1987); Chenhall & Langfield-Smith, 1998. *The strategic priority (SP4): adapted from Büchner et al. (2013), where this strategy represents the base of development plans in Libyan state (Ministry of Planning, Libya). *The strategic priority (SP6): adapted from Hyvonen (2007). *The strategic priority (SP7): adapted from Anuar (2005); Aragón-Sánchez, Barba-Aragón & Sanz-Valle (2003); and suggested by the participants in a pilot study.

6.9.2.6 Perceived environmental uncertainty (PEU)

The purpose of this part of the research is to examine the influence of environmental uncertainty on the CFF process in CB decisions. In empirical literature, PEU was conceptualized by six items or observed variables. These items include the "financial capital markets, primary competitors, governmental regulations, primary labour union, primary customers and the primary suppliers of raw materials" (Haka, 1987, p.40). Hence, firms operating in heterogeneous environments find it more difficult to predict these factors. According to Anuar (2005), the predictability in external environment was built by the eight items that are measured on a six-point Likert scale, from 1 "always predictable" to 6 "never predictable".

As discussed in chapter five, several studies addressed the relationship between the PEU and organizational performance (Hoque 2004; Gordon and Narayanan, 1984; Govindarajan, 1984; Cooper, 1995; Goldman et al., 1995; Hoque & Hopper, 1997). Also, the influence of PEU on management accounting practices has been discussed in management accounting research (Abdel-Kader and Luther, 2008; Abugalia, 2011; Ekholm and Wallin, 2011).

This thesis adopted items used in previous studies to measure PEU. Respondents were asked to indicate the environmental conditions surrounding the investment operations in manufacturing and oil firms. The researcher used a five-point Likert scale from 1 "never predictable" to 5 "always predictable" to measure environmental predictability, and respondents can select one or more of its items. Table 6.28 specifies the items of perceived environmental uncertainty in Libyan manufacturing and oil companies over the recent three years (2008-2010).

Table 6.28: Items used in measuring the perceived environmental uncertainty (PEU)

No	*The items* of perceived environmental uncertainty*	*Symbol*	*QS*
1	Actions of the primary suppliers of raw materials	PEU1	B5
2	Competitors' actions	PEU2	B5
3	Changes in financial position of your company	PEU3	B5
4	Demand for existing products	PEU4	B5
5	Expected cash flows generated by the investment expenditures*	PEU5	B5

Sources: Anuar, 2005; Haka, 1987; Hoque 2004; Abugalia, 2011; Ekholm and Wallin, 2011.
* PEU5: adapted from Sundum, 1974 and based on the statement of financial accounting concept No. 7 (FASB, 2000).

6.9.3 The institutional variables

In the second part of moderated variables, the researcher sought to investigate the influence of coercive, mimetic and normative pressures on the CB process, rather contingency variables, as mentioned above. The researcher suggests that the application of the CFFP during institutional isomorphism within organizations may influence the extent to which CBT are used in Libyan firms. In other words, the interaction between the forecasting process and the existence of institutional pressures has a significant influence on the use of CBT. Therefore, the researcher determined three aspects relating to institutional pressures.

Firstly, the influence of legislation and government regulations on the adoption of CFF process, particularly PMUF, was addressed in the first task, where coercive pressures derive from economical-political influences. In other words, this thesis examines the influence of legislation and government regulations on the use of forecasting proceduers and methods in manufacturing and oil firms operating in Libya. Hussain and Hogue (2002, p.163) identified four items to conceptualize coercive pressures: "central bank's regulatory control, accounting standards and financial legislation, socioeconomic-political institutions' pressures". The five-point Likert scale ranging from 4 "very high impact" to 0 "no impact" was used to measure the elements of coercive pressures affecting performance measurement systems in Japanese banks (Ibid). Similarly, coercive pressures comprised two observed variables: the central bank's regulatory control and financial legislation (Munir et al., 2011). Subsequently, Mohammed (2013) examined the effect of political priorities and development plans on investment appraisal processes in Libyan firms; a five-point scale (1 "completely unimportant" … 5 "very important") was used to measure the coercive pressures.

As discussed in chapter four and five, this thesis used similar procedures for measuring coercive pressures to previous studies. Respondents were asked to select one or more coercive pressure, divided into six elements: commercial code and tax system, financial constraints on funding, the privatization system in Libya, the intervention of Libyan Government in CB decisions, international accounting standards (IAS) and political and economic instability in Libya. As indicated in previous studies, a five-point Likert scale is used, ranging from 1 "strongly disagree" to 5 "strongly agree", to measure the items comprising coercive pressures.

Secondly, the copying or adopting of CB processes from other organizations is understood as mimetic pressures. The researcher seeks to test the influence of the adoption of the CB processes from local, foreign and multinational companies on the use of forecasting proceduers and methods in manufacturing and oil firms. From the literature, the copying of best costing and performance measurement systems from other organizations can be used to measure mimetic pressures (Hussain and Hogue, 2002), whereby companies attempt to copy the best systems and practices from other organizations (Herman and Renz, 2008). Similarly, Liang et al. (2007) consider that mimetic pressures are constructed by competing companies adopting ERP processes in the USA. To measure the main competitors who have adopted ERP, three items were identified (Ibid, p.81):

- The main competitors have greatly benefitted.
- The main competitors are favourably perceived by others in the same industry.
- The main competitors are favourably perceived by their suppliers and customers.

Subsequently, a five-point Likert scale was used to measure each item of the main competitors.

In this thesis, mimetic pressures are understood as the basis for adopting the CB processes from each of Libyan, foreign and multinational companies operating in Libya. These items were measured by a five-point Likert scale.

Finally, normative pressures have been widely studied by many researchers, all of whom used procedures used to measure this variable. Liang et al. (2007) identified three items to construct normative pressures, which include the adoption of ERP by suppliers, customers, and the Government's support of IT systems; the five-point Likert scale ranging from 1 "very low" to 5 "very high" was used to measure these items. Similarly, professional accountants and accounting education were included as normative pressures affecting the investment decision-making process; a five-point Likert scale (5 “always attempt” to 1 “never attempt”) was employed to measure these items (Mohammed, 2013).

In line with previous studies, this thesis utilized chartered accountants and accounting education system in the Libyan universities to measure the normative pressures according to a five-point Likert scale. Table 6.29 summarizes the items used to measure each of institutional variables, whereby respondents were asked to choose one answer for each item on a five-point Likert scale (1 “strongly disagree” to 5 “strongly agree”).

Table 6.29: The items used in measuring the institutional variables (CMNP)

No	*CMNP variables*	*Items**	*Symbol*	*QS*
1	Coercive pressures	The impact of coercive pressures based on:	CP	D1
1.1		Commercial code and tax system	CP1	=
1.2		Financial constraints and banking system	CP2	=
1.3		The system of privatization	CP3*	=
1.4		The intervention of Libyan Government	CP4*	=
1.5		International accounting standards	CP5	=
1.6		Economical-political instability in Libya	CP6*	=
2	Mimetic pressures	The adoption of PMUF by:	MP	D2
2.1		Libyan companies	MP1	=
2.2		Multinational and foreign companies	MP2	=
3	Normative pressures	The adoption of PMUF by:	NP	=
3.1		Education system in Libyan universities	NP1	=
3.2		Libyan chartered accountants	NP2	=

Sources: adapted from Hussain and Hogue, 2002; Mohammed, 2013; Liang et al., 2007. Carpenter and Feroz, 2001; Johnston 2013; Munir et al., 2011. *CP3+CP4: adapted from Mohammed, 2013; SGPC, 2001, 2003, 2005; Central Bank of Libya. *CP6: adapted from Holmen and Pramborg, 2009; Eljelly and AbuIdris, 2001.

6.9.4 Capital budgeting techniques.

The researcher presented the mediating role of CBT between the forecasting process and the financial performance of firms, whereby the effect of the CFFP on firm performance is mediated through the use of CBT. As mentioned in theoretical and empirical literature, CBT have been widely studied in the financial and accounting fields. Klammer (1973) classified CBT into five categories: payback period, accounting rate of return, discounted cash flow methods, risk appraisal techniques and management science techniques. These were measured according to a binary scale 1 “use” or 0 “non-use”.

On the one hand, Pike (1984, 1986) added new categories to measure the use of CBT, rating the priority of its use (1= primary use or 2= secondary use).

On the other hand, respondents in US firms were asked to define the frequency of their use of CBT on a five-point Likert scale, ranging from 1 “always use” to 5 “never use”. The CBT were divided into two groups: financial and risk appraisal techniques, and operations research methods (Ryan and Ryan, 2002). Graham and Harvey (2002) also illustrated CBT as a single group and used a similar scale, ranging from 0 "never use" to 4 "always use". The use of CBT in Swedish listed companies was measured in the same way (Daunfeldt and Hartwig, 2011).

In terms of applying CBT in developing countries, the application of investment appraisal techniques in Chinese firms was categorized into primary and secondary use (Chan et al., 2001). This category was also used in South African Companies (Hall and Mutshutshu, 2013). However, Ahmed (2013) used a four-point Likert scale, ranging from 1 "never" to 4 "always" to measure the use of CBT in UAE listed companies. Moreover, there is an extensive trend towards the uses of financial appraisal techniques in Pakistani firms; the same scale mentioned above was used to measure the extent of CBT usage (Farrukh et al., 2015). According to Verma et al. (2009, p.6), "the CBT preferred by Indian firms" were presented in financial appraisal techniques, with a five-point Likert scale ranging from 1 "never" to 5 "always" being used to identify preferred financial appraisal techniques among Indian firms.

In this thesis, the researcher attempts to specify the appraisal techniques used in CB decisions. The same procedure was used to measure the extent of use of CBT (five-point Likert scale). In this regard, respondents were asked to select each of the appraisal techniques used in their CB decisions and rank the importance of each technique, ranging from "not a priority" to "an essential priority". These techniques are shown in table 6.30.

Table 6.30: The investment appraisal techniques used in capital budgeting decisions

No	*The investment appraisal techniques*	*Symbol*	*QS*
	Financial appraisal techniques:	FAT	C4
1	Payback period	PB	=
2	Accounting rate of return	ARR	=
3	Net present value	NPV	=
4	Profitability index	PI	=
5	Internal rate of return	IRR	=
	Risk appraisal techniques:	RAT	=
6	Subjective Assessment	SAS	=
7	Cost-Volume-Profit (CVP) Analysis	CVP	=
8	Sensitivity analysis.	SA	=
9	Scenario Analysis	SCA	=
10	Shorten the PB period	SBP	=
11	Raise the discount rate.	RDR	=
	Operations research techniques:	ORT	=
12	Mathematical Programming	MP	=
13	Decision Theory	DT	=
14	PERT/CPA analysis	PERT	=

Sources: Pike (1984, 1986, 1988, 1989, 1996); Ryan and Ryan (2002); Daunfeldt and Hartwig (2011); Alkaraan & Northcott (2006); Alzoubi and Alazawi (2010).

6.9.5 Firms' financial performance (PERF)

There is considerable interest in studying the relationship between the CB process and firm performance (Farragher et al, 2001; Kim, 1981; Klammer, 1973; Pike, 1981, 1984, 1986). The uses of sophisticated CBT are seen to improve organizational performance (Copeland and Weston 1988). Indeed, "performance can be measured using either stock market information, accounting information or a combination of both" (Jakovicka et al., 2003, p.35). On the other hand, some argue that the measurement of performance can be divided into financial and non-financial measures (Büchner et al., 2013). Most organizations have used a traditional view of profitability as their performance indicator, while several organizations ignored non-financial factors, such as market competition, customer satisfaction, efficiency and quality control, in performance measurement (Hussain and Hogue, 2002). Financial performance measures were used to analyse hospital performance in four aspects: "return on investment (ROI), operational cash flow, earnings before interest & taxes & depreciation & amortization (EBITDA) and equity ratio" (Büchner et al., 2013, P.310; Alexander and Lee, 2006).

In empirical literature, several studies examine the influence of CB factors on financial performance (Jakovicka et al., 2003; Chai, 2011; Irungu, 2014; Haka et al., 1985; Klammer, 1973; Pike, 1984). In general, financial and income statements are considered as the basis for measurement of a firm's performance (Agmon, 1991). Profitability and cash flow indices were employed to measure performance (Pike, 1981). Haka et al. (1985) used the firms' market returns and the estimated average return for each security respectively, to measure firm performance using discounted cash flow techniques (DCFT). Moreover, the effectiveness of DCFT was measured by comparing the firms' returns, "using DCFT and non-DCFT" (Haka, 1987, P.42). However, return on assets (ROA) and Tobin's Q were used to measure firm performance based on accounting and market information (Gompers et al., 2003; Guest, 2009; Haniffa and Hudaib, 2006; Klapper and Love, 2004; Ntim, 2009). Similarly, Ramadan (1991) measured the performance of Jordanian firms using different parameters such as ROI, and return per share.

Furthermore, Klammer (1973) employed ORR to measure the effectiveness of CBT usage and its reflection in US firms' performance. In fact, the calculation of ROI depends on two indicators: net income and investment expenditures. ROI equals net income divided by investment expenditures, and hence, "ROI is not a reliable measure of a firm's ability to reward its shareholders" (Bernstein, 1993).

An appropriate alternative is ORR, which is used to measure the firms' financial performance (Farragher et al., 2001; Klammer, 1973; Pike, 1984, 1986). ORR equals operating profit divided by total operating assets. Kim (1981) used operating cash flow instead of operating profits, whereby "operating cash flow is defined as income after tax but before financing expenses, depreciation and non-recurring items and operating assets are defined as tangible assets" (Jakovicka et al., 2003, p.40). Similarly, this thesis applies the average operating rate of return (AORR) to measure the PERF.

In line with prior research, this thesis applied ORR to measure the financial performance of firms using the CB processes. In this case, the researcher utilized different techniques to determine the ORR. In calculating the ORR, two indicators should be used: the operating profits or losses (EBITDA), and total operating assets (TOA). This enables ORR to be calculated as EBITDA divided by TOA. In a pilot study, the researcher found that some respondents in Libyan manufacturing and oil firms did not understand the ORR formula. Therefore, to measure the financial performance of firms over the recent three years, the researcher used multiple techniques, including a quantitative approach, and other descriptive aspects of the company's profits. Thus, the ORR is calculated based on different elements (descriptive and numerical analysis). Accordingly, respondents were asked to specify the following aspects:

- The actual working years used in calculating the EBITDA and AORR (2008, 2009, 2010, or other years specified by the respondents).
- The average earnings before interest, taxes, depreciation and amortization (EBITDA) for the three years (2008, 2009, 2010).
- The average operating rate of return (AORR) for the three years (2008, 2009, 2010).

Hence, these aspects were measured differently, including ordinal and numerical values/categories/ratios. Table 6.31 demonstrates the measurement of these elements.

Table 6.31: Measuring the indicators of the firms' financial performance (PERF) and control variable

No	*The indicators of PERF*	*Symbol*	*QS*	*Type of Measurement*
1	Average operating rate of return	AORR	C5.4	<1%, 1-5%, 6-10%,…..over 35%
2	EBITDA to average of annual sales	EB..AAS*		<1%, 1-5%, 6-10%,…..over 35%
3	EBITDA to average of investment expenditures (ROI).	EB..AAS		<1%, 1-5%, 6-10%,…..over 35%
	Control variable: the average earnings before interest, taxes, depreciation & amortization (EBITDA)			
1	Average EBITDA	EBITDA	C5.2	Unacceptable, ……,very high

Sources: Alexander and Lee (2006); Bernstein (1993); Büchner et al. (2013); Klammer (1973); Pike (1986). *EB..AAS is often referred to as the net profit ratio or profit margin ratio as addressed in financial statement analysis textbooks

6.10 The link between the research objectives, questions and hypotheses

As mentioned in the first chapter, this study aims to establish the role of the CFFP in CB. To achieve the main aim, the following objectives are summarized:

ROB1: To identify and describe the forecasting procedures and methods (FPM) and the capital budgeting techniques (CBT) used in manufacturing and oil firms operating in Libya.

ROB2: To examine the relationships among the forecasting process variables (PMUF & FMPF)[9] and the extent of CBT usage.

[9] The forecasting process variables consist of the forecasting procedures and methods, and financial, marketing and production factors (the components of cash flow).

ROB3: To examine the effects of the key factors related to forecasting process on the use of forecasting procedures and methods. Such factors include data sources (DS), forecasting horizon (FH) and the qualifications and positions of forecasters (QUA and POS).

ROB4: To investigate the influence of contingent and institutional variables on the use of forecasting procedures and methods.

ROB5: To examine the indirect effect of the use of forecasting procedures and methods (FPM) on the firms' financial performance (PERF) which occurs across the extent of CBT usage.

ROB6: To examine the direct effect of the extent of use of CBT on the firms' financial performance (PERF).

However, this thesis presents a review of CB in terms of CFF and evaluation processes, and explores how the CFFP plays an important role in CB. In doing so, the researcher determined ten main research questions:

RQ1: To what extent can the capital budgeting techniques be used as an essential priority in the investment appraisal process? **ROB1**

RQ2: What are the forecasting procedures and methods (FPM*) often/always used in estimating future cash flow generated by the investment projects? **ROB1**

RQ3: What is the relationship between the use of forecasting procedures and methods (FPM) and financial, marketing and production factors (FMPF)? **ROB2**

RQ4: What is the relationship between the use of forecasting procedures and methods (FPM) and the extent of CBT usage? **ROB2**

RQ5: What is the relationship between financial, marketing and production factors (FMPF) and the extent of CBT usage? **ROB2**

RQ6: What is the relationship between the use of forecasting procedures and methods and the key factors (DS, FH, QUA and POS) related to the forecasting process? **ROB3**

RQ7: What is the influence of combined contingency variables on the use of forecasting procedures and methods (FPM)? **ROB4**

RQ8: What is the influence of institutional variables (CMNP) on the use of forecasting procedures and methods (FPM)? **ROB4**

RQ9: What is the indirect relationship between the use of forecasting procedures and methods (FPM) and the firms' financial performance (PERF) which occurs across the extent of CBT usage? **ROB5**

RQ10: What is the direct relationship between the extent of use of CBT and the firms' financial performance (PERF)? **ROB6**

Having linked the research objectives with the research questions, which are closely linked with the research hypotheses, the research hypotheses are segmented into five groups as follows:

The First Group (G1): The relationships among the forecasting process variables and the use of CBT, is based on the following hypotheses:

> *H1: There is a positive association between the use of forecasting procedures and methods (FPM) and the financial, marketing and production factors (FMPF) observed in both manufacturing and oil firms.*
>
> *H2: The use of forecasting procedures and methods (FPM) are positively associated with the extent of CBT usage in manufacturing and oil firms.*
>
> *H3: The financial, marketing and production factors (FMPF), which are created by the PMUF, are positively associated with the extent of CBT usage in manufacturing and oil firms.*

The second Group (G2): The effect of the key factors (DS, FH, QUA and POS) on the procedures and methods used in forecasting (PMUF) were discussed in chapter five and are based on the following hypotheses:

> *H4: The use of multiple data sources in forecasting processes is positively associated with the use of forecasting procedures and methods (FPM) for capital budgeting decisions made by top management in manufacturing and oil firms.*

H5: The long-term forecast is positively associated with the use of forecasting procedures and methods (FPM) for capital budgeting decisions made by top management in manufacturing and oil firms.

H6: The presence of qualified forecasters is positively associated with the use of forecasting procedures and methods (FPM) for capital budgeting decisions made by top management in manufacturing and oil firms.

H7: The presence of official persons responsible for the forecasting process (position of forecasters) is positively associated with the use of forecasting procedures and methods (FPM) for capital budgeting decisions made by top management in manufacturing and oil firms.

The Third Group (G3): The influence of contingent and institutional variables on the procedures and methods used in forecasting (PMUF) has been discussed, based on the following hypotheses:

H8: The combined contingent variables (AAS, AIE, NEM, IND, SP and PEU) have a strong effect on the use of forecasting procedures and methods for capital budgeting decisions made by top management in manufacturing and oil firms.

$H8_a$: The effect of combined contingency variables (AAS, AIE, NEM, IND, SP and PEU) on the use of forecasting procedures and methods is significantly stronger in public companies than in private ones.

$H8_b$: The effect of combined contingency variables (AAS, AIE, NEM, SP and PEU) on the use of forecasting procedures and methods is significantly stronger in manufacturing companies than in oil ones.

H9: The coercive, mimetic and normative pressures within the Libyan institutions have a strong impact on the use of forecasting procedures and methods for capital budgeting decisions made by top management in manufacturing and oil firms.

$H9_a$: The effect of the coercive, mimetic and normative pressures on the use of forecasting procedures and methods is significantly stronger in public companies than in private ones.

The Fourth Group (G4): The indirect relationship between forecasting procedures and methods and the firms' financial performance will be tested using the following hypothesis:

> *H10: The relationship between the use of forecasting procedures and methods (FPM) and the financial performance is mediated by the extent of CBT usage in manufacturing and oil firms.*

The Fifth Group (G5): The direct relationship between the use of CBT and the firms' financial performance will be tested by using the following hypothesis:

> *H11: There is a positive relationship between the extent of use of capital budgeting techniques (CBT) and the financial performance of manufacturing and oil firms.*

6.11 Data analysis techniques:

6.11.1 Multiple regression equations

Multiple regression equations are formulated for each of the seven path models. This study analyses the causal relationships between research variables. As discussed in chapter four, a mediation model is appropriate for this research, and is considered an important element of path analysis models (Hair et al., 2014). In empirical literature, path analysis models are sequential and causally-focused, allowing testing of the relationships between the research variables and examining direct and indirect effects on outcomes or dependent variables (Hair et al., 2014; Hair et al., 2011a, 2011b). Figure 6.5 illustrates the sequential and causal analysis in a simple mediation model, including direct, indirect, and total effects.

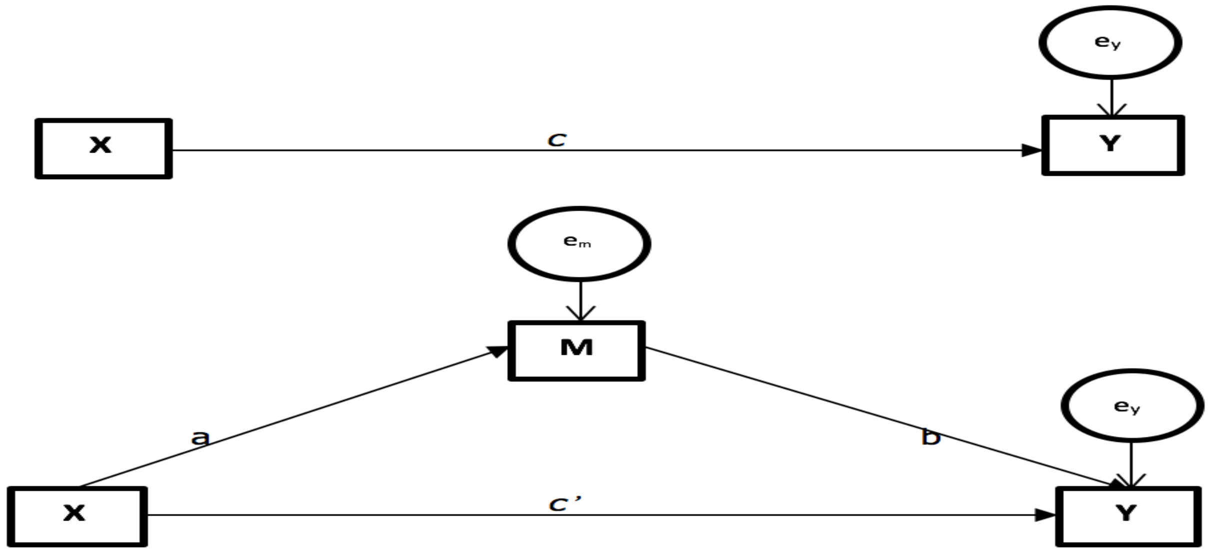


Figure 6.3: Simple mediation model in path diagram form

Adopted from Hayes and Preacher (2014, p.452)

The statistical diagram shown in figure 6.3 illustrates the relationship sequences among X, Y and M, in simple mediation model. In other words, "this model reflects a causal sequence in which X affects Y indirectly through mediator variable M. In this model, X is postulated to affect M and this effect, then propagates causally to Y" (Hayes and Preacher, 2014, p.251). The indirect effect of X on Y must account for the intervening effects of M. The value of path coefficient a*b determine the type of indirect effect (partial or full mediation). In path analysis models, the direct effect of X on Y is determined by the path coefficient c' when the mediator variable M is introduced into the path model. Consequently, the path coefficient c' specifies the total effect of X on Y when the mediator M is not incorporated into the path model. By adding the mediator M to the path model, the total effect of X on Y equals a*b plus c' coefficients.

However, this study examines the direct and mediated impact of forecasting process variables on the use of CBT and financial performance (outcomes). In this case, the mediating effect is examined according to the analytical approach suggested by Baron and Kenny (1986). In this approach, the analytical procedures consist of four steps, as identified by Hayes (2013, p.145):

> *Firstly, it examines the direct significant relationship between the independent variable (x) and the mediator variable (m). In the second step, it verifies the*

significant effect of independent variable (x) on the dependent variable (y); when the mediator variable (m) is not added to the path model.

Thirdly, this procedure examines the significant effect of the mediator variable (m) on the dependent variable (y) when the independent variable is incorporated into the model. Finally, it verifies the significant effect of X on Y when the mediator M is also added to the path model. In line with the path analysis in mediated models, regression equations are formulated based on the causal relationships among the research variables.

6.11.1.1 Path model 1

The path model examines the relationships among the research variables depending on the research hypotheses (H_1, H_2, H_3, H_{10} and H_{11}). In this part of the study, the first path model represents the causal mediation model that consists of the procedures and methods used in forecasting (PMUF), the financial, marketing and production factors (mediating variables), the use of CBT, and the firms' financial performance (outcomes).

Firstly, the relationships among the forecasting process variables will be tested with regard to the first hypothesis (H_1), which concerns the direct relationship between the procedures and methods used in forecasting (PMUF) and the components of cash flow as determined by the financial, marketing and production factors (FMPF). In the second hypothesis, the direct relationship between the procedures and methods used in forecasting (PMUF) and the use of CBT will also be tested. Similarly, the direct effect of the cash flow components (FMPF) on the use of CBT is examined in the third hypothesis. Depending on the logical sequences of the CFFP in CB, the relationship between the PMUF and the use of CBT is mediated by financial, marketing and production factors (FMPF). This relationship is not generally into account. As a rule, the use of CBT mediates the relationship between the PMUF and financial performance (hypothesis 10), and the direct relationship between the use of CBT and financial performance (PERF) will be formulated in hypothesis 11. The mathematical formulation of the first model is based on the conceptual and statistical diagram shown in figure 6.4. Therefore, the following regression equations are formulated:

$$\boldsymbol{FMPF1}_{nj} = \beta_{11} + \sum_{m=1}^{10} d_1 PMUF_{mj} + e_{fmpf1} \quad \text{Eq. 6.1}$$

$$\boldsymbol{CBT1}_{ij} = \beta_{12} + \sum_{m=1}^{10} a_1 PMUF_{mj} + \sum_{n=1}^{13} \mathrm{f}_1\, FMPF1_{nj} + e_{cbt1} \quad \text{Eq. 6.2}$$

$$\boldsymbol{PERF1}_{kj} = \beta_{13} + \sum_{m=1}^{10} c_1\, PMUF_{mj} + \sum_{i=1}^{14} CBT1_{ij} + \lambda_1\, EBITDA1_j + e_{perf1} \quad \text{Eq. 6.3}$$

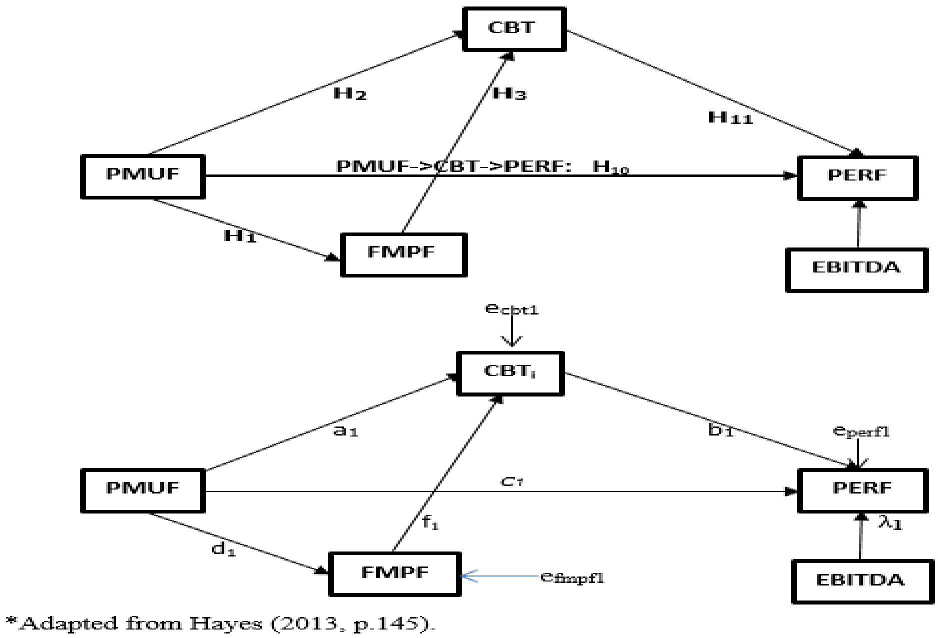


Figure 6.4: Path model 1 (conceptual and statistical models)

*Adapted from Hayes (2013, p.145).

Where:
FMPF: Financial, marketing and production factors associated with forecasting process
PMUF: Procedures and methods used in forecasting
CBT: Capital budgeting techniques
PERF: Firms' financial performance.
β_{11} , β_{12} , β_{13}: Constants
α_1, b_1, c_1, d_1, $f1$, λ_1: Path coefficients
e_{fmpf1} , e_{cbt1} , e_{perf1}: Error terms
i: Capital budgeting techniques i=1,2,3,.......14
j: Firms, J =1,2,3,4,......N
M*:* Number of PMUF variables; m=1,2,3….10
n: Number of FMPF variables; n=1,2,3…….13
k: Number of PERF variables; k=1,2,3 (AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization (control variable).

6.11.1.2 Path model 2

In this part of the study, the researcher examines the factors related to the procedures and methods used in forecasting (PMUF). In the second path model, the researcher attempts to test the influence of using multiple data sources (DS) on the PMUF (the fourth hypothesis). One relationship in this model is the indirect effect of DS on the use of CBT, which is mediated by the PMUF (although this relationship is not hypothesized). As explained in the first path model, research hypotheses H_2, H_{10} and H_{11} will be addressed in all path models. Similarly, the same procedures are used to formulate the regression equations as shown in figure 6.5. Therefore, the researcher formulates the following regression equations:

$$PMUF2_m = \beta_{21} + \sum_{r=1}^{6} s_1 DS_{rj} + e_{pmuf2} \quad \text{Eq. 6.4}$$

$$\boldsymbol{CBT2}_{ij} = \beta_{22} + \sum_{m=1}^{10} a_2\, PMUF2_{mj} + e_{cbt2} \quad \text{Eq. 6.5}$$

$$\boldsymbol{PERF2}_{kj} = \beta_{23} + \sum_{m=1}^{10} c_2\, PMUF2_{mj} + \sum_{i=1}^{14} b_2\, CBT2_{ij} + \lambda_2\, EBITDA2_j + e_{perf2} \quad \text{Eq. 6.6}$$

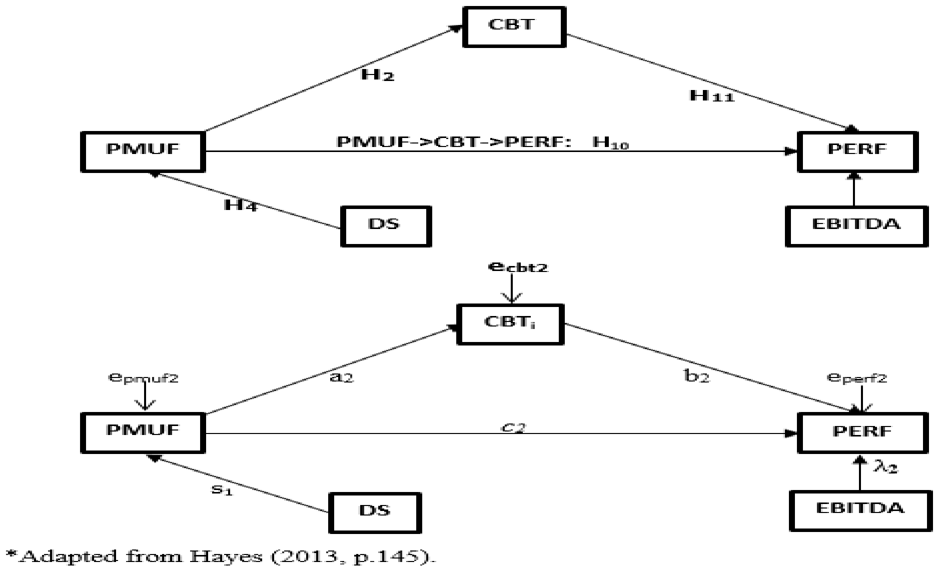


Figure 6.5: Path model 2 (conceptual and statistical models)

Where:
DS: Data sources used in forecasting
PMUF: Procedures and methods used in forecasting
CBT: Capital budgeting techniques
PERF: Firms' financial performance.
B_{21} , β_{22} , β_{23}: Constants
a_2, s_1, c_2, b_2, λ_2: Path coefficients
e_{pmuf2} , e_{cbt2} , e_{perf2}: Error terms
i: Capital budgeting techniques i=1,2,3,.......14
j: Firms, J =1,2,3,4,......N
m: Number of PMUF variables; m=1,2,3….10
r: Number of DS variables; r=1,2,3,4,5,6.
k: Number of PERF variables; k=1,2,3 (AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization (control variable).

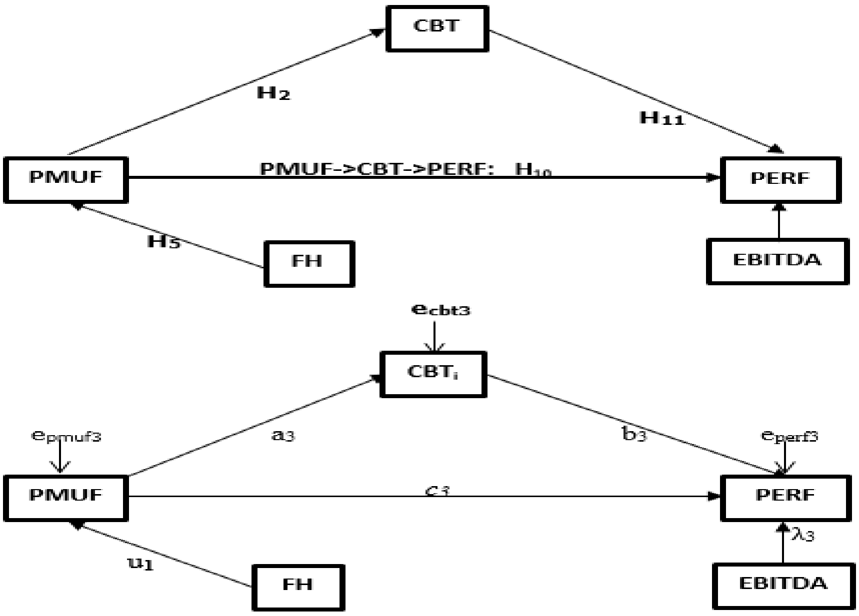
6.11.1.3 Path model 3

The forecasting horizon (FH) is related to the procedures and methods used in forecasting (PMUF). This model examines the direct effect of forecasting horizon (FH) on the procedures and methods used in forecasting (PMUF) and the indirect effect of FH on the use of CBT due to the use of forecasting procedures and methods will also be addressed. Nevertheless, this relationship is not hypothesized. In any path model, the research hypotheses H_2, H_{10} and H_{11} will be addressed. Similarly, the same procedures are used to formulate the regression equations as shown in figure 6.6. Therefore, the researcher formulates the following regression equations:

$$\boldsymbol{PMUF3}_{mj} = \beta_{31} + \sum_{s=1}^{3} u_1 FH_{sj} + e_{pmuf3} \qquad \text{Eq. 6.7}$$

$$\boldsymbol{CBT3}_{ij} = \beta_{32} + \sum_{m=1}^{10} a_3\, PMUF3_{mj} + e_{cbt3} \qquad \text{Eq. 6.8}$$

$$\boldsymbol{PERF3}_{kj} = \beta_{33} + \sum_{m=1}^{10} c_3\, PMUF3_{mj} + \sum_{i=1}^{14} b_3\, CBT3_{ij} + \lambda_3\, EBITDA3_j + e_{perf3} \qquad \text{Eq. 6.9}$$



*Adapted from Hayes (2013, p.145).

Figure 6.6: Path model 3 (conceptual and statistical models)

Where:
FH: Forecasting horizon
PMUF: Procedures and methods used in forecasting
CBT: Capital budgeting techniques
PERF: Firms' financial performance.
B_{31} , β_{32} , β_{33}: Constants
α_3, u_1, c_3, b_3, λ_3: Path coefficients
e_{pmuf3} , e_{cbt3} , e_{perf3}: Error terms

i: Capital budgeting techniques i=1,2,3,.......14
j: Firms, J =1,2,3,4,......N
m: Number of PMUF variables; m=1,2,3….10
s: Number of FH variables, s=1,2 and 3 (1-5 years, 6-10 years and over 11 years)
k: Number of PERF variables; k=1,2,3 (AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization (control variable).

6.11.1.4 Path model 4

The qualification of the forecaster (QUA) responsible for preparing future cash flow estimates is the third factor affecting the forecasting process. As discussed above, path model 4 presents the role of qualified forecasters (QUA) in using forecasting procedures and methods as is assumed in the sixth hypothesis. In the same way, the indirect effect of QUA on the use of CBT due to forecasting procedures and methods usage is tested, but is also not hypothesized. Deriving from the causal analysis shown in figure 6.7, the following regression equations are formulated:

$$\boldsymbol{PMUF4}_{mj} = \beta_{41} + \sum_{p=1}^{3} w_1 QUA_{pj} + e_{pmuf4} \qquad \text{Eq. 6.10}$$

$$\boldsymbol{CBT4}_{ij} = \beta_{42} + \sum_{m=1}^{10} a_4\, PMUF4_{mj} + e_{cbt4} \qquad \text{Eq. 6.11}$$

$$\boldsymbol{PERF4}_{kj} = \beta_{43} + \sum_{m=1}^{10} c_4\, PMUF4_{mj} + \sum_{i=1}^{14} b_4\, CBT4_{ij} + \lambda_4\, EBITDA4_j + e_{perf4} \qquad \text{Eq. 6.12}$$

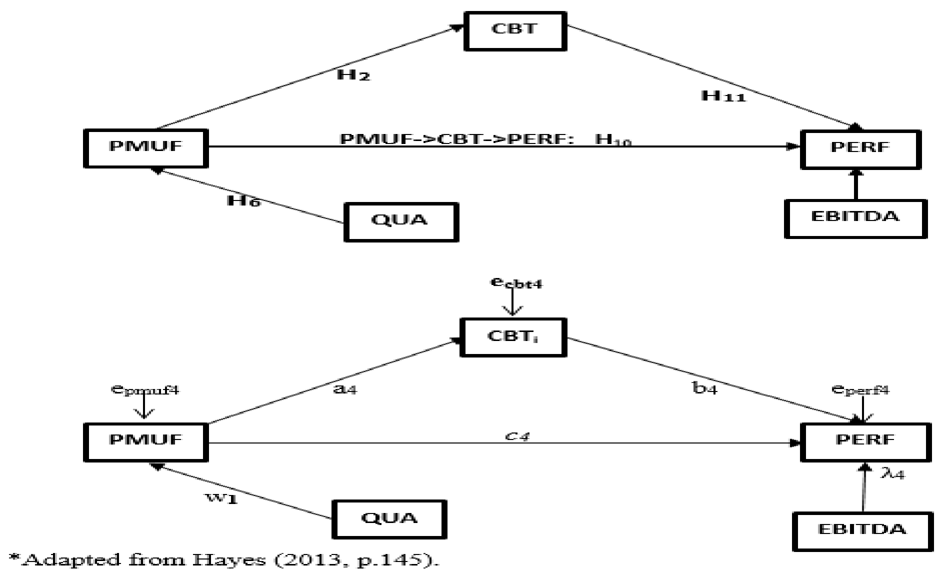


Figure 6.7: Path model 4 (conceptual and statistical models)

Where:
QUA: Qualifications of forecasters
PMUF: Procedures and methods used in forecasting
CBT: Capital budgeting techniques

PERF: Firms' financial performance.
B_{41}, β_{42}, β_{43}: Constants
a_4, w_1, c_4, b_4, λ_4: Path coefficients
E_{pmuf4} , e_{cbt4} , e_{perf4}: Error terms
i: Capital budgeting techniques i=1,2,3,.......14
j: Firms, J =1,2,3,4,......N
m: Number of PMUF variables; m=1,2,3….10
p: Number of QUA variables, p=1,2 and 3 (BCs, MSc/MA and PhD)
k: Number of PERF variables; k=1,2,3 (AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization (control variable).

6.11.1.5 Path model 5

The position of forecasters (POS) responsible for the forecasting process is the fourth factor relating to the forecasting process. Consequently, path model 5 examines the influence of official persons (POS) on the forecasting procedures and methods, as is supposed in the seventh hypothesis. In the same way, the indirect effect of POS on the use of CBT, through the use of forecasting procedures and methods is tested, but this is not hypothesized. In line with this, the mathematical formulation of the regression equations is based on the causal links of relevant factors in the path model, as shown in figure 6.8. Accordingly, the following regression equations are formulated:

$$\boldsymbol{PMUF5}_{mj} = \beta_{51} + \sum_{q=1}^{4} z_1 POS_{qj} + e_{pmuf5} \qquad \text{Eq. 6.13}$$

$$\boldsymbol{CBT5}_{ij} = \beta_{52} + \sum_{m=1}^{10} a_5\, PMUF5_{mj} + e_{cbt5} \qquad \text{Eq. 6.14}$$

$$\boldsymbol{PERF5}_{kj} = \beta_{53} + \sum_{m=1}^{10} c_5\, PMUF5_{mj} + \sum_{i=1}^{14} b_5\, CBT5_{ij} + \lambda_5\, EBITDA5_j + e_{perf5} \qquad \text{Eq. 6.15}$$

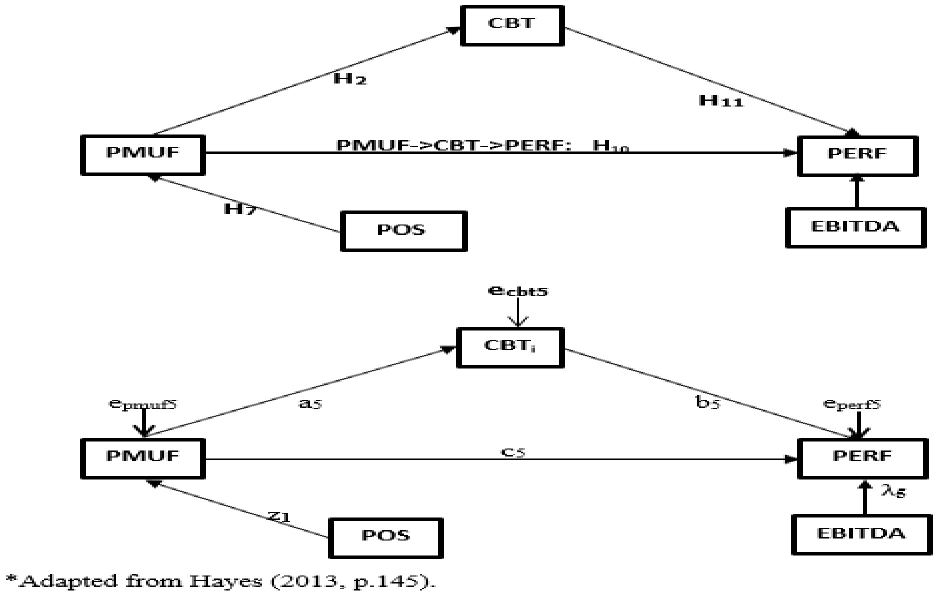


Figure 6.8: Path model 5 (conceptual and statistical models)

Where:
POS: Position of forecasters
PMUF: Procedures and methods used in forecasting
CBT: Capital budgeting techniques
PERF: Firms' financial performance.
B_{51} , β_{52} , β_{53}: Constants
a_5, z_1, c_5, b_5, λ_5: Path coefficients
E_{pmuf5} , e_{cbt5} , e_{perf5}: Error terms
i: Capital budgeting techniques i=1,2,3,.......14
j: Firms, J =1,2,3,4,......N
m: Number of PMUF variables; m=1,2,3….10
q: Number of POS variables, q=1,2,3 and 4 (ACC, ACCM, CFO and others)
k: Number of PERF variables; k=1,2,3 (AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization (control variable).

6.11.1.6 Path model 6

The influence of combined contingent variables (CV) on the procedures and methods used in forecasting (PMUF) is highlighted in the eighth hypothesis. In path model 6, the mediating role of PMUF in influencing the relationship between contingency variables (CV) and the use of CBT will be tested, but it is also not hypothesized. Consequently, the use of CBT mediates the relationship between the use of forecasting procedures and methods (PMUF) and the firms' financial performance (PERF). This relationship is hypothesized in all path models (H_{10}). Moreover, the researcher used multi-group analysis (MGA) to test the differences between the public and private companies in terms of the use of forecasting procedures and methods, particularly the influence of contingent variables on the PMUF as will be tested in $H8_a$. In line with MGA, the differences between manufacturing and oil companies are discussed as well in

H8b. Drawing upon the causal relationships among research variables, as shown in figure 6.9, the following regression equations are formulated:

$$\boldsymbol{PMUF6}_{mj} = \beta_{61} + \sum_{d=1}^{13} g_1 CV_{dj} + e_{pmuf6} \qquad \text{Eq. 6.16}$$

$$\boldsymbol{CBT6}_{ij} = \beta_{62} + \sum_{m=1}^{10} a_6 PMUF6_{mj} + e_{cbt6} \qquad \text{Eq. 6.17}$$

$$\boldsymbol{PERF6}_{kj} = \beta_{63} + \sum_{m=1}^{10} c_6\, PMUF6_{mj} + \sum_{i=1}^{14} b_6\, CBT6_{ij} + \lambda_6\, EBITDA6_j + e_{perf6} \qquad \text{Eq. 6.18}$$

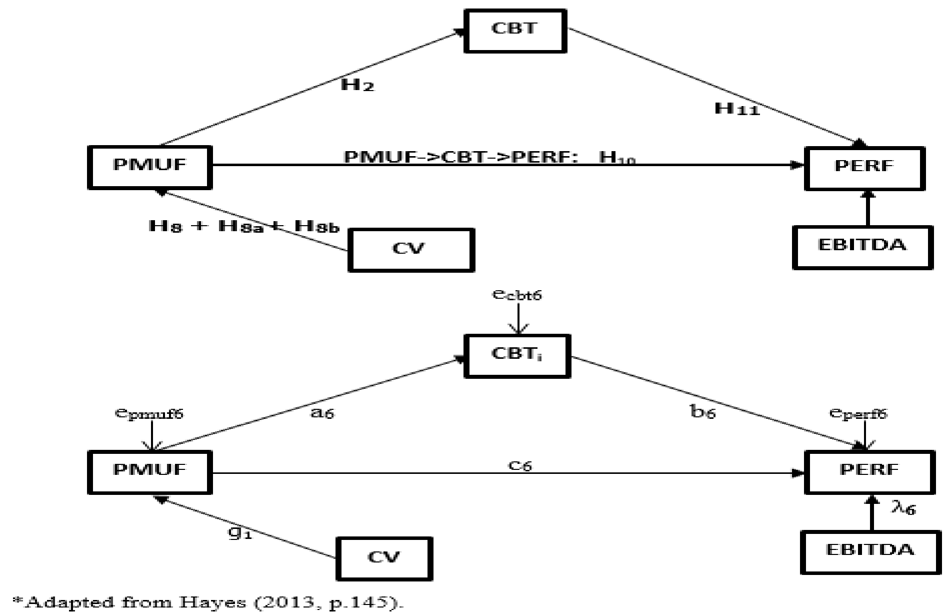


Figure 6.9: Path model 6 (conceptual and statistical models)

Where:
CV: Combined contingent variables (CV)
PMUF: Procedures and methods used in forecasting
CBT: Capital budgeting techniques
PERF: Firms' financial performance.
B_{61} , β_{62} , β_{63}: Constants
a_6, g_1, c_6, b_6, λ_6: Path coefficients
e_{cv} , e_{cbt} , e_{perf}: Error terms
i: Capital budgeting techniques i=1,2,3,.......14
j: Firms, J =1,2,3,4,......N
m: Number of PMUF variables; m=1,2,3….10
d: Number of CV variables, d=1,2,3,…..13
k: Number of PERF variables; k=1,2,3 (AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization (control variable).

6.11.1.7 Path model 7

This study examines the influence of institutional variables on the use of forecasting procedures and methods (the ninth hypothesis). The institutional variables include coercive, mimetic and normative pressures (CMNP). In path model 7, the indirect effect of the CMNP on the use of CBT due to forecasting procedures and methods usage is assessed, but not hypothesized. Moreover, the researcher used multi-group analysis (MGA) to test the differences between the public and private companies in terms of the use of forecasting procedures and methods, particularly the influence of CMNP variables on the PMUF as will be tested in $H9_a$. Deriving from the causal relationships among research variables, as shown in figure 6.10, the following regression equations are formulated:

$$\boldsymbol{PMUF7}_{mj} = \beta_{71} + \sum_{v=1}^{9} t_1 CMNP_{vj} + e_{pmuf7} \qquad \text{Eq. 6.19}$$

$$\boldsymbol{CBT7}_{ij} = \beta_{72} + \sum_{m=1}^{10} a_7\, PMUF7_{mj} + e_{cbt7} \qquad \text{Eq. 6.20}$$

$$\boldsymbol{PERF7}_{kj} = \beta_{73} + \textstyle\sum_{m=1}^{10} c_7\, PMUF7_{mj} + \sum_{i=1}^{14} b_7\, CBT7_{ij} + \lambda_7\, EBITDA7_j + e_{perf7} \qquad \text{Eq. 6.21}$$

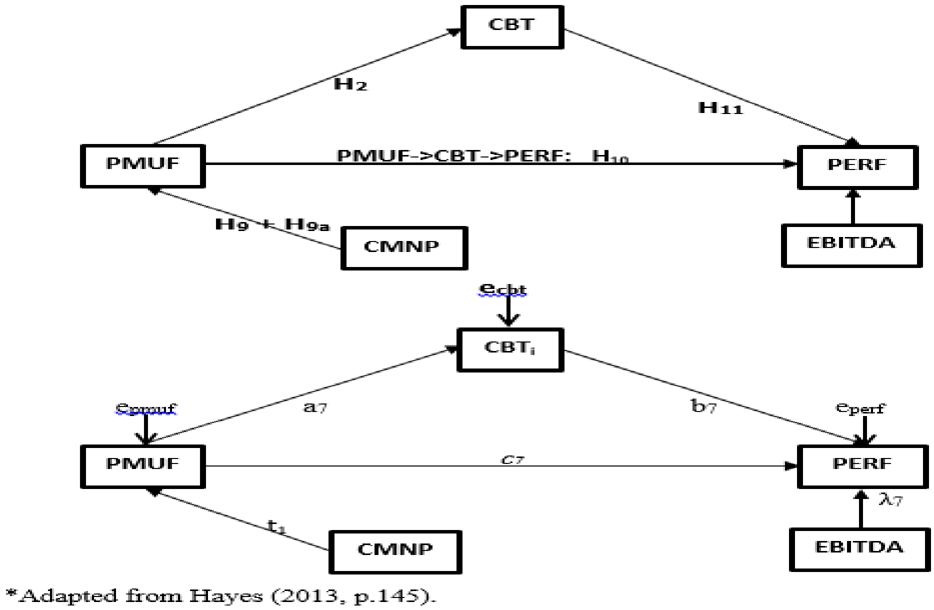


Figure 6.10: Path model 7 (conceptual and statistical models)

Where:
CMNP: Coercive, mimetic and normative pressures
PMUF: Procedures and methods used in forecasting
CBT: Capital budgeting techniques
PERF: Firms' financial performance.
B_{71}, β_{72}, β_{73}: Constants
a_7, t_1, c_7, b_7, λ_7: Path coefficients
e_{pmuf7}, e_{cbt7}, e_{perf7}: Error terms
i: Capital budgeting techniques i=1,2,3,.......14
j: Firms, J =1,2,3,4,......N
m: Number of PMUF variables; m=1,2,3….10
v: Number of CMNP variables, V=1,2,3,…..9

k: Number of PERF variables; k=1,2,3 (AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization (control variable).

In summary, multiple regression analysis (MRA) defines Y as a function of Xs, which means Xs predicts Y. Indeed, the MRA refers to the relationship between independent and dependent variables. This is expressed in a simple model of ordinary least squares (OLS) regression. On the other hand, OLS cannot be applied in complex contexts such as in path analysis, where mediated and moderated variables are present. In complex situations, sophisticated multivariate techniques are more appropriate to test mediating or indirect effects.

6.11.2 PLS-SEM technique (PLS path modelling)

Partial least squares structural equation modelling (PLS-SEM) is considered a "second-generation technique" of multivariate analysis (Hair et al., 2014, p.2). In this thesis, the research applied the partial least squares (PLS), which was "developed as a multiple linear regression model by Wold et al. (2001, p.109). In line with this, Wold (1985) amended the PLS to become a sophisticated multivariate technique, which is elaborated with a statistical software by Chin (2001).

The researcher employed PLS-SEM to incorporate PLS regression into the data analysis. This is a combination of multiple regression, path analysis, and factor analysis, to examine and test the relationship between the observed and latent variables (constructs), depending on the output of the factor analysis (Hair et al., 1998, 2014). In addition, SEM explains the link between the constructs and observed variables. The constructs, such as forecasting methods, "are measured by the observed variables called manifest variables or indicators" (Yenilmez-Dramali, 2013, p.104).

In empirical literature, the relationship between variables in the SEM model can be estimated by two techniques: covariance-based SEM (CB-SEM) and PLS-SEM (Hair et al., 2014). The application of each technique depends on the research context, and the researcher should apply the appropriate method that relates to the properties of the research framework and algorithm assumptions (Ibid).

CB-SEM is used to examine relationships between variables, according to a specific theory, where the essential aim of CB-SEM is to predict the outcome (DV) based on independent variables' values, and changes in contextual factors (Little et al., 2007). CB-SEM requires a large sample size to produce significant statistical predictors, and collected data should be distributed normally (Hair et al., 2014). The structural model results produced by CB-SEM are dependent on ANCOVA approach to test the relationship between the research variables. In other words, the underlying assumptions in CB-SEM are based on null hypotheses, where the relationship between two variables is insignificant (Fornell et al., 1990). Also, CB-SEM aims to achieve a goodness-of-fit between the research model and data (Lowry and Gaskin, 2014). Moreover, CB-SEM is only employed in confirmatory research as based on theoretical arguments (Fornell and Bookstein 1982; Mulaik, 1976). CB-SEM deals only with reflective indicators.

In contrast, PLS-SEM is applied when previous studies are limited and there is insufficient existing knowledge about the research topic. PLS-SEM can be used in confirmatory and exploratory research. The goal of applying PLS-SEM is to predict the main factors or constructs that enable the building of a theoretical model (Hair et al., 2014). PLS with SEM is also used particularly in measuring residuals (errors) to assess the fit between data and the research model (Ibid). Moreover, PLS-SEM is used for small sample sizes and does not require parametric data. This means no assumptions are involved in data distribution. To sum up, PLS-SEM is a "variance-based structural equation modelling technique" that has been widely used by social sciences and technology research (Henseler et al., 2016, p.2).

Hence, PLS is one of the statistical multivariate techniques suggested in this study for the following reasons (Hair et al., 2014; Lowry and Gaskin, 2014):

- PLS is used in specific situations where the measurement of observed variables is required to employ different measures, such as nominal, interval, categorical and ordinal scales.
- PLS is used when the sample size is small, involving approximately 50 to 100 respondents.
- The application of PLS is essential when the research path model includes reflective and formative constructs/factors.
- PLS is preferred when the research model includes more than 50 indicators.
- PLS is applied in this study because of the non-normal distribution of data.
- The research model is a hierarchical model consisting of interrelated parts (multilevel parts) including independent, mediated and dependent variables.

However, the limitations of PLS-SEM have been determined as follows (Hair et al., 2014, pp.17-18):

- PLS-SEM may be not appropriate "when structural models contain circular relationships between the latent variables".
- Lack of adequate goodness-of-fit measures in PLS-SEM. (However, this study used SRMR to assess the Goodness-of-fit, as based on SmartPLS3 software).
- PLS-SEM results by assessing structural and measurement models may not be optimal, subject to bias and consistency issues. Previous studies demonstrate that the results/estimates derived from CB-SEM and PLS-SEM are slightly different (Reinartz et al., 2009).

Moreover, multi-group analysis (MGA) in SmartPLS 3 software cannot be used when the number of observations is less than the number of indicators/measures.

PLS-SEM has recently been applied widely in many areas of business research, such as marketing (Hair et al., 2012b), strategic management (Hair et al., 2012a), management information systems (Ringle et al., 2012), operations management (Peng and Lai, 2012), and accounting (Lee et al., 2011).

In empirical literature, several studies have applied PLS-SEM to examine the impact of contextual factors on management accounting and forecasting processes. Ekholm and Wallin (2011) employed PLS-SEM to examine the impact of perceived environmental uncertainty (PEU) and the accentuation of strategy on the benefits of fixed and flexible budgets. Similarly, Büchner et al. (2013, p.1) utilised the PLS-SEM technique to investigate the influence of "the governing board's strategy-setting role on board-management relations and financial performance". PLS-SEM was also used to test the relationship between institutional pressures and the extent of use of enterprise resource planning (ERP) systems through the top management (Liang et al., 2007). Moreover, Naranjo-Gil et al. (2008, p.222) applied PLS-SEM to assess the measurement and structural models; a moderated analysis is applied to explain how "the top management team (TMT) heterogeneity moderates the relationship between strategic change and operational performance". In forecasting processes, PLS-SEM has received considerable attention in recent years. According to Danese and Kalchschmidt (2011a, 2011b), PLS-SEM was used to test the relationship between the forecasting process and operational performance, while influenced by forecast accuracy. Danese and Kalchschmidt's study (2011a) reported that the mediating effect of forecast accuracy is insignificant, although the forecasting process has a direct significant effect on operational performance.

6.12 The reliability and validity assessment.

This section is similar to the assessment of measurement models when PLS-SEM was used to assess the reliability and validity of indicators (Hair et al., 2014). This study seeks to assess the quality of the adopted measures, as discussed in section 6.9. Hence, the accuracy of indicators/measures is a crucial aspect of all selected measures, where accurate measurements lead to the effective identification of relationships among the research variables. Accordingly, inferential statistical analysis can be reliable and valid.

However, the statistical criteria used to assess the formative measures are different from the reflective measures (Hair et al., 2014). There is a causal relationship between the formative indicators and their constructs, where the indicators produce their constructs. In this research, there are nine reflective constructs, and one formative and one single construct. The formative construct is financial performance (PERF). This thesis also used the PLS (SmartPLS 3 software) to assess the reliability and validity of the selected measures.

Regarding the formative indicators of PLS measurement models, the researcher identifies the following criteria (Ekholm and Wallin, 2011; Lowry and Gaskin, 2014):

- The existence of causal relationships. In this case, the indicators produce the constructs.
- A change in predicated variable as a function of its formative indicators. For example, financial performance (construct) is defined as a function of profitability ratios.
- Formative indicators are not interchangeable. This means that the removal of an indicator produces a change in latent variables (construct).

Moreover, the theoretical background is a vital criterion for comparing between formative and reflective constructs in PLS research. Therefore, table 6.32 presents the reflective and formative latent variables (constructs) addressed in previous studies. The formative and reflective models consider that the latent variable is measured by its indicators (Monecke and Leisch, 2012; Petter et al., 2007).

Table 6.32: Prior studies on reflective and formative latent variables (constructs)

The latent variable (constructs)	*The type of variable*	*RLV/FLV**
Diamantopoulos (1999):		
1-Export market performance 2-Economic and financial outcome 3-Strategic performance	Dependent variable = = = =	FLV FLV FLV
Yenilmez-Dramali (2013): Forecasting methods	Moderated variable	SV*
Haka (1987):		
1-Strategy 2-Environmental predictability 3-Environmental diversity 4-Information system 5-Reward structure 6-Degree of decentralization 7-Tools 8-Organizational stability 9-Short vs. long term rewards	Independent variable = = = = = = = =	RLV = = = = = SV RLV =
Danese and Kalchschmidt (2011a,b)		
1-Cost performance 2-Delivery performance 3-Forecast error 4-Forecasting techniques 5-Information (forecasting data) 6-The role of forecasting	Dependent variable = = Mediating variable Independent variable = = = =	RLV = = = = =
Ekholm and Wallin (2011)		
1-Perceived environmental uncertainty (PEU) 2-Strategic priorities 3-Fixed annual budget usefulness 4-Flexible budget usefulness	Independent variable = = Dependent variable = =	FLV FLV RLV =
Baines and Smith (2003)		
1-Changes in competitive environment 2-Changes in strategy 3-Changes in organization design 4-Changes in technology 5-Changes in advanced management accounting practices 6-Nonfinancial management accounting information 7-Changes in organizational performance: used scoring method	Independent variable Independent and mediating = = = = = = = = Dependent variable	RLV RLV RLV RLV RLV RLV SV
Jayaram, et al. (2010)		
1-Contingent variables: -Firm size -TQM duration -Unionization -Industry type 2-Cultural variables 3-Quality system design 4-TQM outcome constructs: 4.1: Design Performance (DP) 4.2: Process Quality (PCQ) 4.3: Product Quality (PDQ) 4.4: Customer Satisfaction (CS)	 Moderated variable Moderated variable = = = = Independent variables Mediating variables Outcome variables = = = = = = = =	 RLV RLV RLV RLV RLV RLV RLV RLV RLV RLV RLV

Table 6.32: **(continued)**

Christ and Burritt (2013)		
*The contingent factors:	Independent variable	RLV
-Environmental strategy	= =	RLV
-Organizational structure	= =	RLV
-Industry	= =	RLV
-Organizational size	= =	RLV
-Industry	= =	RLV
*The present role of environmental management accounting (EMA)	Dependent variable	RLV
*The future role of EMA	Dependent variable	RLV
Smith and Mentzer (2010)		
1-Forecasting support systems	Independent variable	RLV
2-Forecasting procedures	= =	RLV
3-Forecasting task-technology fit	Mediating variable	RLV
4-Forecast performance	Dependent variable	RLV
Verbeeten (2006): Sophisticated capital budgeting techniques	Dependent variable	RLV

*RLV: Reflective latent variable. FLV: Formative latent variable. SV: Single variable.

This section explains the procedures and criteria related to the reliability and validity tests. Sequentially, reliability is prior to validity (Gronlund, 1982), and an indicator is considered is valid if it is reliable (Churchill, 1979). Accordingly, reliability assessment will be outlined first, followed by validity. This section examines the reliability and validity assessment of the reflective and formative measurement models.

6.12.1 Assessing the reflective measurement models

The assessment of reflective measurement models can be divided into four elements. Firstly, internal consistency can be assessed by its composite reliability. Secondly, the indicators' outer loadings will be used to assess the reliability of reflective indicators. Thirdly, the convergent validity of reflective constructs can be evaluated by using the average variance extracted (AVE). Finally, the Heterotrait-monotrait (HTMT) ratio is employed to assess discriminant validity. Therefore, the following procedures and criteria will be used to assess the reflective measurement models.

6.12.1.1 The internal consistency and indicator reliability

Reliability is defined as the degree of stability and consistency, which is then related to the measurement model or outer model (Chisnall, 1997; Carmines & Zeller, 1979). This section shows how the constructs are measured by their indicators. Cronbach's alpha is the traditional criterion used to assess internal consistency reliability, but due to its limitations, composite reliability (CR) is the preferred option to measure internal consistency reliability (Hair et al., 2014). Statistically, Cronbach's alpha and CR are not appropriate for use in formative measurement models due to multicollinearity issues among the formative indicators. According to empirical literature, the appropriate score of Cronbach's alpha for each variable should be above 0.50 (Nunnally, 1978; Anuar, 2005), whereas the CR score should be greater than 0.60 (Fornell and Larcker, 1981; Hair et al., 2014).

To assess the reliability of reflective measurement indicators, Hair et al. (2014, p.107) suggested the following criteria:

- The CR ratio should be above 0.60, and Cronbach's alpha can be considered as a "conservative measure of internal consistency reliability".
- The indicators' outer loadings can be accepted with a ratio above 0.70.
- "Indicators with outer loadings between 0.40 and 0.70 should be considered for removal only if the deletion leads to an increase in composite reliability and AVE above the suggested threshold value".

In empirical literature, indicators with outer loadings above 0.40 have also been adopted by previous studies (Hair et al., 1998; Haka, 1987; Barringer and Bluedorn, 1999; Kaufman et. al, 2000). The general rule is that indicators with low outer loadings should be retained in the PLS path model, providing that the indicator's outer loading is significant (Yenilmez-Dramali, 2013), as this will be followed by formative indicators.

Cronbach's alpha presumes "that all indicators have equal outer loadings on the construct", while PLS-SEM calculates the indicators depending on their individual reliability. Also, Cronbach's alpha does not account for internal consistency reliability (Hair et al. 2014, p.101). Hence, the use of CR is preferred. This technique calculates the internal consistency reliability in different outer loadings of indicators. Consequently, the modern criterion for evaluating the internal consistency reliability is CR rather than Cronbach's alpha.

SmartPLS 3 and ADANCO 2.0 software were used to assess the reliability of reflective measurement indicators and their constructs, where there are nine reflective variables (constructs) in PLS path models. Subsequently, the results will be presented in accordance with the measurement of research variables.

I. Cash flow forecasting variables.

As discussed in section 6.9, the CFF variables are divided into seven variables: two forecasting process variables, and five key variables related to the forecasting process. The TNF variable has been excluded from the research model. To illustrate the internal consistency and reliability of indicators of CFF variables, table 6.33 shows the assessment results.

Table 6.33: Internal consistency reliability of reflective measures – Indicators of Cash flow forecasting variables.

No	*A construct and its measures (*indicators*)*	*Symbol*	Outer loadings	T values	*a **	*CR**
	1- PMUF* (9 indicators):	PMUF	-----		0.799	0.800
1	Personal estimates	PUF1	-0.657*	7.117		
2	Standard procedures	PUF2	0.762	11.914		
3	Official forms/worksheets	PUF3	0.878	31.788		
4	Delphi method (panel of experts' opinions)	JM2	0.631	6.918		
5	Sales force composite	JM3	0.299*	1.909		
6	Time-series models	QM1	0.521	3.833		
7	Regression analysis models	QM2	0.657	6.806		
8	Software developed by company	SUF1	0.686	11.159		
9	Commercial software packages (Excel)	SUF2	0.705	9.335		
	2- FMPF (8 indicators):				0.496	0.645
1	Borrowing and repayment of funds	FF1	0.547	3.452		
2	Tax considerations	FF3	0.495	2.780		
3	Administrative overhead	FF6	0.740	9.517		
4	Sales/revenue forecast.	MF1	-0.072	0.387		
5	Selling expenses	MF2	0.290	1.428		
6	Direct manufacturing costs	PF1	-0.286*	1.762		
7	Manufacturing overhead expenses	PF2	0.482	3.208		
8	Research and development expenses	PF3	0.655	6.061		
	3- DS (4 indicators):				0.356	0.609
1	Firm departments	DS1	0.819	7.946		
2	University research centres	DS4	0.444	1.816		
3	Local analysts (chartered accountants)	DS5	0.545	2.466		
4	Foreign consultants and companies	DS6	0.265	1.122		
	4- FH (2 indicators):				0.515	0.800
	6-10 years	FH2*	0.741	3.033		
	Over 10 years	FH3	0.887	7.232		
	5- QUA (3 indicators):				0.152	0.635
	BA/BSc	BSc	0.523	2.914		
	MA/MSc	MSc	0.602	3.066		
	Ph.D.	PhD	0.690	3.105		
	6- POS (4 indicators):				0.641	0.779
	Accountant	ACC	0.808	10.796		
	Accounting manager	ACCM	0.880	30.186		
	Financial director	CFO	0.496	5.108		
	Others	Others	0.514	3.546		

* *a*: Cronbach's alpha; CR: Composite Reliability; PMUF is often used as a synonym of the forecasting procedures and methods (FPM); PUF1 indicator is significant (P<0.001); JM3 and PF1 indicators are significant (P<0.10); FH1 has been excluded from the PLS path model 3, because FH1 has a weak coefficient on its construct (FH).

Table 6.33 specifies the internal consistency reliability of indicators used to measure the CFF variables. As per the criteria adopted in this thesis, the researcher found that most indicators attained the minimum outer loading benchmark of 0.40. And most indicators' outer loadings are significant, while the CR values of cash flow forecasting constructs are also above the acceptable benchmark of 0.60. In this regard, the results derived from ADANCO software shows that the CR ratio of FMPF equals 0.645; a slightly different result from that reported by SmartPLS3 (CR=0.572). On the other hand, MF1, MF2 and DS6 indicators have outer loadings below 0.40 and hence, are insignificant.

II. The combined contingent variables.

As discussed in section 6.9, the combined contingent variables are divided into six combined primary variables which include firm size (AAS, NEM & AIE), industry type, strategic priorities (SP) and perceived environmental uncertainty; excluding the investment project's type and the type of ownership used in multi-group analysis. To illustrate the internal consistency and reliability of indicators used to measure the contingency construct, table 6.34 outlines the assessment of the combined contingent variables.

Table 6.34: Internal consistency reliability of reflective measures: Contingency variables (CV)

No	*A construct and its measures (*indicators*)*	*Symbol*	Outer loadings	T values	*a **	*CR**
	CV (13 indicators):	CV			0.785	0.835
1	Average of annual sales	AAS	0.894	26.709		
2	Average of investment expenditures	AIE	0.851	20.037		
3	Number of employees	NEM	0.798	13.676		
4	Type of industry	IND	0.421	3.293		
5	Competitors' actions	PEU2	0.131	0.830		
6	Changes in financial position	PEU3	0.552	5.221		
7	Demand for existing products	PEU4	0.138	1.017		
8	Expected cash flows ….	PEU5	0.654	9.141		
9	To protect the existing main activity	SP1	0.289	2.249		
10	The investments associated with high return	SP2	0.274*	1.989		
11	Feasibility study …..	SP3	0.433	4.221		
12	General economic considerations….	SP4	0.384	2.935		
13	The training of human resources…..	SP7	0.825	23.976		

* SP2 indicator is significant ($p<0.05$).

In assessing the reliability of indicators used to measure contingency variables, as shown in Table 6.34, the researcher found that most of the indicators' outer loadings are significant and the CR value of contingency construct is above the adopted threshold value (CR>0.60). Even though, PEU2 and PEU4 have outer loadings below 0.40 and are insignificant.

III. The institutional variables.

The institutional variables are determined as the coercive, mimetic and normative pressures (CMNP). Section 6.9 presented ten indicators used to measure CMNP constructs; excluding CP6 from the PLS path models because respondents' answers were almost identical for the CP6 indicator. Table 6.35 shows the results of the internal consistency reliability assessment.

Table 6.35: Internal consistency reliability of reflective measures: Indicators of institutional variables

No	A construct and its measures (indicators)	*Symbol*	Outer loadings	T values	*a* *	*CR**
	CMNP (9 indicators):	CMNP	----		0.734	0.795
1	Commercial code and tax system	CP1	0.522	3.411		
2	Financial constraints and banking system	CP2	0.481	2.945		
3	The system of privatization*	CP3	0.476	3.029		
4	Intervention by Libyan Government*	CP4	0.631	5.789		
5	International accounting standards	CP5	0.523	4.195		
6	Libyan companies	MP1	0.600	4.214		
7	Multinational and foreign companies	MP2	0.515	3.503		
8	Education system in Libyan universities	NP1	0.565	3.227		
9	The Libyan chartered accountants	NP2	0.616	3.518		

Table 6.35 indicated that the reliability of most of the CMNP indicators with outer loadings above 0.40 are significant, and the CR value of CMNP construct is above the adopted threshold value.

IV. Capital budgeting techniques (CBT).

The CBT were discussed in chapter three. Section 6.9 specified the techniques used in evaluating investment opportunities and how previous works have measured these techniques in accordance with each studies' objectives whether they are orientated towards exploration or explanation. To understand the reliability of indicators used to measure CBT construct, Table 6.36 summarises this assessment.

Table 6.36: Internal consistency reliability of reflective measures: Capital budgeting techniques (CBT).

No	A construct and its measures (indicators)	Symbol	Outer loadings	T values	*a* *	*CR**
	CBT (12 indicators):	CBT			0.734	0.795
1	Payback period	PB	-0.268	1.771*		
2	Net present value	NPV	0.732	8.429		
3	Profitability index	PI	0.655	7.241		
4	Internal rate of return	IRR	0.819	15.300		
5	Subjective Assessment	SAS	-0.334	1.987*		
6	Cost-Volume-Profit Analysis	CVP	0.547	7.043		
7	Sensitivity analysis.	SA	0.716	9.759		
8	Scenario Analysis	SCA	0.777	10.304		
9	Shorten the PB period	SPB	0.427	3.143		
10	Mathematical Programming	MAP	0.675	5.178		
11	Decision Tree/Theory	DT	0.740	9.861		
12	PERT/CPA analysis	PERT	0.642	6.740		

* PB indicator is significant ($p<0.10$). * SAS Indicator is significant ($p<0.05$).

The reliability assessment of the CBT is achieved according to most indicators' outer loadings. The CR value of CBT constructs is above the suggested threshold value. Two indicators (PB and SAS) have low outer loadings. The exclusion criterion adopted in this study suggests that these indicators should be retained in the PLS path model, because their outer loadings are significant.

6.12.1.2 The convergent and discriminant validity

Convergent validity explains how the construct's indicators have a high correlation with other indicators of the same construct (Hair et al., 2014; Carmines & Zeller, 1979). The average variance extracted (AVE) is commonly used to measure convergent validity (Fornell and Larcker, 1981). In this regard, the AVE can be calculated by using the sum of the squared outer loadings divided by the number of indicators of the same construct (Hair et al., 2014). Consequently, the AVE focuses on the relationship between the constructs and their indicators. In empirical literature, the AVE value must be more than 0.50, but it can still be accepted with a value of less than 0.50, provided that the value of CR is greater than 0.60 (Huang et al., 2013).

Discriminant validity (DV) refers to constructs, which can be clearly distinguished from others. Two criteria can be used to measure discriminant validity (Hair et al., 2014, p.105):

- The cross loadings of the indicators: particularly, "the indicator's outer loading on the specific construct should be greater than all of its loadings on other constructs". It is evident that two or more latent variables manifest the discriminant validity.

- Secondly, the Fornell-Larcker (FL) criterion is a conventional technique used to assess discriminant validity. The FL function equals the square root of the AVE ($\sqrt{\text{AVE}}$), which enables the comparison of $\sqrt{\text{AVE}}$ values with the constructs' correlations. "The square root of the AVE of each construct should be higher than its highest correlation with any other construct".

To address the discriminant validity, the $\sqrt{\text{AVE}}$ value of each construct must be greater than its correlation with other constructs. In this research, the average variance extracted (AVE) and square root of the AVE ($\sqrt{\text{AVE}}$) of each construct is shown in table 6.37.

Table 6.37: Convergent validity – average variance extracted (AVE) statistics

No	*A construct or latent variable (LV)*	*Symbol*	*No. of indicators*	*AVE**	$\sqrt{AVE}$
1	Procedures and methods used in forecasting	PMUF	9	0.438	0.662
2	Financial, marketing and production factors	FMPF	8	0.241	0.491
3	Capital budgeting techniques	CBT	12	0.403	0.635
4	The data sources used in forecasting	DS	4	0.309	0.556
5	Forecasting horizon	FH	2	0.443	0.666
6	Qualifications of forecasters	QUA	3	0.370	0.608
7	Position of forecasters	POS	4	0.484	0.696
8	The combined contingent variables	CV	13	0.329	0.574
9	Coercive, normative and mimetic pressures	CNMP	9	0.303	0.550

The AVE values of most research variables are less than 0.50. In this study, the exclusion criterion requires that variables with AVE of less than 0.50 should be retained if their CR values are greater than 0.60 (Huang et al., 2013).

Recently, Heterotrait-monotrait (HTMT) ratio of correlations has been proposed to assess discriminant validity due to perceived limitations of Cronbach's alpha and CR in resolving discriminant validity in collaborative research (Henseler et al., 2015). The HTMT is based on the multitrait-multimethod matrix, which concentrates on evaluating the analysis of variance. In general, discriminant validity is a useful tool to analyse relationships among the constructs. This study has seven path models, each with five constructs (latent factors). HTMT is only applied in the correlation between reflective constructs (SmartPLS3 and ADANCO 2.0 software). Accordingly, the HTMT ratios can be demonstrated for each PLS path model as shown in table 6.38, while the FL criterion is not available in SmartPLS3 software.

Table 6.38: Discriminant validity: Heterotrait-monotrait (HTMT) ratios

PATH MODEL 1	*PC**	*Mean (M)*	*SD*	*T statistics*	*P values*
EBITDA -> CBT**	0.269	0.298	0.074	3.640	0.000
FMPF -> CBT	0.830	0.854	0.060	13.870	0.000
FMPF -> EBITDA	0.258	0.328	0.086	3.005	0.003
PMUF -> CBT	0.672	0.706	0.070	9.555	0.000
PMUF -> EBITDA	0.216	0.262	0.067	3.229	0.001
PMUF -> FMPF	0.769	0.815	0.076	10.149	0.000
PATH MODEL 2	*PC*	*Mean (M)*	*SD*	*T statistics*	*P values*
DS -> CBT	0.798	0.831	0.113	7.080	0.000
EBITDA -> CBT	0.269	0.297	0.073	3.668	0.000
EBITDA -> DS	0.203	0.299	0.114	1.778	0.076
PMUF -> CBT	0.672	0.704	0.071	9.454	0.000
PMUF -> DS	0.827	0.834	0.121	6.813	0.000
PMUF -> EBITDA	0.216	0.268	0.065	3.338	0.001
PATH MODEL 3	*PC*	*Mean (M)*	*SD*	*T statistics*	*P values*
EBITDA -> CBT	0.269	0.298	0.073	3.670	0.000
FH -> CBT	0.393	0.509	0.164	2.392	0.017
FH -> EBITDA	0.234	0.277	0.111	2.104	0.036
PMUF -> CBT	0.672	0.706	0.070	9.613	0.000
PMUF -> EBITDA	0.216	0.261	0.065	3.309	0.001
PMUF -> FH	0.408	0.536	0.173	2.366	0.018
PATH MODEL 4	*PC*	*Mean (M)*	*SD*	*T statistics*	*P values*
EBITDA -> CBT	0.269	0.296	0.075	3.599	0.000
PMUF -> CBT	0.672	0.704	0.070	9.651	0.000
PMUF -> EBITDA	0.216	0.261	0.066	3.266	0.001
QUA -> CBT	1.315	1.098	0.240	5.479	0.000
QUA -> EBITDA	0.136	0.351	0.163	0.832	0.405
QUA -> PMUF	1.285	1.079	0.240	5.358	0.000
PATH MODEL 5	*PC*	*Mean (M)*	*SD*	*T statistics*	*P values*
EBITDA -> CBT	0.269	0.294	0.077	3.522	0.000
PMUF -> CBT	0.672	0.702	0.068	9.902	0.000
PMUF -> EBITDA	0.216	0.258	0.069	3.131	0.002
POS -> CBT	0.703	0.744	0.090	7.789	0.000
POS -> EBITDA	0.154	0.238	0.093	1.649	0.100
POS -> PMUF	0.687	0.728	0.098	6.980	0.000
PATH MODEL 6	*PC*	*Mean (M)*	*SD*	*T statistics*	*P values*
CV -> CBT	0.802	0.811	0.059	13.627	0.000
EBITDA -> CBT	0.269	0.298	0.075	3.585	0.000
EBITDA -> CV	0.390	0.405	0.071	5.506	0.000
PMUF -> CBT	0.672	0.706	0.071	9.457	0.000
PMUF -> CV	0.837	0.852	0.054	15.625	0.000
PMUF -> EBITDA	0.216	0.263	0.066	3.248	0.001
PATH MODEL 7	*PC*	*Mean (M)*	*SD*	*T statistics*	*P values*
CMNP -> CBT	0.607	0.658	0.071	8.550	0.000
EBITDA -> CBT	0.269	0.293	0.076	3.557	0.000
EBITDA -> CMNP	0.427	0.450	0.077	5.540	0.000
PMUF -> CBT	0.672	0.701	0.068	9.883	0.000
PMUF -> CMNP	0.608	0.670	0.068	8.967	0.000
PMUF -> EBITDA	0.216	0.257	0.066	3.291	0.001

*PC: Path coefficient. **The relationship between EBITDA and research variables is not hypothesised, because EBITDA is used as a control variable.

Table 6.38 shows that all HTMT ratios are significant under the P values ($p<0.001$; $p<0.01$; $p<0.05$; $p<0.10$). The conservative value of HTMT should not exceed 0.85 (Henseler et al., 2015) because a HTMT value of close to one, indicates a lack of discriminant validity. As a result, all constructs have established discriminant validity.

6.12.2 Assessing the formative measurement models.

Previous studies have assessed formative indicators. Hair et al. (2014, p. 121) outlined three main criteria used to assess the reliability of formative measurement models: convergent validity assessment of formative constructs, collinearity or multi-collinearity issues associated with formative indicators, and the significance of formative indicators.

Firstly, the convergent validity assessment of formative constructs is based on redundancy analysis (Chin, 1998). This means that information related to convergent validity can be derived from the formative and reflective constructs. Subsequently, Hair et al. (2014, p.121) state that the formative construct should be highly correlated with the reflective measures of the same construct ($R^2 \geq 0.64$). Additionally, redundancy analysis (RA) for convergent validity assessment of the formative constructs is not available in SmartPLS 3 software.

Secondly, collinearity issues occur when there is a high correlation between two indicators. The existence of high correlation between three indicators or more is referred to as multicollinearity (Hair et al., 2014). To assess the collinearity or multi-collinearity between indicators, the tolerance (TOL) and variance inflation factor (VIF) are used for each formative path model. The importance of using collinearity analysis is due to the occurrence of non-significant weights within the formative models. Subsequently, the researcher used SPSS software (version 22) to determine the collinearity statistics (TOL and VIF). In this research, the firms' financial performance (PERF) only represents the formative construct (dependent variable). The firm's performance indicators are the profitability ratios, identified as AORR, EB..AIE and EB..AAS. In this regard, the multi-collinearity analysis of the firms' performance indicators is illustrated in table 6.39.

Table 6.39: Firms' financial performance indicators – Multi-collinearity analysis

The firms' financial performance (PERF) indicators	*Symbol*	*Multi-collinearity statistics*	
		Tolerance	*VIF*
Average operating rate of return	AORR	.726	1.379
EBITDA/ average of investment expenditures	EB..AIE	.753	1.328
EBITDA/ average of annual sales	EB..AAS	.646	1.548

Table 6.39, shows that all financial performance (PERF) indicators should remain in the PLS path models, because the variance inflation factor (VIF) for each PERF indicator is less than five. In this thesis, a tolerance (TOL) value of 0.20 or higher, and VIF value of 5 or lower, are the acceptance criteria used for the remaining indicators that do not have collinearity issues.

However, the earnings before interest, taxes, depreciation and amortization (EBITDA) factor forms the control variable for the firm's performance construct due to the strong correlation between profitability ratios (performance's indicators) and EBITDA. The profitability ratios used to measure financial performance (PERF) in this study are calculated depending on the EBITDA variable as a numerical value. Therefore, the EBITDA is used as the control variable for performance, whereby the profitability ratios (AORR, EB..AIE and EB..AAS) will change as a function of the EBITDA. Furthermore, the variance proportion of variables must be less than 0.90. Thus, the variance indices are as presented in table 6.40.

Table 6.40: Financial performance (PERF) indicators - collinearity diagnostics

Model 1	Eigenvalue	Condition index	Variance proportions			
			(Constant)	EB..AIE	EB..AAS	AORR
1	3.447	1.000	.02	.02	.02	.02
2	.218	3.981	.00	.70	.01	.46
3	.184	4.329	.97	.06	.16	.09
4	.151	4.772	.01	.22	.81	.43

Finally, the third task in establishing the reliability of formative measurement models is to assess the significance and relevance of the formative indicators. The following procedures were used to define the significance and relevance of the formative indicators (Hair et al., 2014):

- The formative indicator's outer weight and loading (OW/L) should be more than 0.50.
- A bootstrapping procedure should be used to assess the significance of outer weight and outer loading of the same indicator. The exclusion criterion is suggested that the indicator should be retained if its outer weight is significant.

- The process used to retain or omit the non-significant formative indicators is to test their outer loadings rather than their outer weights and analyse the significance of outer loadings. Subsequently, there are two options (Hair et al., 2014, p.131):

- The outer loading is ≥ 0.5, thus the formative indicator can be retained despite it being insignificant.
- The outer loading is ≤ 0.5, then test the significance of the outer loading according to the following results:
  - The outer loading is < 0.5 but is significant. Subsequently, examine the results where the indicator is included, and then omitted and compare these results.
  - The outer loading is < 0.5, but is not significant. Remove the formative indicator.

Consequently, table 6.41 clarifies the significant/non-significant formative indicators based on the procedures and criteria addressed above.

Table 6.41: The significant of formative indicators

Indicators	The significant of outer weights		The significant of outer loadings	
	Outer weights	T Statistics	Outer loadings	T Statistics
AORR	0.755	8.328	0.946	26.782
EB..AAS	0.228	2.043	0.709	8.741
EB..AIE	0.209	1.701	0.592	4.673
EBITDA*	1.000	-----	1.000	-------

*EBITDA: Single latent variable.

Table 6.41 provides evidence that most of the formative indicators are significant and should be retained.

6.13 Chapter summary

This chapter outlined the study’s research design and structure in aiming to achieve six main objectives. Firstly, regarding research philosophy and methodology, the researcher applied a positivist paradigm underpinned by an objective epistemology. Hence, a quantitative method was used with data being obtained from a survey. The sample was selected from a list of manufacturing and oil firms disclosed by the authorities in Libya, which include the NOC, Industrial Research Centre, PIB, the Ministry of Industry and other local authorities. The researcher intended to collect data from 100 firms. Respondents included the financial directors and officials who work in manufacturing and oil firms operating in Libya. The questionnaire survey yielded a 31% response rate, which is acceptable when compared with other accounting research, and most respondents were financial directors (53.65%). Secondly, the questionnaire survey was conducted in sequential stages: structuring (constructing), piloting and administering the questionnaire, in order to develop and disseminate a valid questionnaire. Thirdly, the research model determined the main research variables. Two variables referred to the forecasting process (FPM and FMPF). Four variables constitute the key factors related to the forecasting process (DS, FH, QUA and POS). The contingency and institutional variables, CBT and the firm performance, are also addressed. The last consideration is the control variable (EBITDA). Fourthly, the researcher outlined a guide to assist in measuring the research variables using different categories and scales; the purpose of this section is to highlight the previous empirical studies to measure the variables of this thesis. Fifthly, the researcher presented the statistical methods used in this thesis and explained the reasons for the adoption of partial least squares structural equation modelling (PLS-SEM) as the statistical data analysis technique. The PLS-SEM is an appropriate method when a study's sample is relatively small, as opposed to larger samples in business research which employ the covariance-based SEM technique (CB-SEM). Indeed, PLS-SEM is a combination of multiple regression, path modelling analysis and factor analysis. Finally, the reliability and validity assessment were used in place of formative and reflective measurement models. This assessment involved internal consistency reliability, indicator reliability, convergent and discriminant validity, and multicollinearity issues. In this regard, the composite reliability (CR) ratio was used to assess internal consistency reliability. It became evident that all reflective constructs were close to 0.60, as the acceptable benchmark of composite reliability (CR). Regarding convergent and discriminant validity, the resultant statistics from PLS-SEM reported that all constructs established discriminant validity (HTMT ratio). In terms of indicator reliability, most of the outer loadings and weights of reflective and formative indicators are significant.

Accordingly, this chapter addressed the structure of the research design and how this thesis can be conducted in accordance with its philosophical and rational positions. The next chapter will present the data analysis and results obtained from testing the research hypotheses.

7 CHAPTER SEVEN: DATA ANALYSIS

7.1 Introduction

This chapter presents an analysis of data collected from the questionnaire. It aims to achieve three main tasks. Firstly, descriptive statistics for the research variables are outlined, with details of the use of forecasting procedures and methods, and CBT in manufacturing and oil companies. Secondly, this section addresses the assessment of the research hypotheses and clarifies the significance of path coefficients that elaborates on the relationship between the exogenous and endogenous constructs (latent variables). Thirdly, this part of the study aims to assess the results derived from the PLS-SEM structural model, one of which is addressed in the second section. In general, the statistical analysis technique (PLS-SEM) is used to assess the significance of the research hypotheses and the goodness of model fit.

7.2 Descriptive statistics.

7.2.1 The contingency variables

The questions B1...B5 and 5A, C3 and C5.3 concern firms' contingent variables, which are firm's age and size, type of industry and ownership, strategy and environmental uncertainty.

7.2.1.1 Company's age and size.

For question 5a section (A), the ages of companies are presented in table 7.1, which shows that about 55% of the manufacturing and oil companies operating in Libya are more than 21 years old. Verma et al. (2009) assert that there is no relationship between the firm's age and its use of financial appraisal techniques except the payback period method. Therefore, the age variable has been excluded from the research path models, which will be presented next.

Table 7.1: Ages of companies

Age in years	*Frequency*	*Percentage*	*Cumulative percentage*
1-5 years	4	5.8	5.8
6-10	7	10.1	15.9
11-15	10	14.5	30.4
16-20	10	14.5	44.9
Over 21years	38	55.1	100.0
Total	69	100.0	

In this study, the researcher used four observed variables to measure the firm's size, which are average of annual sales (AAS), number of employees (NEM), average of investment expenditures (AIE) and average-total of operating assets (ATOA). The researcher selected AAS, AIE and NEM to measure the firm's size. Respondents were first asked to identify the number of full-time workers (employees) and average of annual sales in their companies, respectively (see table 7.2 and table 7.3).

Table 7.2: Number of employees (NEM)

No. of employees	*Frequency*	*Percentage*	*Cumulative percentage*
Less than 100	33	47.8	47.8
100-<200	11	16.0	63.8
200-<400	7	10.1	73.9
400-<800	0	0	73.9
800-<1600	6	8.7	82.6
1600-<3200	7	10.2	92.8
Over 3200	5	7.2	100.0
Total	69	100.0	

Table 7.3: Average of annual sales (AAS)

Annual sales	*Frequency*	*Percentage*	*Cumulative percentage*
0-<200TLD	0	0	0
200TLD-<1 MLD	11	15.9	15.9
1-<5 MLD	25	36.3	52.2
5-<10 MLD	9	13.0	65.2
10-<20 MLD	2	2.9	68.1
20-<40 MLD	5	7.2	75.3
40-<80 MLD	3	4.4	79.7
80-<160MLD	1	1.5	81.2
160-< 320 MLD	2	2.9	84.1
320-<640 MLD	2	2.9	87.0
Over 640 MLD	9	13.0	100.0
Total	69	100.0	

Table 7.2 refers to the number of employees working in manufacturing and oil companies, where the majority of companies (47.8%) have been operating with less than 100 full-time workers. The average of annual sales achieved in Libyan companies is demonstrated in table 7.3. About 52.2% of manufacturing and oil companies achieved annual sales of between 1 and 5 MLD. In contrast, there are only nine Libyan companies (13%) that achieve the highest level of annual sales (more than 640 MLD). Anuar (2005) used the same variables (NEM and AAS) to measure firm size and he found that average of annual sales in Malaysian companies ranged from RM 1Million to 25Million (51 out of 88 companies). Similarly, Zotteri and Kalchschmidt (2007) used the number of employee and overall sales in measuring the firm size.

Respondents were asked to provide data from three recent years which should be identical to the actual working years used in the calculation of earnings before interest, taxes, depreciation and amortization (EBITDA), as mentioned in question C5.1 (Appendix B). In this regard, the years 2008, 2009 and 2010 were determined as the recent years, or actual working years used by the Libyan manufacturing and oil companies. Alternatively, respondents should specify the other years provided if information is not available for 2008, 2009 and 2010. For question C5.1 (questionnaire, section c), the respondents' answers are:

- 2008, 2009, 2010 years: 40 respondents (58%).
- Other (different years): 29 respondents (42%).

Average of investment expenditure (AIE) and average total of operating assets (ATOA) are covered in section C, questions C3 and C5-3, respectively. Table 7.4 and 7.5 display these observed variables.

Table 7.4: Average of investment expenditure (AIE)

AIE	*Frequency*	*Percentage*	*Cumulative percentage*
0-<200TLD	14	20.3	20.3
200TLD-<1 MLD	21	30.4	50.7
1-<5 MLD	8	11.6	62.3
5-<10 MLD	10	14.5	76.8
10-<20 MLD	3	4.4	81.2
20-<40 MLD	3	4.3	85.5
40-<80 MLD	1	1.5	87.0
80-<160MLD	1	1.4	88.4
160-< 320 MLD	4	5.8	94.2
320-<640 MLD	1	1.5	95.7
Over 640 MLD	3	4.3	100.0
Total	69	100.0	

Table 7.5: Average-total of operating assets (ATOA)

ATOA	*Frequency*	*Percentage*	*Cumulative percentage*
200TLD-<1MLD	8	11.60	11.60
1-<5MLD	13	18.85	30.45
5-<10MLD	15	21.75	52.20
10-<20MLD	10	14.5	66.70
20-<40MLD	3	4.35	71.05
40-<80MLD	4	5.8	76.85
80-<160MLD	0	0	76.85
160-<320MLD	2	2.9	79.75
320-<640MLD	4	5.8	85.55
640-<1280MLD	3	4.35	89.90
Over1280MLD	7	10.10	100.00
Total	69	100.0	

In Table 7.4, it can be observed that 50.7% of Libyan manufacturing and oil companies have implemented investment projects not exceeding 1 MLD over the last three years, whereas three Libyan companies (4.3%) allocated more than 640 MLD to their investment projects. In this regard, Pohlman et al. (1988) stated that the use of multiple forecasting methods in large US firms is associated with higher capital expenditures. Table 7.5 presents the average-total of operating assets as one of the firm size variables. The data shows that 52.2% of Libyan companies have total operating assets ranging from 200 TLD (TLD) to 10 MLD (MLD). Only seven companies (10.10%) have total operating assets valued at more than 1280 MLD. In terms of the descriptive statistics, the firm size variables are demonstrated in table 7.6.

Table 7.6: Descriptive statistics of the firm size variables

Main statistics	*AAS*	*NEM*	*AIE*	*ATOA*
Mean	3.91	2.65	2.58	3.59
SD	3.067	2.106	2.789	3.246
Minimum	0	1	0	0
Maximum	10	7	10	10

7.2.1.2 Type of industry, ownership and investment project

In questionnaire questions B2 and B3 (Section B), respondents were asked to identify the type of industry and ownership in manufacturing and oil companies. The industrial categories and company's ownership type are demonstrated in figure 7.1 and table 7.7, respectively.

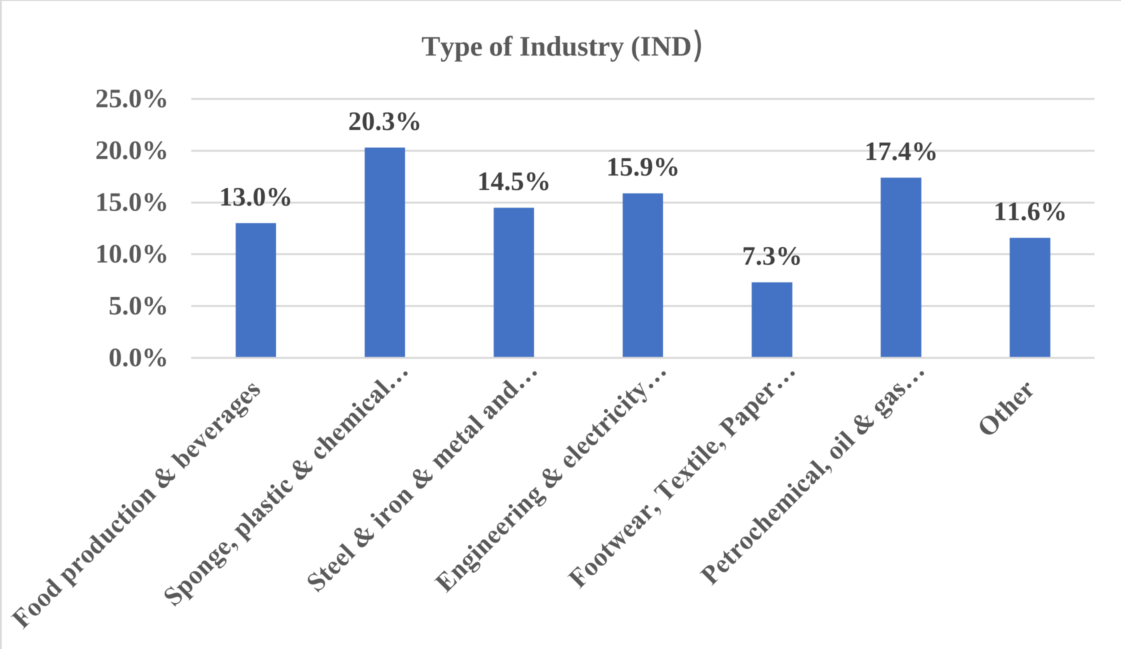


Figure 7.1: Type of industry (IND)

In the bar chart above, it can be seen that each industrial type has the same chance of appearing in the study's sample, except for footwear, textile, paper and packaging industries, which comprise only 7.3% of industrial companies. In a similar way, Anuar (2005) used the firm's major products to examine the relationship between the firm's major products and the use of sophisticated CBT in Malaysian manufacturing companies. In line with this, the use of sophisticated CB is associated with the firm size and type of industry (Verbeeten, 2006).

Table 7.7: Type of ownership (TOW)

Company ownership type	*Frequency*	*Percentage*
State company (100% owned)	21	30.4
Private/privatized company (100% owned)	35	50.7
Foreign company (100% owned)	2	2.9
Joint venture: shared between the state and a foreign partner	5	7.2
Joint venture: shared between the private sector and a foreign partner	1	1.4
Joint venture: shared between the state and private sector	4	5.8
Joint venture: shared between the state, foreign and private sectors	1	1.4
Total	69	100.0

Table 7.7 shows that 50.7% of the manufacturing and oil companies are private companies, whereas 2.9% of the respondents are foreign companies. In terms of the types of investment projects, manufacturing and oil companies in Libya focus on four types of investment projects:

the new plant/production line, renewal and development of existing projects, expansion of existing capacity and replacement of equipment, as shown in table 7.8.

Table 7.8: Types of investment projects (TIP)

*Types of investment projects (TIP)**	*Symbol*	*Response (yes)*	*% (yes)*	*Mean*	*SD*
New investment projects (new plant/line)	TIP1	45**	65.2%	.65	.480
Renewal and development of existing project	TIP2	40	58%	.58	.497
Expansion of existing capacity	TIP3	35	50.7%	.51	.504
Replacement of equipment	TIP4	27	39.1	.39	.492
Change in production or activity	TIP5	10	14.5%	.14	.355
Cases of non-regular maintenance	TIP6	18	26.1%	.26	.442

*The binary scale used to measure the TIP is Y/N.   ** The total number of respondents is 69.

7.2.1.3 Strategic priorities (SP) of the firm

Respondents were asked to identify the strategic priorities (SP) implemented by top management. These priorities appeared in questionnaire question B4 (section B). The main descriptive statistics of strategic priorities are demonstrated in Table 7.9, where the researcher used a five-point Likert scale, ranging from “strongly disagree” to “strongly agree” to measure strategic priorities.

Table 7.9: Descriptive statistics of strategic priorities

Strategic priorities (SP)	*Symbol*	*Response frequencies* (Likert scale)*					*Mean*	*SD*
		1	*2*	*3*	*4*	*5*		
Protect the existing main activity	SP1	7	13	20	17	12	3.20	1.232
Support the investments with high return	SP2	3	5	20	26	15	3.65	1.041
Focus on the feasibility studies	SP3	2	5	19	23	20	3.78	1.041
Focus on the general economic considerations	SP4	12	19	16	14	8	2.81	1.275
Improve the competitive position	SP5	2	5	21	26	15	3.68	0.993
Rely on the flexible manufacturing systems	SP6	6	15	23	14	11	3.13	1.187
Support the training of human resources	SP7	13	18	19	13	6	2.72	1.223

* The total number of respondents is 69

From table 7.9, the strategic priorities SP2, SP3 and SP5 have substantial interests in manufacturing and oil companies. These strategies refer to investment decisions that aim to achieve a high return, implement the feasibility studies for new investments, or to improve market share and competitive position, rather than to maximize the firm’s profits.

As discussed in chapter five, the use of differentiation and low cost strategies was employed to measure the strategic priorities of UK and Australian firms (Abdel-Kader and Luther, 2008; King et al., 2010). In line with this study, Haka (1987) used three items to measure the strategic policies in US firms, focusing on new production lines, selecting investment projects with high return and risk, and emphasising research development.

7.2.1.4 Perceived environmental uncertainty (PEU)

In section B, particularly in questionnaire question B5, respondents were asked to identify their environmental conditions, in terms of predictability of the environment surrounding manufacturing and oil companies over the past three years. The researcher used a five-point Likert scale to measure this factor, ranging from “never predictable” to “always predictable”. Table 7.10 displays the item or observed variables and the main descriptive statistics related to this factor.

Table 7.10: The descriptive statistics of the items of perceived environmental uncertainty (PEU)

The items/ observed variables	*Symbol*	*Response (five-point Likert scale)*					*Mean*	*SD*
		1	*2*	*3*	*4*	*5*		
Actions of the primary suppliers	PEU1	3	7	10	27	22	3.84	1.120
Competitors’ actions	PEU2	3	8	14	36	8	3.55	0.993
Changes in financial position	PEU3	1	15	26	18	9	3.28	0.998
Demand for existing products	PEU4	0	1	17	32	19	4.00	0.767
Expected cash flow generated by the investment projects	PEU5	0	9	23	29	8	3.52	0.868

It can be seen that most manufacturing and oil companies have found slightly difficult to predict the environmental conditions associated with competitors’ actions (PEU2), changes in financial position (PEU3), and cash flow forecasting (PEU5). In empirical literature, environmental uncertainty is perceived as changes in competitor’s actions, financial and technological developments and governmental policies surrounding the firm’s operations (Miles & Snow, 1978). In this regard, financial and marketing factors are more predictable within US firms (Heka, 1987).

7.2.2 Cash flow forecasting variables

SPSS software was used for descriptive analysis. In the questionnaire survey, section E is allocated to present information about the CFF. Thus, the variables related to CFF are demonstrated using the mean and SD. These variables consist of the procedures and methods used in forecasting, the components of cash flow (FMPF), data sources used in forecasting, forecasting horizon, and qualifications, position and the number of forecasters.

7.2.2.1 The procedures and methods used in forecasting (PMUF)

The procedures and methods used in forecasting often start with personal or subjective estimates and advance to the use of computers. In questionnaire question E5, respondents were asked to identify the procedures, forms, methods and software used in forecasting future cash flow within the manufacturing and oil companies operating in Libya. To measure this factor the researcher used a five-point Likert scale, ranging from "never use" to "always use". The descriptive analysis of the items/observed variables related to PMUF is shown in table 7.11.

Table 7.11: Descriptive statistics of procedures and methods used in forecasting (PMUF)

The procedures and methods used in forecasting (PMUF)	*Symbol*	*Response (five-point Likert scale)*						*Mean*	*SD*	*Rank-ing.*
		1	*2*	*3*	*4*	*5*	*Total*			
Personal estimates	PUF1	5	5	11	12	36	69	4.00	1.283	2
Standard procedures	PUF2	11	22	8	18	10	69	2.91	1.348	5
Official forms/worksheets	PUF3	30	6	9	12	12	69	2.57	1.595	6
Executive's opinions	JM1	1	1	13	23	31	69	4.19	0.896	1
Delphi method	JM2	43	15	6	4	1	69	1.62	0.972	8
Sales force composite	JM3	5	8	26	20	10	69	3.32	1.091	4
Time-Series models	QM1	24	17	9	10	9	69	2.46	1.431	7
Regression analysis models	QM2	50	8	6	5	0	69	1.51	0.933	9
Software developed by a company	SUF1	56	9	1	3	0	69	1.29	0.709	10
Commercial software packages (Excel)	SUF2	5	6	22	22	14	69	3.49	1.133	3

According to table 7.11, about 70% of manufacturing and oil companies operating in Libya depended on personal estimates and executives' opinions in forecasting future cash flow resulting from investment projects (48/69 and 54/69, respectively). Subsequently, table 7.11 shows that only 40.5% (28/69) of respondents employ standard procedures to forecast future cash flow. Similarly, 37% of the respondents in both Greek and Cypriot firms have standard procedures for forecasting future cash flow instead of using forecasting models (Lazaridis, 2002, 2006). Moreover, about 7% (5/69) of respondents in manufacturing and oil companies operating in Libya applied the regression analysis models as opposed to 50% of respondents in US firms who used sophisticated mathematical models in forecasting future cash flow resulting from investment projects (Pohlman et al., 1988).

7.2.2.2 Financial, marketing and production factors (FMPF)

The components of cash flow are determined in terms of financial, marketing and production factors, which are the main elements of CFF in CB decisions. Respondents were asked to indicate the extent of association that financial, marketing and production factors had with the procedures and methods used in forecasting and the evaluation of investment projects (CB process). To measure this factor, the researcher used a five-point Likert scale, ranging from "not associated" to "extremely associated". The descriptive analysis of the observed variables related to this factor (FMPF) is shown in table 7.12.

Table 7.12: Descriptive statistics of the financial, marketing and production factors (FMPF)

The items of FMPF	*Symbol*	*Response (five-point Likert scale)*						*Mean*	*SD*	*Rank-ing.*
		1	*2*	*3*	*4*	*5*	*Total*			
Borrowing & repayment of funds	FF1	13	12	17	17	10	69	2.99	1.334	10
Foreign exchange rate	FF2	0	1	5	24	39	69	4.46	.698	3
Tax considerations	FF3	0	17	28	17	7	69	3.20	.933	8
Working capital requirements	FF4	0	0	8	32	29	69	4.30	.671	5
Investment expenditures	FF5	0	3	5	20	41	69	4.43	.813	4
Administrative overhead	FF6	7	20	27	11	4	69	2.78	1.027	11
Sales forecast (revenues)	MF1	0	0	1	6	62	69	4.88	.365	2
Selling expenses	MF2	2	10	33	17	7	69	3.25	.930	7
Competitive expenses	MF3	7	24	19	18	1	69	2.74	1.010	12
Direct manufacturing costs**	PF1	0	0	0	7	62	69	4.90	.304	1
Manufacturing overhead expenses	PF2	1	2	32	26	8	69	3.55	.796	6
Research & development expenses	PF3	8	29	19	11	2	69	2.57	.992	13
Depreciation costs	PF4	9	17	27	9	7	69	2.83	1.137	9

** Direct manufacturing costs are similar to the operating expenses in service sectors

Table 7.12 shows that most respondents in manufacturing and oil companies operating in Libya consider MF1, PF1, FF2, FF4 and FF5 to be wholly associated with the procedures and methods used in forecasting and the evaluation of investment projects (CB process). In addition, the manufacturing and oil companies in Libya are not interested in borrowing funds and tax considerations; approximately 35% of respondents consider these factors to be either very, or extremely associated with CB processes (27/69 and 24/69, respectively). On the one hand, more than two-thirds of the Greek and Cypriot firms considered that borrowing & repayment of funds (external financing) was the significant factor in CFF (Lazaridis, 2002, 2006). On the other hand, more than two-thirds of the US firms ranked tax considerations as the most important factor in forecasting future cash flow (Pohlman et al., 1988). The sales forecast (MF1) and the direct manufacturing costs (PF1) are the most important factors affecting the CFFP (Lazaridis 2002, 2006; Pohlman et al., 1988).

7.2.2.3 Data sources (DS) used in forecasting

In questionnaire question E1, respondents were asked to identify the data sources used for forecasting the components of cash flow in manufacturing and oil companies operating in Libya. To measure these factors, the researcher used a five-point Likert scale, ranging from 1 "never use" to 5 "always use". The descriptive analysis of the observed variables related to this factor (DS) is shown in table 7.13.

Table 7.13: Descriptive statistics of data sources (DS) used in forecasting

The items of data sources (DS)	*Symbol*	*Response (five-point Likert scale)*						*Mean*	*SD*
		1	*2*	*3*	*4*	*5*	*Total*		
Firm's departments	DS1	4	12	11	17	25	69	3.68	1.289
Suppliers	DS2	2	7	19	29	12	69	3.61	.988
Customers' sales plans	DS3	4	13	17	19	16	69	3.43	1.206
University research centres	DS4	32	25	9	3	0	69	1.75	0.847
Local analysts (CA)	DS5	27	26	12	4	0	69	1.90	0.894
Foreign consultants and companies	DS6	22	15	18	9	5	69	2.42	1.265

Apparently, most manufacturing and oil companies in Libya depend on the firm's departments, suppliers and customers' sales plans as the main sources used in forecasting future cash flow. As has been discussed in chapter five, several studies utilized external and internal information sources to collect data relating to the forecasting process (Winklhofer, et al., 1996; Danese and Kalchschmidt (2011a, 2011b). According to Wotruba and Thurlow (1976, p.11), sales force is an important source of forecasting information in the area of marketing. On the other hand, macroeconomic data was considered to be a useful source, where 90% of respondents in US firms incorporated the national macroeconomic variables in econometric forecasting models (Naylor, 1981).

7.2.2.4 Forecasting horizon

In questionnaire question E2, respondents were asked to select the period used in forecasting future cash flows in CB decisions. There are three periods used for forecasting the components of cash flow in manufacturing and oil companies operating in Libya: medium-term, long-term and extensive-term. To measure this factor, the researcher used a five-point Likert scale, ranging from 1 "never use" to 5 "always use". The descriptive analysis of the items/observed variables related to forecasting horizon (FH) is shown in table 7.14.

Table 7.14: Descriptive statistics of forecasting horizon (FH)

The items of forecasting horizon	*Symbol*	*Response (five-point Likert scale)*						*Mean*	*SD*
		1	*2*	*3*	*4*	*5*	*Total*		
Medium-term (1-5 years)	FH1	1	1	2	13	52	69	4.65	0.744
Long-term (6-10 years)	FH2	17	36	9	4	3	69	2.13	0.999
Extensive-term (over 11 years)	FH3	54	7	8	0	0	69	1.33	0.679

Table 7.14 shows that about 95% of the Libyan manufacturing and oil companies often/always use the medium-term (1-5 years) in forecasting future cash flows resulting from investment projects. Similarly, Klassen and Flores (2001), segmented the forecasting horizon in Canadian firms into four periods: the shortest term (1-3 months), the medium-shorter term (4-12 months), the medium term (12-24) and the longest term (greater than 24 months). Hence, Sanders and Manrodt (1994) confirmed that US managers used various techniques for multiple forecast periods.

7.2.2.5 The qualifications, position and the number of forecasters

This part of the study focuses on the responsibility for preparing the CFF. In questionnaire question E4, the responsibility for preparing the cash flow estimates is divided into three factors: the qualifications, position and the number of forecasters. In this case, the researcher used dummy variables ("No" or "Yes") to measure these factors. The descriptive analysis of the observed variables related to these factors is shown in tables 7.15-7.17.

Table 7.15: Descriptive statistics of the qualifications of forecasters

Qualifications	*Symbol*	*Response (yes)*	*Yes %*	*Mean scores*	*SD*
PhD	PhD	7	10.1	0.10	0.304
Master's degree	MA/MSc	25	36.2	0.36	0.484
Bachelor's degree	BSc	63**	91.3	0.91	0.284
Professional qualification (chartered accountants)	PQ	8	11.6	0.12	0.323
High school or college	HS	20	29	0.29	0.457

** Number of response close to 69, because each company may have more one of the PhD, MA, BSc, PQ and HS qualifications

Table 7.16: Descriptive statistics of the position of forecasters

No	*Job title or position*	*Symbol*	*Response (yes)*	*Yes %*	*Mean scores*	*SD*
1	Accountant	ACC	21	30.4	.30	.464
2	Accounting manager	ACCM	33	47.8	.48	.503
3	Financial director	CFO	61	88.4	.88	.323
4	Executive manager	CEO**	66	95.7	.96	.205
5	Vice-president or president	VPP	17	24.6	.25	.434
6	Chartered accountant	CA	11	15.9	.16	.369
7	Foreign consultant, internal auditor, planning manager, engineer.	Others	16	23.2	.23	.425

** Number of responses close to 69, because each company may have one of the ACC, ACCM, CFO, CEO… CA

Table 7.17: Descriptive statistics of the total number of forecasters (TNF)

The total number of forecasters	*Response (ordinal scale)*				*Mean*	*SD*
	1-3	*4-6*	*7-9*	*over 10*		
TNM-single item	40	20	6	3	1.59	0.828

From table 7.15, it can be seen that most forecasters responsible for preparing future cash flows in Libyan manufacturing and oil companies have Bachelor's qualifications. The responsibility of the forecasting process is limited to the financial directors and executives, as confirmed by statistical analysis shown in table 7.16. Table 7.17 states that the average number of forecasters in Libyan manufacturing and oil companies is about three persons. The variable TNF has been excluded from the research model as discussed in the last chapter.

As has been discussed in chapter five, one or more of the financial analysts, accountants, treasurers, department managers, controllers, vice-presidents and presidents are responsible for forecasting future cash flows in the Greek, Cypriot and US firms (Pohlman et al. 1988; Lazaridis, 2002, 2006). Nevertheless, most of the organisations depend on top management and CEOs to conduct the forecasting process (West, 1994; Klassen and Flores, 2001).

7.2.3 The institutional variables

In spite of contingent factors, the researcher examined the influence of institutional variables on the procedures and methods used in forecasting future cash flows generated by the investment projects. Institutional variables encompass coercive, mimetic and normative pressures (CMNP). To measure these variables, the researcher used a five-point Likert scale, ranging from 1 "strongly disagree" to 5 "strongly agree". The descriptive analysis of the items/observed variables related to CMNP is shown in table 7.18.

Table 7.18: The descriptive statistics of the coercive, mimetic and normative pressures

The coercive, mimetic and normative pressures (CMNP)	*Symbol*	*Five-point Likert scale: respondents' number*					
		1	*2*	*3*	*4*	*5*	*Total*
Coercive pressures:							
Commercial code and the tax system	CP1	8	21	20	13	7	69
Financial constraints	CP2	6	16	21	21	5	69
The system of privatization	CP3	33	14	11	6	5	69
Intervening the Libyan Government	CP4	24	11	13	17	4	69
International accounting standards	CP5	26	35	4	3	1	69
The political instability	CP6	0	1	0	5	63	69
Normative pressures:							
Education system in Libyan universities	NP1	23	31	10	4	1	69
chartered accountants	NP2	4	25	21	17	2	69
Mimetic pressures:							
The Libyan companies	MP1	16	20	16	14	3	69
Multinational and foreign companies	MP2	14	21	16	14	4	69

Statistics	CP1	CP2	CP3	CP4	CP5	CP6	NP1	NP2	MP1	MP2
Mean	2.855	3.043	2.072	2.507	1.812	4.884	1.971	2.826	2.536	2.609
Error of Mean	0.140	0.131	0.155	0.162	0.102	0.053	0.111	0.117	0.142	0.143
SD	1.167	1.091	1.287	1.346	0.845	0.438	0.923	0.969	1.183	1.191
Variance	1.361	1.189	1.656	1.812	0.714	0.192	0.852	0.940	1.399	1.418

In empirical literature, Hussain and Hogue (2002) examined the influence of coercive, mimetic and normative pressures (CMNP) on non-financial performance measurement systems in Japanese banks. In the same way, Liang et al. (2007) examined the impact of the CMNP on the use of enterprise resource planning (ERP) systems in US firms.

7.2.4 Capital budgeting techniques

The first objective of this study is to explore the CBT used in manufacturing and oil companies operating in Libya. Therefore, respondents were asked to indicate the appraisal techniques used in CB and rank these techniques according to their priorities/importance (questionnaire question C4). The researcher used a five-point Likert scale ranging from 1 "not a priority" to 5 "an essential priority" to measure these techniques. Subsequently, the descriptive analysis of the CBT is shown in table 7.19.

Table 7.19: Descriptive statistics of the capital budgeting techniques (CBT)

Capital budgeting techniques (CBT)	*Symbo*	*Response (five-point Likert scale)*						*Mean*	*SD*	*Rank ing*
		1	*2*	*3*	*4*	*5*	*Total*			
Financial appraisal techniques:										
Payback period	PB	6	14	9	4	36	69	3.72	1.484	1
Accounting rate of return	ARR	14	12	4	28	11	69	3.14	1.427	2
Net present value	NPV	38	13	5	7	6	69	1.99	1.356	3
Profitability index**	PI	50	11	5	2	1	69	1.45	.867	5
Internal rate of return	IRR	55	5	2	6	1	69	1.45	1.008	4
Risk appraisal techniques:										
Subjective assessment	SAS	13	5	4	8	39	69	3.80	1.614	1
CVP analysis	CVP	28	7	5	17	12	69	2.68	1.613	2
Sensitivity analysis	SA	44	16	5	1	3	69	1.59	1.005	3
Scenario analysis	SCA	57	4	4	2	2	69	1.38	.941	5
Shorten the PB period	SPB	49	13	3	3	1	69	1.46	.884	4
Raise the discount rate	RDR	66	2	0	1	0	69	1.07	.396	6
Operations research techniques:										
Mathematical programming	MAP	60	3	1	2	3	69	1.33	.980	2
Decision theory	DT	52	5	6	3	3	69	1.55	1.105	1
PERT	PERT	58	3	1	5	2	69	1.41	1.034	3

**Profitability index (PI) = 1 + [NPV ÷ initial investment cost]

Apparently, 57% of respondents in manufacturing and oil companies consider the payback period (PB) and accounting rate of return (ARR) to be important techniques used in making CB decisions. The previous studies in Libya have found the same results in terms of CBT. 98% of manufacturing companies (44/45) used PB as the criterion for selecting investment projects and 74% of Libyan companies in different sectors (31/43) utilized it in CB decisions (AlWakil, 2000; Mohammed, 2013). In contrast, Drury et al. (1993) confirmed that 35% of smaller firms and 90% of larger ones in the UK always used discounted cash flow methods (NPV and IRR), which are commonly used in European, Australian and US firms (Freeman and Hobbes 1991; Graham and Harvey, 2001; Hermes et al., 2007). Moreover, table 7.19 indicates that most Libyan manufacturing and oil companies (approximately 70%) depend on subjective assessment in assessing the risk inherent within investment projects. Whereas, sensitivity analysis (SA) is used by 88% of UK firms to assess project risk in CB (Pike, 1996).

7.2.5 Firms' financial performance (PERF)

The researcher assessed the influence of using CBT on firm performance, especially financial performance. To identify the components of financial performance, two variables were determined: EBITDA, which is a single variable used to control the profitability ratios, and the operating rate of return (ORR). Thus, respondents were asked to select one of each EBITDA indices listed in questionnaire question C5.2 (section C). In addition, respondents were also asked to identify the percentage of the average ORR listed in questionnaire question C5.4 (section C). Moreover, the researcher used Microsoft Excel to create two new variables derived from the respondents' answers in the questionnaire questions (C5.2, C5.3 and C5.4). The criteria used to calculate the new variables are determined as follows:

- AORR = EBITDA/average-total of operating assets (ATOA): respondents' answers in C5.4.
- Average-total of operating assets: respondents' answers in C5.3.
- Calculate the value of EBITDA; where the respondents' answers in C5.2 are carried out as a verbal procedure rather than a numerical value.
- Create two new variables, which are calculated as shown in appendix G:
  - ➢ EB..AAS = EBITDA/average of annual sales.
  - ➢ EB..AIE = EBITDA/average of investment expenditures.

In this regard, the researcher used ordinal scales to measure the observed variables related to financial performance. First, the EBITDA was measured on a nine-point Likert scale ranging from 0 "unacceptable or losses" to 8 "very high". Second, the researcher used nine numerical scales ranged from 0 "less than 1%" to 8 "over 36%" to measure the AORR, EB..AAS and EB..AIE. Table 7.20 illustrates the descriptive analysis of the observed variables related to the financial performance of firms.

Table 7.20: Descriptive statistics of the firms' financial performance (PERF) indicators and EBITDA (control variable)

No	PERF indicators/observed variables	Symbol
1	Average operating rate of return	AORR
2	EBITDA/Average of Investment Expenditures	EB..AIE
3	EBITDA/Average of Annual Sales	EB..AAS
No	Control variable:	
1	Earnings before interest, taxes, depreciation and amortization	EBITDA

EBITDA			*EB..AAS*			*EB..AIE*			*AORR*		
Scale	*RES**	*%*	*Scale*	*RES**	*%*	*Scale*	*RES**	*%*	*Scale*	*RES**	*%*
Unacceptable	4	5.8	<1%	9	13.0	<1%	20	29.0	<1%	8	11.6
Very weak	6	8.7	1-5%	5	7.2	1-5%	0	0.0	1-5%	16	23.2
Weak	3	4.3	6-10%	13	18.8	6-10%	2	2.9	6-10%	13	18.8
Below the average	8	11.6	11-15%	10	14.5	11-15%	1	1.4	11-15%	10	14.5
Moderate	14	20.3	16-20%	12	17.4	16-20%	7	10.1	16-20%	13	18.8
Acceptable	17	24.6	21-25%	8	11.6	21-25%	8	11.6	21-25%	4	5.8
Desirable	10	14.5	26-30%	2	2.9	26-30%	3	4.3	26-30%	4	5.8
High	6	8.7	31-35%	2	2.9	31-35%	1	1.4	31-35%	0	0.0
Very high	1	1.4	Over36%	8	11.6	Over36%	27	39.1	Over36%	1	1.4
Total	69	100	Total	69	100	Total	69	100	Total	69	100

The descriptive statistics:				
Statistics	*EBITDA*	*EB..AAS*	*EB..AIE*	*AORR*
Mean	4.159	3.464	4.580	2.551
Std. Error of Mean	0.237	0.289	0.404	0.219
SD	1.968	2.405	3.358	1.819
Variance	3.871	5.782	11.277	3.310

*RES: number of respondents.

From Table 7.20, it can be seen that the average operating rate of return (AORR) ranges from 1-20% in most manufacturing and oil companies operating in Libya (87% of respondents). This is similar to the EBITDA/average of annual sales ratio (EB..AAS). About 83% of respondents confirm that EB..AAS ranging from 1% to 25%. EBTIDA is near average levels in most manufacturing and oil companies operating in Libya. In accounting literature, Klammer (1973) used the ORR to measure US manufacturing firms' performance. Likewise, Pike (1984, 1986) employed the average operating rate of return (AORR) to measure the UK firms' performance.

7.3 Testing the research hypotheses.

This part of the study explains the correlation between the exogenous and endogenous constructs (latent variables). The main purpose of this section is to develop the research model relationships. To achieve this, the research model shows the link between research variables, as shown in figure 7.2.

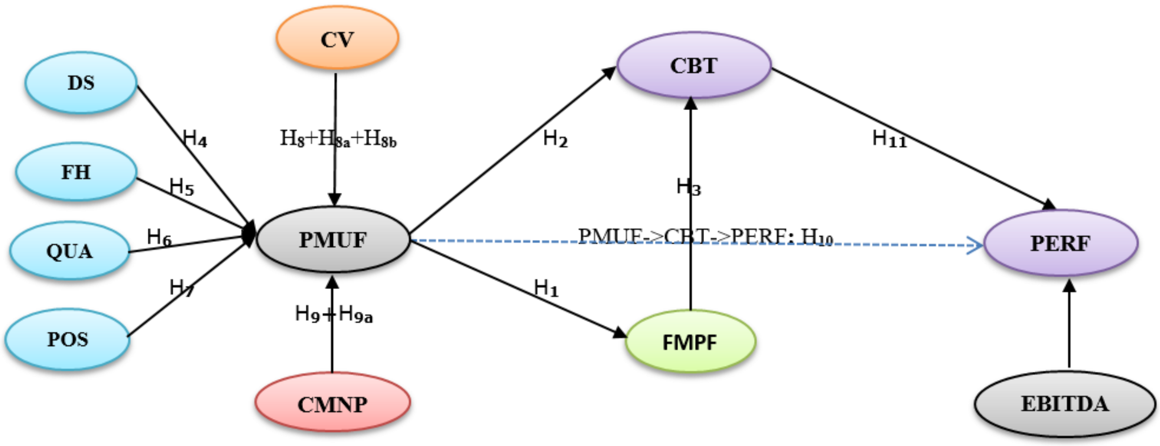


Figure 7.2: Link between research variables

Where:

DS: Data sources used in forecasting
FH: Forecasting horizon
QUF: The qualification of forecaster
POS: The position of forecaster
PMUF: Procedures and methods used in forecasting.
FMPF: The financial, marketing and production factors (components of cash flow)
CV: The contingent variables:
- AAS: Average of annual sales
- AIE: Average of investment expenditures
- NEM: The number of employees
- TIND: Type of industry
- SP: Strategic priorities
- PEU: Perceived environmental uncertainty

CMNP: Coercive, mimetic and normative pressures
CBT: The capital budgeting techniques
PERF: Financial firms' Performance (AORR, EB..AAS and EB..AIE)
EBITDA: The earnings before interest, taxes, depreciation and amortization

As has been discussed in chapter six, this thesis included seven path models. The PLS path models are distinguished depending on five main categories: CFF variables, contingent and institutional variables, CBT, financial performance, and EBITDA (control variable).

In comparing between the PLS-SEM and CB-SEM, the covariance based structural equation modelling (CB-SEM) technique is based on the correlations between variables. The research model in CB-SEM is built in accordance with the theoretical approach. PLS-SEM, on the other hand, deals with the factorial analysis of variance with observed variables (indicators). In other words, PLS utilizes the analysis of variance (ANOVA) to predict dependent variable(s). The PLS-SEM is used to test the research hypotheses and depends on the statistical significance level and path coefficient benchmark. In the form of the path model, the relationships between dependent and independent variables are explained in the hypothesized forms; the SEM techniques examine and specify these relationships. Hence, the PLS path models (1-7) are presented in order to test the research hypotheses.

Subsequently, the PLS is a model based on the practical orientation, while, the "theory is less developed" (Hair et al., 2014, p.14). In this research, there are several statistical criteria used to assess the significance of loadings, weights and path coefficients. This part of study also focuses on the assessment of path coefficients, which is associated with the constructs in the PLS path models.

- **The strength of path coefficient**

Chin (1998) stated that the adoption of a standardized path index should be above 0.20. Subsequently, the 0.10 benchmark was adopted to assess the substantial strength of path coefficients (Yenilmez-Dramali, 2013). Accordingly, this research adopts the 0.10 benchmark for assessing the path coefficients associating with the constructs.

- **Statistical significance criterion**

Most researchers applied T-test and P values to assess the path coefficients similar to the loading and weight coefficients. The significance level (P value) differs from one piece of research to another, even though three levels of P value are commonly used in such research (Anuar, 2005 and Yenilmez-Dramali, 2013):

- A significance level of 1% (α=0.01; two-tailed test). Then, T value equals 2.57 by using the student t-value tables.
- A significance level of 5% (α=0.05; two-tailed test). Then, T value equals 1.96 by using the student t-value tables.
- A significance level of 10% (α=0.10; two-tailed test). Then, T value equals 1.65 by using the student t-value tables.

7.3.1 Testing the PLS path model 1

PLS path model 1 examines the relationships among the five research variables: the PMUF, FMPF, CBT, firms' financial performance (BERF) and the EBITDA (control variable). These variables can be defined as the exogenous or observed variables which are highlighted as the yellow rectangles in PLS path model 1, where the values attached to the arrows are the T-test values calculated based on P values (see Figure 7.3).

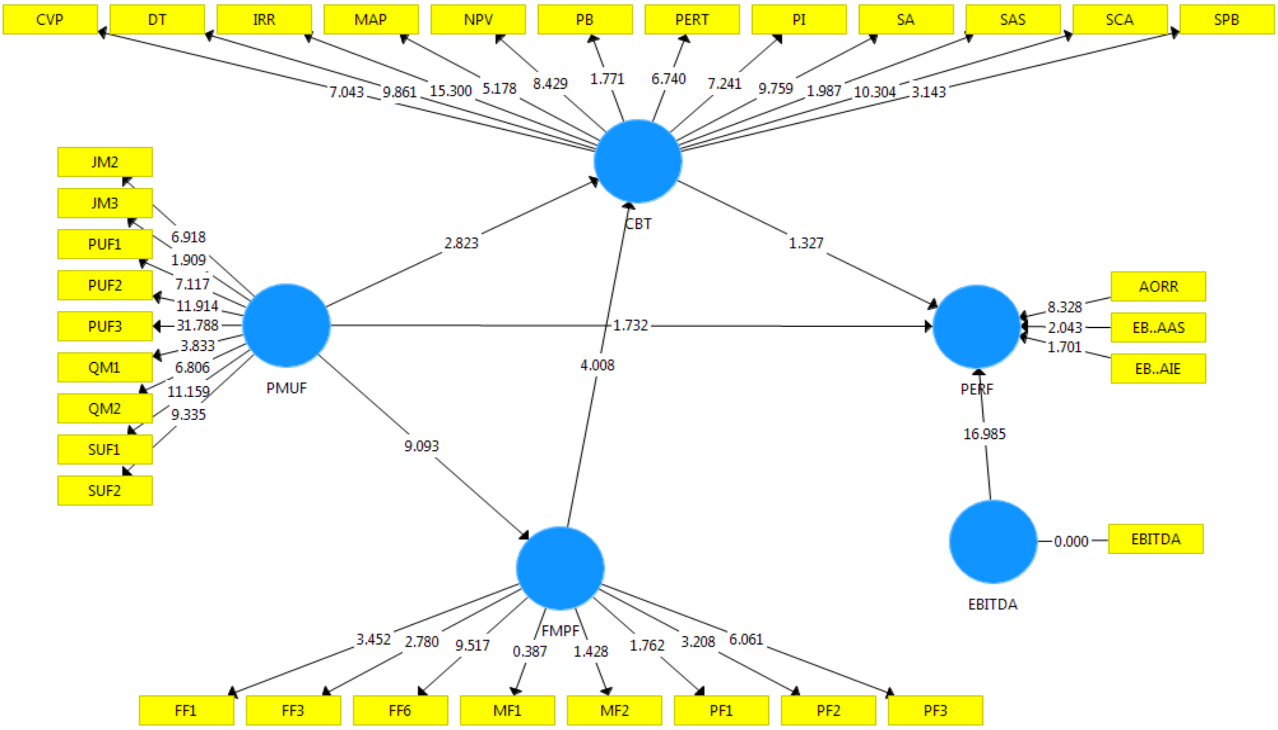


Figure 7.3: PLS path model 1 (Bootstrapping 4900)

Where:
PMUF: The procedures and methods used in forecasting
FMPF: The financial, marketing and production factors associated with forecasting
CBT: The capital budgeting techniques.
BERF: The firms' financial performance.
EBITDA: Earnings before interest, taxes, depreciation and amortization.

PLS path model 1 addresses the research hypotheses: H_1, H_2, H_3, H_{10} and H_{11}. Figure 7.3 illustrates the causal mediation model that consists of the five main relationships. Beginning with the first hypothesis, the researcher tests the link between the procedures and methods used in forecasting (PMUF) and the components of cash flow determined by financial, marketing and production factors (FMPF). Next, the direct relationship between the procedures and methods used in forecasting (PMUF) and the use of CBT is assumed in the second hypothesis. Subsequently, the relationship between the components of cash flow (FMPF) and the use of CBT is tested in the third hypothesis. Moreover, this model shows the role of financial, marketing and production factors (FMPF) in mediating between the PMUF and the use of CBT; even though, this relationship is not hypothesised. As a rule, the use of CBT mediates the relationship between the PMUF and the PERF (hypothesis 10). In general, all of the PLS path models investigate the direct relationship between the extent of use of CBT and PERF (hypothesis 11).

To assess the significance of PLS path model 1, the researcher follows the same procedures and criteria as discussed above (the strength of path coefficient and the significance of level P value/T test). Hence, bootstrapping of the PLS path model presents the following results as shown in Table 7.21.

Table 7.21: The relationship between the research variables (PLS path model 1)

The relationship between the research variables:	*Path*	*PC**	*T statistics*	*P values*
The relationship between the use of CBT and PERF	CBT -> PERF	0.163	1.327	0.185
The impact of EBITDA on PERF	EBITDA-> PERF	0.808	16.985	0.000
The relationship between FMPF and the use of CBT	FMPF -> CBT	0.443	4.008	0.000
The relationship between the use of PMUF* and the use of CBT	PMUF -> CBT	0.332	2.823	0.005
The relationship between the use of PMUF and FMPF	PMUF -> FMPF	0.606	9.093	0.000
The relationship between the use of PMUF and PERF	PMUF-> PERF	-0.172	1.732	0.083
The relationship between FMPF & PERF is mediated by the use of CBT	FMPF->CBT-> PERF	0.072	1.156	0.248
The relationship between the use of PMUF and the use of CBT is mediated by FMPF.	PMUF->FMPF-> CBT	0.268	3.703	0.000
The relationship between the use of PMUF and PERF is mediated by the use of CBT.	PMUF-> CBT-> PERF	0.098	1.257	0.209

*PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).

The results from table 7.21 show that there are indirect relationships between the research variables. These relationships may involve either partial, or full mediation. To determine the type of the indirect effect among the research variables, the researcher used the variance accounted for (VAF) as follows (Hair et al., 2014):

$$VAF_1=(PMUF\text{->}FMPF*FMPF\text{->}CBT)/(PMUF\text{->}FMPF*\ FMPF\text{->}CBT+PMUF\text{->}CBT) \qquad \text{Eq. 7.1}$$

Where, the indirect relationship (PMUF->FMPF->CBT) is a partial mediation.

In this regard, the criteria used in determining the type of mediation is summarised (Hair et al., 2014, p.224):

- VAF > 80%: full mediation
- 20%≤VAF≤80%: partial mediation
- VAF < 20%: no mediation

Table 7.21 provides substantial evidence to identify the significance of research hypotheses, as interpreted in table 7.22.

Table 7.22: Decisions related to the significance of research hypotheses (PLS path model 1)

No	*The research hypotheses*	*PC**	*P value*	*Test result*	*Decision*
H_1	There is a positive relationship between the use of PMUF* and FMPF	PC>0.10	p<0.001	1. Positive relationship 2. Significant	Accept H_1
H_2	The use of PMUF is positively associated with the extent of use of CBT.	PC>0.10	p<0.01	1. Positively associated 2. Significant	Accept H_2
H_3	The FMPF are positively associated with the extent of use of CBT.	PC>0.10	p<0.001	1. Positively associated 2. Significant	Accept H_3
H_{10}	The extent of use of CBT mediates the relationship between the use of PMUF and PERF**.	PC<0.10	p>0.10	1. Positive relationship 2. Insignificant	Reject H_{10}
H_{11}	There is a positive relationship between the extent of use of CBT and PERF.	PC>0.10	p>0.10	1. Moderate relationship. 2. Insignificant	Reject H_{11}

PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).
**There is a direct relationship (negative) between the PMUF and PERF and this relationship is significant (p<0.10).

7.3.2 Testing the PLS path model 2

In the CFFP, the researcher examines the factors associated with the procedures and methods used in forecasting (PMUF). One such factor is the data sources used in forecasting. The use of multiple data sources may require multiple forecasting models. The data sources used in forecasting are generally associated with the forecasting process rather than investment appraisal techniques, which represent the third stage in the CB process. PLS path model 2 involves the set of research hypotheses $H_{2,}$ H_4, H_{10} and H_{11}. As a rule, the research hypotheses $H_{2,}$ H_{10} and H_{11} are addressed in all PLS path models due the structure of the CB process. Thus, only the fourth research hypothesis should be interpreted in this model. Accordingly, figure 7.4 shows the role of multiple data sources in the selection/use of forecasting procedures and methods, and this reflects upon the extent of CBT usage. In other words, the fourth hypothesis investigates the extent to which the data sources are important in employing forecasting procedures and methods.

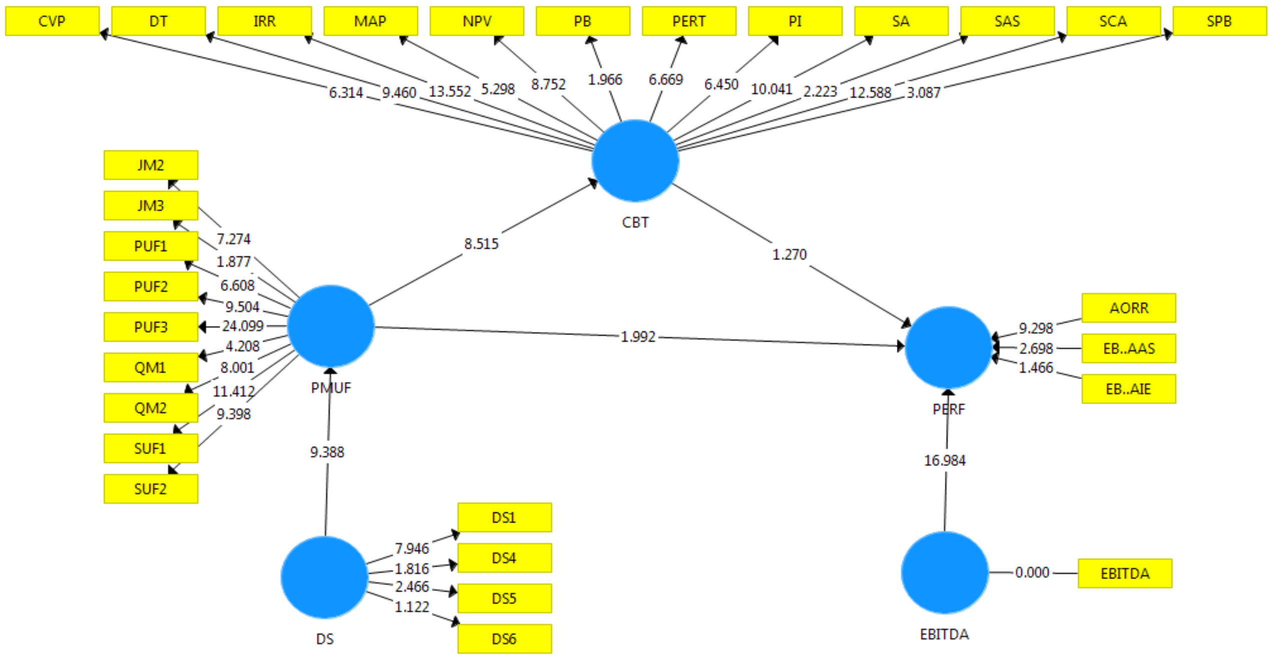


Figure 7.4: PLS path model 2 (Bootstrapping 500

Where:
DS: The data sources used in forecasting
PMUF: The procedures and methods used in forecasting
CBT: The capital budgeting techniques (ARR,PB,......SCA)
BERF: The firms' financial performance (Profitability ratios: AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization

The same procedures and criteria were used to assess the significance of PLS path model 2. The Bootstrapping of 500 samples yielded the results shown in table 7.23.

Table 7.23: The relationship between the research variables (PLS path model 2)

The relationship between the research variables	*Path*	*PC**	*T statistics*	*P values*
The relationship between the use of CBT and PERF	CBT -> PERF	0.158	1.270	0.205
The relationship between the use of data sources (DS) and the use of PMUF*.	DS -> PMUF	0.567	9.388	0.000
The impact of EBITDA on the PERF.	EBITDA -> PERF	0.812	16.984	0.000
The relationship between the use of PMUF and the use of CBT.	PMUF -> CBT	0.606	8.515	0.000
The relationship between the use of PMUF and PERF	PMUF -> PERF	-0.176	1.992	0.047
The relationship between the use of PMUF and PERF is mediated by the use of CBT.	PMUF->CBT->PERF	0.096	1.195	0.233
The relationship between the DS and the use of CBT is mediated by the use of PMUF.	DS->PMUF->CBT	0.344	6.209	0.000
The relationship between the DS and PERF is mediated by the use of PMUF.	DS->PMUF->PERF	-0.046	0.954	0.340

*PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).

Subsequently, the indirect relationships among the research variables may consist of partial, full mediation, or no mediation. To determine these relations, the researcher used the variance accounted for (VAF) as follows (Hair et al., 2014, p.224):

$$VAF_2 = (DS\text{->}PMUF * PMUF\text{->}CBT)/(DS\text{->}PMUF * PMUF\text{->}CBT + DS\text{->}CBT) \quad \text{Eq. 7.2}$$

Where the indirect relationship (DS->PMUF->CBT) is partial mediation

Moreover, testing the research hypotheses allows the researcher to decide the significance of research hypotheses. Table 7.24 determines the decisions resulting from testing the research hypotheses that appeared in PLS path model 2.

Table 7.24: Decisions related to the significance of research hypotheses (PLS path model 2)

No	*The research hypotheses*	*PC**	*P value*	*Test result*	*Decision*
H_2	The use of PMUF* is positively associated with the extent of use of CBT.	PC>0.10	p<0.001	1. Positive relationship 2. Significant	Accept H_2
H_4	The use of multiple data sources in forecasting (DS) is positively associated with the use of PMUF	PC>0.10	p<0.001	1. Positively associated 2. Significant	Accept H_4
H_{10}	The relationship between the use of PMUF and PERF is mediated by the extent of use of CBT.	PC<0.10	p>0.10	1. Slight relationship. 2. Insignificant	Reject H_{10}
H_{11}	There is a positive relationship between the extent of use of CBT and PERF.	PC>0.10	p>0.10	1. Moderate relationship 2. Insignificant	Reject H_{11}

* PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).
**There is a direct/negative relationship between the PMUF and PERF and this relationship is significant (p<0.05).

7.3.3 Testing the PLS path model 3

The forecasting horizon (FH) is one of the factors related to the procedures and methods used in forecasting (PMUF). In this research, the forecasting horizon (FH) is divided into three periods: medium-term (1-5 years), long-term (6-10 years) and extensive long-term (over 11 years). As discussed in empirical literature, the length of the forecasting horizon (FH) is one of the key factors associated with the PMUF. Figure 7.5 shows that the forecasting horizon (FH) plays an important role in the selection/use of forecasting procedures and methods (the fifth research hypothesis).

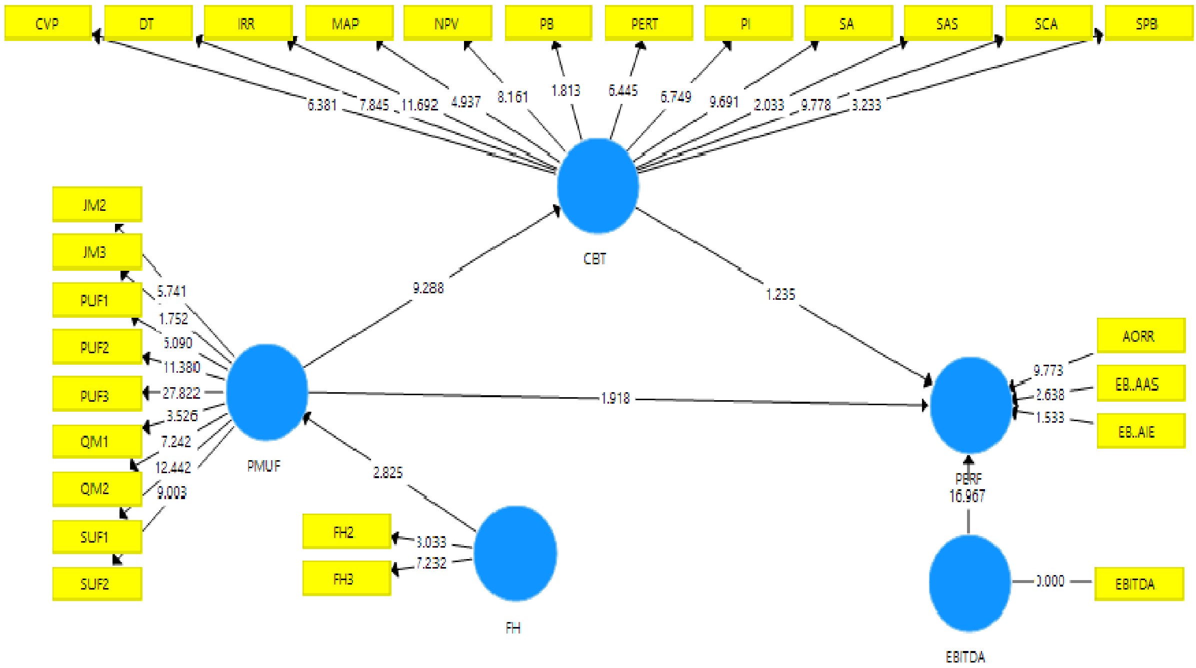


Figure 7.5: PLS path model 3 (Bootstrapping 500)

Where:
FH: Forecasting horizon
PMUF: The procedures and methods used in forecasting
CBT: The capital budgeting techniques (ARR,PB,......SCA)
BERF: The firms' financial performance (Profitability ratios: AORR, EB..AAS and EB..AIE)
EBITDA: Earnings before interest, taxes, depreciation and amortization

PLS path model 3 includes the set of the research hypotheses H_2, H_5, H_{10} and H_{11}. The statistical results from running this model are demonstrated in table 7.25.

Table 7.25: The relationship between the research variables (PLS path model 3)

The relationship between the research variables	*Path*	*PC**	*T statistics*	*P values*
The relationship between the use of CBT and PERF	CBT->PERF	0.165	1.235	0.217
The impact of EBITDA on PERF	EBITDA-> PERF	0.811	16.967	0.000
The relationship between the forecasting horizon (FH) and the use of PMUF.	FH->PMUF	0.333	2.825	0.005
The relationship between the use of PMUF and the use of CBT.	PMUF->CBT	0.617	9.288	0.000
The relationship between the use of PMUF and PERF	PMUF->PERF	-0.184	1.918	0.056
The relationship between the use of PMUF and PERF is mediated by the use of CBT.	PMUF->CBT->PERF	0.102	1.168	0.243
The relationship between FH and the use of CBT is mediated by the use of PMUF	FH->PMUF->CBT	0.206	2.610	0.009
The relationship between FH and PERF is mediated by the use of PMUF.	FH->PMUF->PERF	-0.028	0.995	0.320

*PC: Path coefficient

To determine the indirect relationship among the research variables, the researcher used the variance accounted for (VAF) as follows:

$$VAF_3=(FH\text{->}PMUF*PMUF\text{->}CBT)/(FH\text{->}PMUF*PMUF\text{->}CBT+FH\text{->}CBT) \qquad \text{Eq. 7.3}$$

Where, the indirect relationship (FH->PMUF->CBT) is partial mediation

To assess the research hypotheses, the researcher uses the same criteria to decide the significance of the research hypotheses. Therefore, table 7.26 determines the decisions resulting from testing the research hypotheses that appear in PLS path model 3.

Table 7.26: Decisions related to the significance of research hypotheses (PLS path model 3)

No	*The research hypotheses*	*PC**	*P value*	*Test result*	*Decision*
H_2	The use of PMUF is positively associated with the extent of use of CBT.	PC>0.10	p<0.001	1. Positive relationship 2. Significant	Accept H_2
H_5	The long-term forecast (FH) is positively associated with the use of PMUF.	PC>0.10	p<0.01	1. Positively associated 2. Significant	Accept H_5
H_{10}	The relationship between the use of PMUF and PERF is mediated by the extent of use of CBT.	PC>0.10	p>0.10	1. Full mediation. 2. Insignificant	Reject H10
H_{11}	There is positive relationship between the extent of use of CBT and PERF	PC>0.10	p>0.10	1. Moderate relationship 2. Insignificant	Reject H11

*PC: Path coefficient. ** There is a direct relationship (negative) between the PMUF and PERF (significant: P< 0.10)

7.3.4 Testing the PLS path model 4

The third factor affecting the forecasting procedures and methods are the qualifications (QUA) of forecasters, who are responsible for preparing future cash flow estimates. In this research, PLS path model 4 presents the role of qualified forecasters (QUA) in using forecasting procedures and methods (see Figure 7.6).

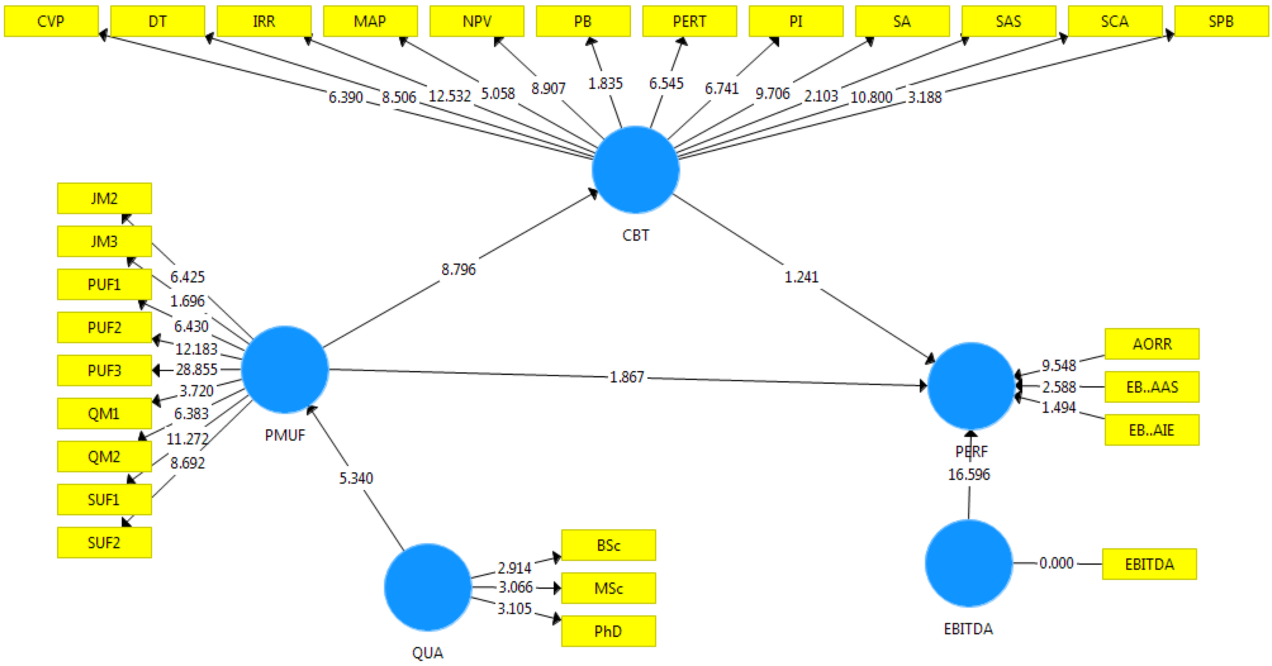


Figure 7.6: PLS path model 4 (Bootstrapping 4900)

Where:
QUA: The qualifications of forecasters.

The structure of PLS path model 4 consists of the research hypotheses: H_2, H_6, H_{10} and H_{11}. The statistical results from the long-run model (Bootstrapping 4900) are summarised in table 7.27.

Table 7.27: The relationship between the research variables (PLS path model 4)

The relationship between the research variables	*Path*	*PC**	*T statistics*	*P values*
The relationship between the use of CBT and PERF	CBT -> PERF	0.161	1.241	0.215
The impact of EBITDA on PERF	EBITDA -> PERF	0.808	16.596	0.000
The relationship between the use of PMUF and the use of CBT	PMUF -> CBT	0.611	8.796	0.000
The relationship between the use of PMUF and PERF	PMUF -> PERF	-0.179	1.867	0.062
The relationship between the qualified forecasters (QUA) and the use of PMUF	QUA -> PMUF	0.483	5.340	0.000
The relationship between the use of PMUF and PERF is mediated by the use of CBT.	PMUF->CBT-> PERF	0.098	1.178	0.239
The relationship between QUA and the use of CBT is mediated by the use of PMUF	QUA->PMUF-> CBT	0.295	3.960	0.000
The relationship between QUA and PERF is mediated by the use of PMUF	QUA->PMUF-> PERF	-0.039	0.934	0.350

*PC: Path coefficient

The types of indirect relationship among the research variables can be determined by the variance accounted for (VAF) as follows:

$$VAF_4 = (QUA\text{->}PMUF*PMUF\text{->}CBT)/(QUA\text{->}PMUF*PMUF\text{->}CBT+QUA\text{->}CBT) \quad \text{Eq. 7.4}$$

Where the indirect relationship (QUA->PMUF->CBT) is partial mediation

To assess the research hypotheses, the researcher utilized the same criteria to decide the significance of the research hypotheses. Table 7.28 determines the decisions resulting from testing the research hypotheses that appeared in PLS path model 4.

Table 7.28: Decisions related to the significance of research hypotheses (PLS path model 4)

No	*The research hypotheses*	*RC**	*P value*	*Test result*	*Decision*
H_2	The use of PMUF is positively associated with the extent of use of CBT	PC>0.10	p<0.001	1. Positive relationship 2. Significant	Accept H_2
H_6	The presence of qualified forecasters is positively associated with the use of PMUF.	PC>0.10	p<0.001	1. Positively associated 2. Significant	Accept H6
H_{10}	The relationship between the use of PMUF and PERF is mediated by the extent of use of CBT**	PC<0.10	p>0.10	1. Weak relationship 2. Insignificant	Reject H_{10}
H_{11}	There is a positive relationship between the extent of use of CBT and PERF	PC>0.10	p>0.10	1. Moderate relationship 2. Insignificant	Reject H_{11}

* PC: Path coefficient. ** There is a direct negative relationship between the PMUF and PERF and this relationship is significant (p<0.10)

7.3.5 Testing the PLS path model 5

The position (POS) of forecasters, who are responsible for the forecasting process, is the fourth factor affecting the forecasting process. Consequently, PLS path model 5 illustrates the influence of official persons (POS) on the use of forecasting procedures and methods and this effect reflects on the use of CBT (see Figure 7.7).

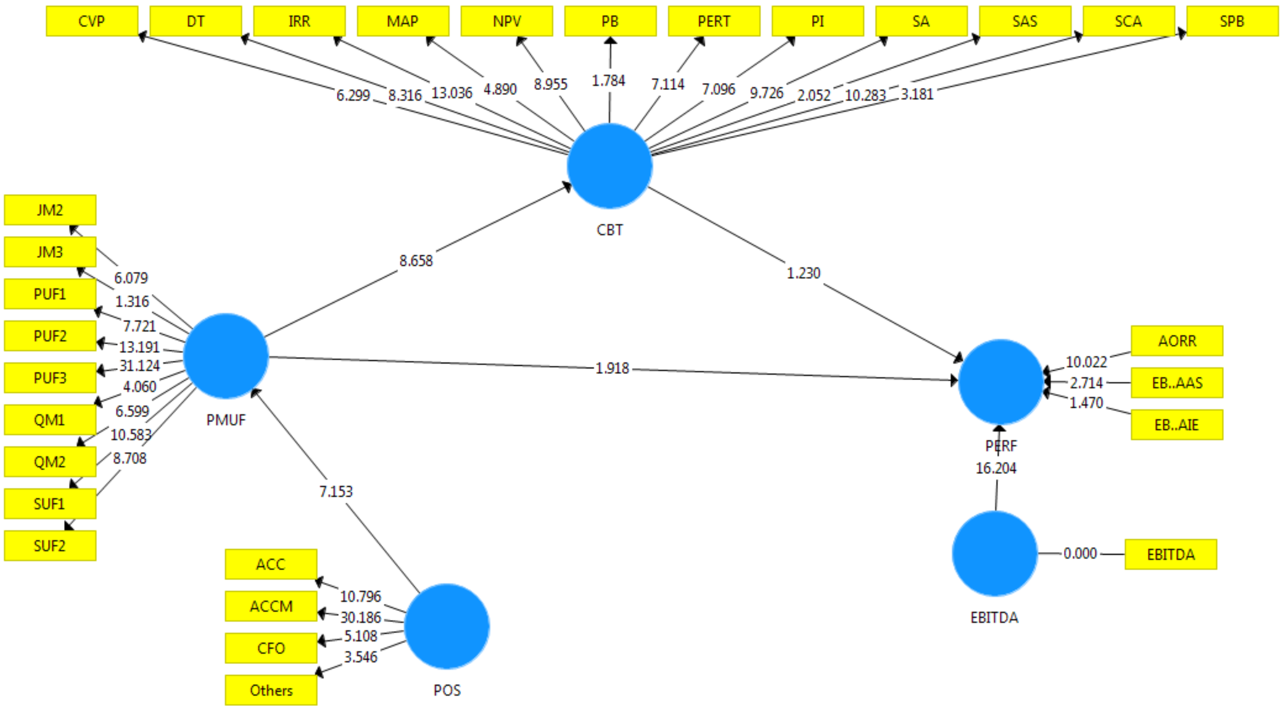


Figure 7.7: PLS path model 5 (Bootstrapping 500)

Where:
POS: The position of forecasters.

As a rule, the researcher employs the same procedures to assess the significance of the structural model (PLS path model 5). The PLS Bootstrapping procedure is applied to achieve this. Table 7.29 provides the following results:

Table 7.29: The relationship between the research variables (PLS path model 5)

The relationship between the research variables	*Path*	*PC**	*T statistics*	*P values*
The relationship between the use of CBT and PERF	CBT->PERF	0.159	1.230	0.219
The impact of EBITDA on PERF	EBITDA->PERF	0.807	16.204	0.000
The relationship between the use of PMUF and the use of CBT	PMUF->CBT	0.602	8.658	0.000
The relationship between the use of PMUF and PERF	PMUF->PERF	-0.176	1.918	0.056
The relationship between the presence of official forecasters (POS) and the use of PMUF.	POS ->PMUF	0.568	7.153	0.000
The relationship between the use of PMUF and PERF is mediated by the use of CBT	PMUF->CBT-> PERF	0.096	1.151	0.250
The relationship between POS and the use of CBT is mediated by the use of PMUF.	POS->PMUF-> CBT	0.342	4.779	0.000
The relationship between POS and PERF is mediated by the use of PMUF.	POS->PMUF-> PERF	-0.046	0.914	0.361

*PC: Path coefficient

The type of indirect relationship among the research variables can be determined by the variance accounted for (VAF) as follows:

$$VAF_5=(POS\text{->}PMUF*PMUF\text{->}CBT)/(POS\text{->}PMUF*PMUF\text{->}CBT+POS\text{->}CBT) \quad \text{Eq. 7.5}$$

Where the indirect relationship (POS->PMUF->CBT) is a partial mediation.

To test the significance of the research hypotheses, table 7.30 outlines the decisions resulting from testing the research hypotheses manifested in PLS path model 5.

Table 7.30: Decisions related to the significance of research hypotheses (PLS path model 5)

No	*The research hypotheses*	*RC**	*P value*	*Test result*	*Decision*
H_2	The use of PMUF is positively associated with the extent of use of CBT.	PC>0.10	$p<0.001$	1. Positive relationship 2. Significant	Accept H_2
H_7	The presence of official persons (POS) is positively associated with the use of PMUF	PC>0.10	$p<0.001$	1. Positively associated 2. Significant	Accept H_7
H_{10}	The relationship between the use of PMUF and PERF is mediated by the extent of use of CBT **	PC<0.10	$p>0.10$	1. Weak relationship 2. Insignificant	Reject *H10*
H_{11}	There is a positive relationship between the extent of use of CBT and PERF	PC>0.10	$p>0.10$	1. Moderate relationship. 2. Insignificant	Reject *H11*

* PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).
**There is a direct negative relationship between the PMUF and PERF and this relationship is significant ($p<0.10$)

7.3.6 Testing the PLS path model 6

This model focuses on the influence of a firm's contingent variables on the procedures and methods used in forecasting (PMUF). This reflects on the use of the CBT in manufacturing and oil companies. In PLS path models 6, the combined contingent variables (CV) are determined as follows (see figure 7.8):

- Average of annual sales (AAS)
- Average of investment expenditures (AIE)
- The number of employees (NEM)
- Type of industry (IND)
- The strategic priorities (SP)
- Perceived environmental uncertainty (PEU)

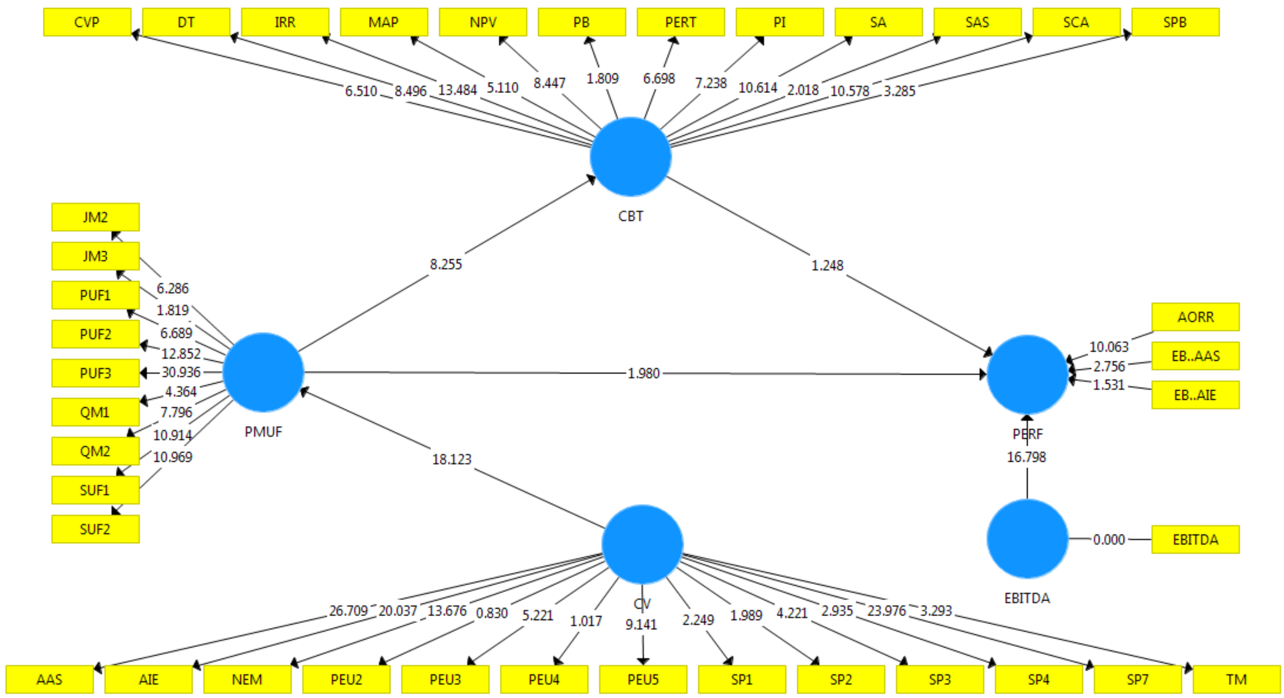


Figure 7.8: PLS path model 6 (Bootstrapping 500)

Where:
CV: The combined contingent variables

The structure of PLS path model 6 encompasses four research hypotheses: H_2, H_8, H_{10} and H_{11}. The statistical results from the short-run model (Bootstrapping 500) are presented in table 7.31.

Table 7.31: The relationship between the research variables (PLS path model 6)

The relationship between the research variables	*Path*	*PC**	*T statistics*	*P values*
The relationship between the use of CBT and PERF	CBT->PERF	0.159	1.248	0.213
The impact of CV on the use of PMUF*	CV->PMUF	0.754	18.123	0.000
The impact of EBITDA on PERF	EBITDA-> PERF	0.811	16.798	0.000
The relationship between the use of PMUF and the extent of use of CBT	PMUF->CBT	0.601	8.255	0.000
The relationship between the use of PMUF and PERF	PMUF->PERF	-0.182	1.980	0.048
The relationship between the use of PMUF and PERF is mediated by the use of CBT.	PMUF->CBT->PERF	0.096	1.183	0.237
The relationship between CV and the use of CBT is mediated by the use of PMUF.	CV->PMUF->CBT	0.453	6.147	0.000
The relationship between CV and PERF is mediated by the use of PMUF.	CV->PMUF->PERF	-0.065	1.054	0.292

*PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).

The type of indirect relationship among the research variables can be determined by the variance accounted for (VAF) as follows:

$$VAF_6 = (CV\text{->}PMUF*PMUF\text{->}CBT)/(CV\text{->}PMUF*PMUF\text{->}CBT+CV\text{->}CBT) \quad \text{Eq. 7.6}$$

Where the indirect relationship (CV->PMUF->CBT) is a partial mediation.

Based on the results derived from table 7.31, the significance of the research hypotheses can be determined as shown in table 7.32, displacing the decisions resulting from testing the research hypotheses that appeared in PLS path model 6.

Table 7.32: Decisions related to the significance of research hypotheses (PLS path model 6)

No	*The research hypotheses*	*PC**	*P value*	*Test result*	*Decision*
H_2	The use of PMUF is positively associated with the extent of use of CBT.	PC>0.10	p<0.001	1. Positive relationship 2. Significant	Accept H_2
H_8	The combined contingent variables (CV) have a positive impact on the use of PMUF.	PC>0.10	p<0.001	1. Positive impact. 2. Significant	Accept H_8
H_{10}	The relationship between the use of PMUF and PERF is mediated by the extent of use of CBT**	PC<0.10	p>0.10	1. Weak relationship 2. Insignificant	Reject *H10*
H_{11}	There is a positive relationship between the extent of use of CBT and PERF	PC>0.10	p>0.10	1. Moderate relationship 2. Insignificant	Reject *H11*

* PC: Path coefficient. **There is a direct/negative relationship between the PMUF and PERF and this relationship is significant (p<0.05).

7.3.7 Testing the PLS path model 7

The influence of the coercive, mimetic and normative pressures (CMNP) on the CFFP, particularly the procedures and methods used in forecasting (PMUF), are investigated according to NIS theory, which considers institutional isomorphism to be the most powerful indicator that can lead to the adoption of CFF and CB processes in manufacturing and oil firms. The researcher employed NIS theory, because the use of CB processes in manufacturing and oil firms is similar to those applied in other organizations. This study seeks to assess the influence of coercive, mimetic and normative pressures on the procedures and methods used in forecasting (PMUF).

In the same way, the researcher used the same criteria to test the significance of the ninth hypothesis, as shown in figure 7.9. Therefore, the PLS bootstrapping procedure was applied to assess the structural PLS path model 7. The findings are as shown in table 7.33.

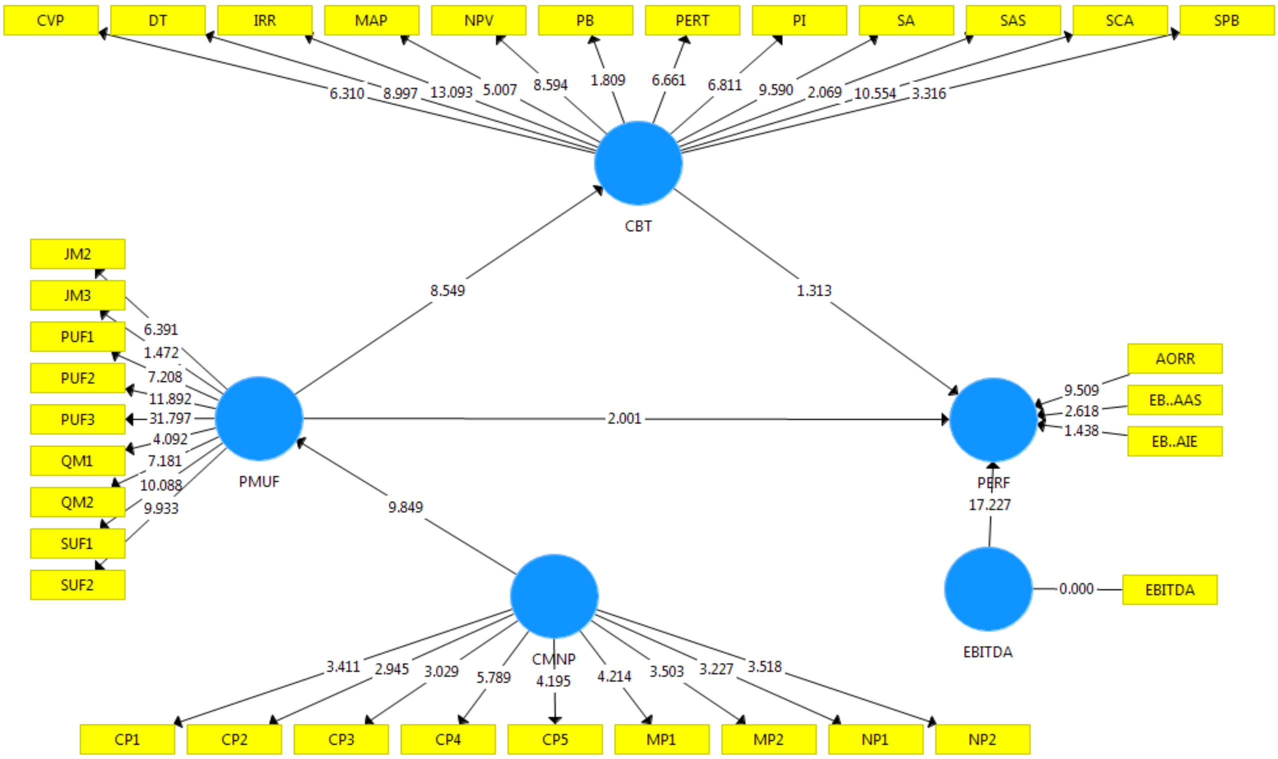


Figure 7.9: PLS path model 7 (Bootstrapping 500)

Where:
CMNP: The coercive, mimetic and normative pressures

Table 7.33: The relationship between the research variables (PLS path model 7)

The relationship between the research variables	*Path*	*PC**	*T statistics*	*P values*
The relationship between the use of CBT and PERF	CBT -> PERF	0.160	1.313	0.190
The impact of CMNP on the use of PMUF.	CMNP -> PMUF	0.591	9.849	0.000
The impact of EBITDA on PERF	EBITDA -> PERF	0.809	17.227	0.000
The relationship between the use of PMUF and the use of CBT.	PMUF -> CBT	0.609	8.549	0.000
The relationship between the use of PMUF and PERF	PMUF -> PERF	-0.178	2.001	0.046
The relationship between the use of PMUF and PERF is mediated by the use of CBT.	PMUF->CBT-> PERF	0.098	1.260	0.208
The relationship between CMNP and the use of CBT is mediated by the use of PMUF	CMNP->PMUF-> CBT	0.360	6.335	0.000
The relationship between CMNP and PERF is mediated by the use of PMUF.	CMNP->PMUF-> PERF	-0.048	0.912	0.362

*PC: Path coefficient.

The type of mediated relationship between the CMNP and CBT can be determined by the variance accounted for (VAF) as follows (Hair et al., 2014):

$$VAF_7=(CMNP\text{->}PMUF*PMUF\text{->}CBT)/(CMNP\text{->}PMUF*PMUF\text{->}CBT+CMNP\text{->}CBT) \quad \text{Eq. 7.7}$$

Where the indirect relationship between CMNP and CBT is partial mediation.

In order to assess the structural model relationships (PLS path model 7), the researcher utilises the same criteria to decide the significance of the research hypotheses. Table 7.34 determines the decisions resulting from testing the research hypotheses that appeared in the PLS path model 7.

Table 7.34: Decisions related to the significance of research hypotheses (PLS path model 7)

No	*The research hypotheses*	*PC**	*P value*	*Test result*	*Decision*
H_2	The use of PMUF* is positively associated with the extent of use of CBT	PC>0.10	p<0.001	1. Positive relationship 2. Significant	Accept H_2
H_9	The coercive, mimetic and normative pressures (CMNP) have a positive impact on the use of PMUF	PC>0.10	p<0.001	1. Positive impact 2. Significant	Accept H_9
H_{10}	The relationship between the use of PMUF and PERF is mediated by the extent of use of CBT**	PC<0.10	p>0.10	1. Weak relationship 2. Insignificant	Reject H_{10}
H_{11}	There is a positive relationship between the extent of use of CBT and PERF	PC>0.10	p>0.10	1. Moderate relationship 2. Insignificant	Reject H_{11}

* PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).
**There is a direct/negative relationship between the PMUF and PERF and this relationship is significant (p<0.05).

Furthermore, there are several relationships among the research variables not encompassed in the research hypotheses. The indirect relationship between the CMNP and CBT is one of these. The researcher identified a positive impact of the coercive, mimetic and normative pressures (CMNP) on the adoption of the forecasting procedures and methods (PMUF) used in manufacturing and oil companies.

7.3.8 Multi-group analysis of the PLS path models

Multi-group analysis is used to test the relationship between the research variables of the PLS path model depending on the two groups. Firstly, the researcher examined the influence of the type of ownership on the relationship between the research variables in both state-owned, and private companies. Secondly, this thesis also explores the impact of the type of industry on the relationship between research variables in both manufacturing and oil companies. In this part of the study, the researcher aims to test the influence of contingent and institutional variables on the forecasting procedures and methods (PMUF) to explain the differences between public and private companies, as well as the differences between manufacturing and oil companies. In other words, the research model relations are limited to PLS path models 6 and 7. Even so, the influence of institutional variables on forecasting procedures and methods based on the differences between manufacturing and oil companies cannot be implemented. In this regard, the multi-group analysis can be used for all of the PLS path models, provided that the number of observations is greater than the number of indicators.

After testing the eighth and ninth research hypotheses, the researcher modified them based on the significance of specific data collected from public and private companies, as well as manufacturing and oil companies, as discussed in the fifth chapter, and which are as follows:

> *$H8_a$: The effect of combined contingency variables (AAS, AIE, NEM, IND, SP and PEU) on the use of forecasting procedures and methods is significantly stronger for public companies than for private ones.*

> *$H8_b$: The effect of combined contingency variables (AAS, AIE, NEM, SP and PEU) on the use of forecasting procedures and methods is significantly stronger for manufacturing companies than for oil ones.*

> *$H9_a$: The effect of institutional pressures (CMNP) on the use of forecasting procedures and methods is significantly stronger for public companies than for private ones.*

7.3.8.1 Multi-group analysis of the PLS path model 6

In this case, this thesis utilizes the multi-group analysis to test the relationship between the contingency variables (CV) and the use of forecasting procedures and methods (PMUF) based on the data collected from two groups: 1) public and private companies, 2) manufacturing and oil companies. The researcher attempts to answer the following question:

1) *Are there significant differences between public and private companies in accordance with the eighth hypothesis?*

2) *Are there significant differences between manufacturing and oil companies in accordance with the eighth hypothesis?*

Firstly, the results derived from PLS multi-group analysis (PLS-MGA) bootstrapping for the two groups (public and private companies) are shown in table 7.35.

Table 7.35: Multi-group analysis of the PLS path model 6 (public and private companies)

Path	*PC Original (TOW1)*	*PC Original (TOW2)*	*PC-diff (|TOW1-TOW2|)*	*p-Value (TOW1 vs TOW2)*
CBT->PERF	-0.268	0.337	0.605	0.899
CV->PMUF	0.838	0.711	0.127	0.044
EBITDA->PERF	0.909	0.722	0.187	0.143
PMUF->CBT	0.750	0.469	0.281	0.177
PMUF->PERF	0.046	-0.337	0.383	0.148
PMUF->CBT->PERF	-0.201	0.158	0.359	0.895
CV->PMUF->CBT	0.629	0.333	0.296	0.109
CV->PMUF->PERF	-0.130	-0.127	0.003	0.522

PC: Path coefficient. TOW1: Public companies=21 companies. TOW2: Private companies=35 companies.
Diff: differences.

Table 7.35 shows the relationships between the research variables of PLS path model 6 based on the specific data collected from the public and private companies (multi-group analysis). In order to assess the structural model relationships, the researcher applied the same criteria to decide the significance of the PLS-MGA. Table 7.36 determines the decisions resulting from testing the research hypotheses, in particular H8a.

Table 7.36: Decisions related to the significance of multi-group analysis based on the data collected from public and private companies (PLS path model 6)

No	*The research hypotheses*	*PC**	*P value*	*Test result*	*Decision*
H2a	The relationship between the use of PMUF* and the extent of use of CBT is significantly different between public & private companies.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff
H8a	The effect of contingency variables (CV) on the use of PMUF is significantly stronger in public companies than in private ones	PC>0.10	p<0.05	1. Positive coefficient 2. Significant	Sig-diff Accept $H8_a$
H10a	The relationship between the use of PMUF and PERF, which is mediated by the extent of use of CBT, is significantly different between public and private companies.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff
H11a	The positive relationship between the extent of use of CBT and PERF is significantly different between public and private companies.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff

* PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).
*Sig-dif: significant difference.

Statistically, the results of this thesis confirm that the influence of contingency variables (CV) on the use of forecasting procedures and methods (FPM) is significantly stronger for public companies than for private ones. Hence, the coefficient effect of public companies (PC=0.838) is stronger than in private ones (PC=0.711). Moreover, there are several relationships among the research variables (PLS path model 6) based on the multi-group analysis, and the researcher only selected the eighth research hypothesis in order to expose the significance of contingency theory compared with institutional theory.

Secondly, the results derived from PLS-MGA bootstrapping for the other two groups (manufacturing and oil companies) can be summarised in Table 7.37.

Table 7.37: Multi-group analysis of the PLS path model 6 (manufacturing and oil companies)

Path	*PC Original (IND1)*	*PC Original (IND 2)*	*PC-diff (|IND1-IND2|)*	*P-Value (IND1 vs IND2)*
CBT->PERF	0.018	0.216	0.198	0.689
CV->PMUF	0.730	0.773	0.043	0.716
EBITDA->PERF	0.816	0.696	0.120	0.453
PMUF->CBT	0.538	0.678	0.139	0.647
PMUF->PERF	-0.157	0.156	0.313	0.695

PC: Path coefficient. IND1: manufacturing companies=57 companies. IND2: oil companies=12 companies. diff: differences.

Table 7.37 shows the relationships between the research variables of PLS path model 6 based on the MGA when the data was collected from the manufacturing and oil companies. In PLS-MGA, the researcher applied the same criteria to decide the significance of the relationship between the research variables based on MGA. Table 7.38 clarifies the decisions resulting from testing the research hypotheses, in particular $H8_b$.

Table 7.38: Decisions related to the significance of multi-group analysis based on data collected from the manufacturing and oil companies (PLS path model 6)

No	*The research hypotheses*	*PC**	*P value*	*Test result*	*Decision*
$H2_b$	The relationship between the use of PMUF* and the extent of use of CBT is significantly different between manufacturing and oil companies.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff*
$H8_b$	The effect of contingency variables (CV) on the use of PMUF is significantly stronger in manufacturing companies than in oil ones.	PC<0.10	p>0.10	1. Weak coefficient 2. Insignificant	No sig-diff. Reject $H8_b$
$H10_b$	The relationship between the use of PMUF and PERF, which is mediated by the extent of use of CBT, is significantly different between manufacturing and oil companies.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff
$H11_b$	The positive relationship between the extent of use of CBT and PERF is significantly different between the manufacturing and oil companies.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff

* PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).
* No Sig-dif: No Significant difference

Table 7.38 clarifies that the impact of contingency variables (CV) on the use of forecasting procedures and methods (PMUF) is not significantly stronger for manufacturing companies than for oil ones. Therefore, the modified eighth hypothesis ($H8_b$) is rejected. This means that contingency theory may not interpret the differences in using the forecasting procedures and methods between manufacturing and oil companies.

7.3.8.2 Multi-group analysis of the PLS path model 7

This thesis applies the multi-group analysis to test the relationship between the coercive, mimetic and normative pressures (CMNP) and the use of forecasting procedures and methods (PMUF) based on the data collected from the two groups: public and private companies. The researcher aims to answer the following question:

> *Are there significant differences between public and private companies in accordance with the ninth hypothesis?*

To answer this question, the data relating to the two groups (public and private companies) was processing by PLS-MGA. The results derived from bootstrapping PLS path model 7 are demonstrated in Table 7.39.

Table 7.39: Multi-group analysis of PLS path model 7 (public and private companies)

Path:	*PC Original (TOW1)*	*PC Original (TOW2)*	*PC-diff (| TOW1 - TOW2 |)*	*P-Value (TOW1 vs TOW2)*
CBT -> PERF	-0.237	0.339	0.577	0.877
CMNP -> PMUF	-0.788	0.681	1.469	0.991
EBITDA -> PERF	0.912	0.720	0.192	0.153
PMUF -> CBT	0.740	0.421	0.319	0.180
PMUF -> PERF	-0.005	-0.345	0.340	0.176
PMUF->CBT->PERF	-0.176	0.143	0.319	0.877
CMNP->PMUF->CBT	-0.583	0.287	0.870	0.882
CMNP->PMUF->PERF	0.142	-0.137	0.280	0.200

PC: Path coefficient. TOW1: Public companies = 21 companies. TOW2: Private companies = 35 companies.
diff: differences

Table 7.39 displays the relationships between the research variables of PLS path model 7 based on the specific data collected from public and private companies. Assessing the structural model relationships, the researcher proceeds the same criteria to decide the significance of the multi-group analysis. Accordingly, table 7.40 presents the decisions resulting from testing of the research hypotheses based on the multi-group analysis of PLS path model 7.

Table 7.40: Decisions related to the significance of multi-group analysis based on the data collected from public and private companies (PLS path model 7)

No	*The research hypotheses*	*PC**	*P value*	*Test result*	*Decision*
$H2_a$	The relationship between the use of PMUF* and the extent of use of CBT is significantly different between the public and private companies.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff*
$H9_a$	The effect of institutional pressures (CMNP) on the use of PMUF is significantly stronger in public companies than in private ones.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff Reject $H9_a$
$H10_a$	The relationship between the use of PMUF and PERF, which is mediated by the extent of use of CBT, is significantly different between public and private companies.	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff
$H11_a$	The positive relationship between the extent of use of CBT and PERF is significant different between public and private companies	PC>0.10	p>0.10	1. Positive coefficient 2. Insignificant	No sig-diff

* PC: Path coefficient. *PMUF is often used as a synonym of the forecasting procedures and methods (FPM).
* No Sig-dif: No significant difference.

Table 7.40 reveals that the influence of institutional pressures (CMNP) on the use of forecasting procedures and methods (FPM) is not significantly stronger for public companies than for private ones. Therefore, the modified ninth hypothesis (H9a) is rejected. This confirms that institutional theory may not interpret the similarities and differences in using the forecasting procedures and methods between the public and the private companies.

7.4 Assessing the PLS-SEM structural model results.

In assessing the reliability and validity of construct measures, this study seeks to assess the structural model results. According to Hair et al. (2014), there are five procedures used to assess the PLS-SEM structural model results. Firstly, the collinearity issues among the latent variables (constructs) are evaluated. Secondly, the significance of the structural model relationships have been assessed in the previous section that is related to assess the research hypotheses. Thirdly, the assessment of the model's predictive accuracy (R^2) will be addressed. Fourthly, the $\mathbf{f^2}$ is one of the statistics used to assess the PLS-SEM structural model results. Finally, Q^2 value is used to assess the model's predictive relevance; this requires riddance analysis.

Subsequently, this part of the study presents the first, third and fourth statistics used to assess the results of PLS Path Models 1-7 as addressed in section 7.3. Instead of Q^2 statistic, which is not available, Goodness of model fit test is one of the statistics used to assess the PLS-SEM structural model results. Statistically, SRMR index is used to test the Goodness of model fit. SRMR can be easily calculated by SmartPLS 3 software. Nevertheless, Hair et al. 2014 states that the Goodness of fit test may not be applied in formative measurement models.

7.4.1 Collinearity issues among the research variables (constructs)

This section applies the same procedures to assess collinearity issues in formative measurement models as discussed in the previous chapter. Therefore, the researcher is required to "examine each set of predictor constructs separately for each subpart of the structural model" (Hair et al. 2014, p.170). In terms of the adopted threshold value, the level of tolerance (TOL) value of 0.20 or higher and VIF value of 5 or lower are adopted in this research as the acceptance criteria (Ibid), which confirmed that there are no collinearity issues among the constructs. Accordingly, Table 7.41 shows the TOL and VIF values used to assess the collinearity issues among the research variables (constructs) as shown in the PLS path models.

Table 7.41: Assessing the collinearity issues among the research variables (constructs)

Path	R^2	TOL	VIF
PMUF->CBT	0.400	0.600	1.667
CBT->PERF	0.142	0.858	1.166
FMPF->CBT	0.438	0.562	1.779
PMUF->PERF	0.095	0.905	1.105
EBTIDA->PERF	0.673	0.327	3.058
DS->PMUF	0.332	0.668	1.497
FH->PMUF	0.121	0.879	1.138
QUA->PMUF	0.234	0.766	1.305
POS->PMUF	0.323	0.677	1.477
CV->PMUF	0.569	0.431	2.320
CMNP->PMUF	0.349	0.651	1.536

Table 7.41 provides evidence that there are no collinearity issues among the research variables (constructs), because the VIF values of each set of research variables (constructs) are less than 5 as the acceptable benchmark adopted in this research.

7.4.2 The coefficient of determination: R^2 value

Hair et al. (2014) confirmed that the R^2 is commonly used to assess the structural model results. Statistically, R^2 coefficient represents "the proportion of the total variation in the dependent variable explained by the variation in the independent variable" (Lind et al., 2015, p.452). R^2 can be defined in several ways (Hair et al., 2014):

- To determine how the regression line fits the data.
- To measure the model's predictive accuracy.
- To assess the correlation between the exogenous and endogenous constructs.

In behavioural research, R^2 value of 0.20 is perceived as acceptable, while in marketing research values of 0.75, 0.50, or 0.25 show that the strength of endogenous construct coefficients may be high, moderate or weak, respectively (Hair et al., 2011a; Henseler et al., 2009). Thus, there are no clear rules in determining R^2 value benchmark. This is based on the complexity level in the research model (Hair et al., 2014).

As a rule, R^2 is only used to assess the predictive ability of the endogenous constructs in PLS path models. Table 7.42 outlines the significance of R^2 values in PLS path models.

Table 7.42: The significance of R^2 values in PLS path models.

Construct	R^2 values	T statistics	P values
PLS path model 1:			
CBT	0.484	7.149	0.000
FMPF	0.367	4.324	0.000
PERF	0.694	10.485	0.000
PLS path model 2:			
CBT	0.368	4.073	0.000
PERF	0.695	10.343	0.000
PMUF	0.322	4.549	0.000
PLS path model 3:			
CBT	0.381	4.424	0.000
PERF	0.696	11.058	0.000
PMUF	0.111	1.290	0.198
PLS path model 4:			
CBT	0.373	4.240	0.000
PERF	0.695	10.460	0.000
PMUF	0.234	2.542	0.011
PLS path model 5:			
CBT	0.362	4.170	0.000
PERF	0.695	10.251	0.000
PMUF	0.323	3.528	0.000
PLS path model 6:			
CBT	0.361	4.039	0.000
PERF	0.696	10.700	0.000
PMUF	0.569	8.858	0.000
PLS path model 7:			
CBT	0.371	4.172	0.000
PERF	0.695	10.417	0.000
PMUF	0.349	4.543	0.000

Most of the R^2 values are significant and the predictive ability of most endogenous constructs has moderate strength.

7.4.3 Effect Size f^2

This measure (f^2) "is computed by noting the change in R^2 when a specific construct is eliminated from the model" (Hair et al., 2014b, p.114). In other words, the $\mathbf{f^2}$ index addresses the effect size of exogenous constructs on the endogenous constructs. Table 7.43 presents the $\mathbf{f^2}$ values as shown in the PLS path models. Cohen (1988) considers that the $\mathbf{f^2}$ values of 0.02, 0.15, and 0.35 respectively represent small, medium, and large effects of the exogenous constructs on the endogenous constructs.

Table 7.43: the f^2 effect size of PLS path models.

Path	f^2	Path	f^2
Model 1:		**Model 5:**	
CBT -> PERF	0.055	CBT -> PERF	0.051
EBITDA -> PERF	2.062	EBITDA -> PERF	2.047
FMPF -> CBT	0.240	PMUF -> CBT	0.568
PMUF -> CBT	0.135	PMUF -> PERF	0.065
PMUF -> FMPF	0.580	POS -> PMUF	0.477
PMUF -> PERF	0.062		
Model 2:		**Model 6:**	
CBT -> PERF	0.050	CBT -> PERF	0.052
DS -> PMUF	0.475	CV -> PMUF	1.319
EBITDA -> PERF	2.069	EBITDA -> PERF	2.078
PMUF -> CBT	0.582	PMUF -> CBT	0.565
PMUF -> PERF	0.064	PMUF -> PERF	0.069
Model 3:		**Model 7:**	
CBT -> PERF	0.054	CBT -> PERF	0.052
EBITDA -> PERF	2.074	CMNP -> PMUF	0.536
FH -> PMUF	0.125	EBITDA -> PERF	2.058
PMUF -> CBT	0.615	PMUF -> CBT	0.590
PMUF -> PERF	0.069	PMUF -> PERF	0.066
Model 4:			
CBT -> PERF	0.052		
EBITDA -> PERF	2.056		
PMUF -> CBT	0.595		
PMUF -> PERF	0.066		
QUA -> PMUF	0.305		

Table 7.43 provides evidence that most of the exogenous constructs have large effects (f^2>0.35) on the endogenous constructs, but the exogenous constructs (CBT and PMUF) have small effects on the endogenous construct PERF.

7.4.4 Goodness of model fit test (SRMR)

Hair et al. (2014, p.17) confirm that there is no “global goodness-of-fit criterion” for formative PLS models, although Standardized Root Mean Square Residual (SRMR) is applied to assess the model fit in SmartPLS 3 software. SRMR represents the covariance between the observed standard deviations in the predicted model. SRMR index deals with the models, which are more sensitive (Hu and Bentler, 1999). In this regard, the accepted value of SRMR should be below 0.08 as a satisfactory benchmark to determine the quality of model (Hu and Bentler, 1999). In this case, “under the non-robustness condition, the combinational rule of SRMR<0.10” is preferable when a sample is less than 50 (Ibid, p.23). In support of this opinion, Sivo et al. (2006) considered that the sample size and data distribution have a significant effect in determining the SRMR index value, where the optimal value of SRMR must be less than 12% for the small sample size (<150). Accordingly, this research adopts this ratio (0.12) to assess the goodness of model fit. The model in general is known as the composite overall model, which includes the formative and reflective constructs. Accordingly, Table 7.44 demonstrates the SRMR index values for each of the path models.

Table 7.44: Goodness of model fit: SRMR common and composite models

SRMR Composite Model

PLS path models	*SRMR index*	*Mean (M)*	*SD*	*T statistics*	*P values*
Path Model 1	0.098	0.128	0.007	13.308	0.000
Path Model 2	0.095	0.124	0.008	11.356	0.000
Path Model 3	0.093	0.121	0.008	11.074	0.000
Path Model 4	0.096	0.123	0.008	11.608	0.000
Path Model 5	0.096	0.122	0.008	12.070	0.000
Path Model 6	0.101	0.127	0.008	13.002	0.000
Path Model 7	0.110	0.136	0.008	14.264	0.000

SRMR Common Factor Model

PLS Path models	*SRMR index*	*Mean (M)*	*SD*	*T statistics*	*P values*
Path Model 1	0.116	0.146	0.008	15.097	0.000
Path Model 2	0.115	0.144	0.008	13.634	0.000
Path Model 3	0.112	0.142	0.009	12.377	0.000
Path Model 4	0.117	0.145	0.009	13.456	0.000
Path Model 5	0.113	0.141	0.008	13.546	0.000
Path Model 6	0.119	0.147	0.008	14.139	0.000
Path Model 7	0.126	0.154	0.008	15.523	0.000

With regard to the findings of SRMR index values, table 7.44 shows that the SRMR index values of PLS path models are acceptable depending on the adopted benchmark (<0.12) and all of the SRMR index values are significant (p<0.001).

7.5 Chapter summary

In this chapter, the researcher sought to achieve three main tasks. Firstly, it focused on the descriptive analysis of data collected by the questionnaire. In this regard, the researcher used SPSS version 22. This section presented important aspects related to descriptive analysis. In terms of the firm’s contingent variables, size was determined by four indicators: average of annual sales (AAS), the number of employees (NEM), average of investment expenditure (AIE) and the average-total of operating assets (ATOA). The researcher selected the first three indicators, because the ATOA variable has a collinearity issue (VIF>5) and the variance proportion of ATOA is more than 0.90. In addition, the researcher surveyed the strategic priorities and environmental uncertainty surrounding manufacturing and oil companies operating in Libya over the recent three years. The three actual working years were specified as 2008, 2009 and 2010 by 40 of 69 respondents.

With regard to the CFF variables, the researcher sought to explore the procedures and methods used in forecasting (PMUF) as the main variable creating the components of cash flow (FMPF). It was discovered that 69.5% of manufacturing and oil companies operating in Libya applied subjective estimates to forecast future cash flow in CB decisions, and there was little interest in the application of mathematical/quantitative methods in forecasting (only 7% of respondents used the regression analysis models). In the same way, the components of cash flow were identified as the financial, marketing and production factors (FMPF). With regard to financial factors, approximately 90% of respondents answered that the foreign exchange rate, working capital requirements and investment expenditures are very and extremely associated with the forecasting procedures and methods.

About 90% of respondents confirmed that sales forecast (MF1) and direct manufacturing costs (PF1) are extremely associated with the forecasting process (PMUF); these answers created a negative effect on the significant and predictive relevance of PLS path research model 1, because the variance indices of MF1 and PF1 are close to zero (0.133 and 0.092 respectively). This issue (variance=0) occurs when the respondents' answers are identical. Instead of the contingent variables, the institutional variables have been detected in terms of the coercive, mimetic and normative pressures (CMNP). Moreover, the use of payback periods and accounting rate of return methods were commonly used in making CB decisions in Libyan manufacturing and oil companies.

Secondly, this chapter concentrated on the assessment of the research hypotheses related to the research variables. The researcher adopted three criteria to assess the significance of the research hypotheses: the path coefficient, levels of P values and the T statistic. In the first three hypotheses, it can be seen that the role of CFF in CB was strongly supported at $p<0.001$ and $p<0.01$. In the first hypothesis, it was confirmed that there is a positive relationship between the use of forecasting procedures and methods (PMUF) and financial, marketing and production factors (FMPF), which positively reflected on the extent of use of CBT (third hypothesis).

In addition, there was strong evidence that the use of forecasting procedures and methods (PMUF) are positively associated with the extent of use of CBT (second hypothesis). In terms of the factors related to the forecasting procedures and methods, these factors are the data sources used in forecasting, forecasting horizon and the qualifications and position of forecasters responsible for preparing future cash flow in CB decisions.

In the fourth research hypothesis, it was confirmed that the use of multiple data sources in forecasting is positively associated with the use of forecasting procedures and methods, which positively influenced on the extent of use of CBT (H_2). The fifth hypothesis is significantly supported, whereby the length of the forecasting horizon is positively associated with the use of forecasting procedures and methods. Subsequently, testing of the sixth and seventh hypotheses provided substantial evidence that the presence of qualified forecasters is positively associated with the use of forecasting procedures and methods.

In the eighth and ninth research hypotheses, the contingency and institutional variables were tested to determine the differences and similarities of forecasting procedures and methods used in CB decisions implemented by the manufacturing and oil companies. Apparently, the relationship between the firms' contingent variables (CV) and the use of forecasting procedures and methods is perceived to be stronger than the institutional variables (CMNP). To support this result, the path coefficient of CV is 0.754, whereas the path coefficient of CMNP is 0.591. Even so, both the contingent and institutional variables are statistically significant ($p<0.001$). In line with multi-group analysis, the results reported that the influence of contingency variables (CV) on the use of forecasting procedures and methods is significantly stronger for public companies than for private ones. On the other hand, there is no significant difference between the manufacturing and oil companies in accordance with the eighth research hypothesis.

The tenth and eleventh research hypotheses entailed the assessment of firms' financial performance. Noticeably, the extent of CBT usage in mediating between the forecasting procedures and methods (PMUF) and the firms' financial performance (PERF) is not statistically supported. Therefore, the tenth research hypothesis was rejected. Nevertheless, the researcher found that there is a negative relationship between the PMUF and the firms' financial performance (PERF) and this relationship is significant at the levels of P value ($p<0.05$ and $p<0.10$). Moreover, there is a weak relationship between the extent of use of CBT and firms' financial performance (PERF). In this case, the path coefficient (CBT->PERF) ranging from 0.158 to 0.164, but this relationship is not significant at the acceptable levels of p value. As a result, the eleventh research hypothesis was rejected.

Thirdly, this study used four statistics to assess the results of the structural models. The research findings reported that there are no collinearity issues among the constructs (VIF<5). In addition, R^2 was used to assess the predictive ability of PLS path models, and the results indicated that all endogenous constructs in PLS path models have the ability to predict their indicators, depending on the significance of R^2 values. Moreover, the results of this study stated that most of the exogenous constructs have large effects on the endogenous constructs ($f^2>0.35$). In the same way, the researcher applied SRMR to assess the goodness of research model fit. The statistical results proved that the SRMR values of PLS path models are acceptable depending on the adopted benchmark (SRMR<0.12), and all of the SRMR values are significant ($p<0.05$). The next chapter compares the results of this study with previous studies.

8 CHAPTER EIGHT: DISCUSSION OF THE RESEARCH FINDINGS

8.1 Introduction

This chapter discusses the research findings, which can be divided into six main objectives. The first objective of this study aims to describe CFF and CB practices. In this regard, the researcher attempts to compare the results of this study to the results of previous studies in terms of forecasting procedures and methods and CBT. Secondly, the findings relating to the forecasting process are represented as the forecasting procedures and methods and the components of cash flow, particularly the financial, marketing and production factors associated with CB process. Accordingly, the researcher seeks to compare the results of this study with previous studies relating to the forecasting process in CB. Thirdly, the findings related to the key factors affecting the PMUF will be presented in terms of data sources, forecasting horizon and the qualifications and position of forecasters who are responsible for preparing cash flow estimates. A comparison between findings relating to the contingent and institutional factors affecting the use of forecasting procedures and methods will be addressed in the fourth and fifth sections. Finally, findings related to the firms' financial performance (PERF) will be discussed in two ways: the indirect relationship between the use of PMUF and PERF and the direct relationship between the extent of use of CBT and PERF.

8.2 The findings of the descriptive statistics

As mentioned in the first chapter, one of the research objectives is to describe forecasting and CB practices in manufacturing and oil firms. In this regard, the researcher attempts to compare descriptive results from this thesis and previous studies in terms of forecasting procedures and methods and the investment appraisal techniques used in CB.

8.2.1 Procedures and methods used in forecasting (PMUF)

The findings relating to the forecasting process are represented as the procedures and methods used in forecasting the components of cash flow, in particular, the financial, marketing and production factors (FMPF) associated with CB decisions. In empirical literature, there is little interest in the procedures and methods used in forecasting future cash flow generated by investment projects (Batra & Verma, 2014). Despite this, there are three studies that address the CFF estimates in CB decisions, therefore, the researcher presents a comparison between the results of this thesis and those of Lazaridis (2002, 2006) and Pohlman et al. (1988) as shown in table 8.1.

Table 8.1: Comparison of the current research findings with Pohlman and Lazaridis's research results (PMUF)

The procedures and methods used in forecasting (PMUF)	*Symbol*	*The current study (2008 -2010) **	*Pohlman et al. 1988 (1986)***	*Lazaridis, 2002 (2002)***	*Lazaridis, 2006 (2002)***
		Libya/ %	*USA/ %*	*Cyprus/ %*	*Greece/ %*
Procedures used in forecasting:					
Personal estimates	PUF1	70	NA	NA	NA
Standard procedures	PUF2	41	85.3	36.27	37.52
Official or standard forms	PUF3	35	78	18.63	24.02
Qualitative methods used in forecasting:					
Executives' opinions	JM1	78.26	90.5*	59.17	48.17
Delphi method	JM2	7	67.2*	15.00	17.07
Sales force composite	JM3	43	NA	NA	NA
Quantitative methods used in forecasting:					
Time-series models	QM1	28	NA	NA	NA
Regression analysis models	QM2	7	48.3*	3.33	3.51
Software package used in forecasting:					
Software developed by a company	SUF1	4	52.2*	6.67	13.72
Commercial software packages (Excel)	SUF2	52	NA	NA	NA
Sensitivity Analysis	SA	N.A	69*	3.33	3.20
Probability Theory	PT	N.A	43.1	2.50	2.59

* 1- The executives' opinions are often referred to as the Management's Subjective Estimates. 2- Delphi method is often referred to as the consensus of experts' opinion. 3- Regression analysis models are similar to the sophisticated mathematical models. 4- The software developed by a company is similar to the computer simulation mentioned by Pohlman and Lazaridis. 5- Sensitivity analysis is applied as one of the risk appraisal techniques in capital budgeting as mentioned in this survey. 6- NA: Not applicable. 7- The current study/type of answer: Always and often used. 8**-The type of answer: Used.

The findings shown in Table 8.1 enable a comparison between the USA, Cyprus, Greece and Libya. This comparison presents relevant empirical evidence on the application of forecasting procedures and methods in the industrial sector.

Beginning with the procedures used in forecasting, 70% of manufacturing and oil companies in Libya applied personal estimates (PUF1) to forecast future cash flow in CB decisions. This procedure (PUF1) does not relate to the executives' opinions, because it is based only on personality. This is different from US, Cypriot and Greek firms, which did not indicate that they utilised this procedure (PUF1). In addition, the standard procedures used in Libya, Cyprus and Greece are similar (41%, 36.27% and 37.52% respectively), while 85.3% of US manufacturing firms used the standard procedures in CFF. Moreover, 35% of the manufacturing and oil companies operating in Libya used official forms to collect cash flow data relating to the investment projects. This procedure is similar to those used by Cypriot and Greek firms (18.63% and 24% respectively), whereas 78% of US manufacturing firms employed official forms.

Secondly, it involves some of the qualitative methods used in forecasting. In this regard, the executives' opinions are identical to management's subjective estimates and are used as a qualitative method in forecasting. Where, there are similarities in using the management's subjective estimates amongst US and Libyan firms (78.26% in Libya and 90.5% in the USA), while 59.17 of Cypriot firms and 48.17 % of Greek firms used the management's subjective estimates in CB decisions. Manufacturing and oil companies in Libya did not pay attention to the use of the Delphi method in forecasting (only 7% used this technique, even less than 15% of Cypriot and 17% of Greek firms utilizing it). In contrast, 67.2% of respondents in US firms applied the consensus of experts' opinion (Delphi method) to forecast future cash flow in investment decisions. With regard to the sales force composite method, the research results of Lazaridis (2002, 2006) and Pohlman et al. (1988) do not refer to this technique, whereas 43% of the manufacturing and oil firms in Libya used the sales force composite method as one of their qualitative methods.

Thirdly, the mathematical models used in forecasting were perceived as being of less interest in Libya, whereas 7% and 28% of the manufacturing and oil firms applied regression analysis and time-series models respectively. Cypriot and Greek firms have not paid attention to the use of mathematical models in forecasting, with less than 4% of respondents using these models. Conversely, 48.3% of US manufacturing firms applied sophisticated mathematical models to forecast future cash flow in CB decisions.

However, most researchers in businesses focus on the application of forecasting methods in marketing/sales areas or operational activities (Klassen and Flores, 2001; Lawrence et al., 2000; Watson, 1996). In this regard, Klassen and Flores (2001) stated that the use of forecasting methods in US firms is similar to the Canadian firms, although only 57% of the latter (n=66) used the forecasting process in capital investment decisions. For more detail, the comparison of the forecasting methods used in Libya and the UK was undertaken by Watson (1996) and Fildes and Hastings (1994), although these studies applied forecasting methods in the marketing field. Table 8.2 shows the results of using these techniques in the UK and Libya.

Table 8.2: Comparison between the findings of this study and UK research results (PMUF)

The procedures and methods used in forecasting (PMUF)	*Symbol*	*This survey*$_1$ *(2008-2010)**	*Watson 1996 (1989) UK*$_2$	*Fildes and Hastings 1994 (1987)UK*$_2$
Qualitative methods:		%	%	%
Executive's opinions *	JM1	78.26	68	24
Delphi method*	JM2	7	35	21
Sales force composite	JM3	43	82	40
Quantitative methods:		%	%	%
Time-series models* (Moving average/trend analysis)	QM1	28	38/38	62/56
Regression analysis models**	QM2	7	7	26
Software package used in forecasting:		%	%	%
Software developed by a company***	SUF1	4	12	17
Commercial software packages (Excel)	SUF2	52	NS	NS

* Executive's opinions are management's subjective estimates; *Delphi method refers to the consensus of experts' opinion; *The time-series models include the moving average, exponential smoothing methods and trend and life cycle analysis... **Regression analysis models are similar to the sophisticated mathematical models; *** The software developed by a company is similar to computer simulation as mentioned in Pohlman and Lazaridis's research results; *$_1$ The type of answer: Always and often used; *$_2$: The type of answer: Used; *2008-2010: Refers to the surveying years. NS: Not surveyed.

In terms of the executives' opinions, both this study and Watson (1996) found that this technique was used by the majority of firms for forecasting, but in different ways. About 78% of Libyan manufacturing and oil firms always use executives' opinions in CB cash flow forecasts and 68% of the UK firms used this technique in sales forecasting. In contrast, Fildes and Hastings (1994) confirmed that only 24% of UK firms employed the executives' opinions in sales forecasting.

With regard to the Delphi method, UK firms certainly paid greater attention to its use than Libyan ones. The use of sales force composite in UK firms (Fildes and Hastings, 1994) was similar to that of Libyan companies, which was close to 40%. Watson (1996) stated that 82% of UK firms used the sales force composite method in sales forecasting. Time-series and regression analysis models were perceived to be more common in UK firms than Libyan ones. Moreover, UK firms were approximately four times more likely to use software programed by their staff.

8.2.2 Capital budgeting techniques (CBT)

In finance and accounting literature, CB is often used synonymously with "capital investment appraisal" (Drury, 2012; McLaney, 2009). As discussed in the third chapter, most of the CB research focused on the evaluation stage of CB process (Burns and Walker, 2009). In this regard, appraisal techniques can be divided into three categories: financial appraisal techniques, risk analysis techniques and management science techniques (Pike 1988, 1996). This section compares the findings of this thesis with prior studies relating to CBT.

In empirical literature there are a number of studies which survey the extent of CBT usage in businesses (Ghahremani et al., 2012). According to Haka, Gordon, and Pinches (1985), three criteria are used to distinguish between the naive and sophisticated financial appraisal techniques in CB: risk, cash flow and the time value of money. Discounted cash flow (DCF) techniques incorporating risk-adjusted discount rates in CB decisions. In contrast, undiscounted cash flow techniques (PB and ARR) do not consider the parameters mentioned above. Financial appraisal techniques are used as the criteria for evaluating and selecting investment projects. As explained in chapter three, the use of DCF techniques is perceived as being more common in developed countries than in developing ones. Theoretically, discounted cash flow (DCF) methods rely basically on the prediction of future cash flow, which involve an inherent risk in investment decisions (Olu-Tima, 2003). Consequently, most studies focus on the use of discounted cash flow methods in the investment appraisal process (Haka et al., 1985). Table 8.3 summarizes the percentage of businesses using financial appraisal techniques in developed and developing countries.

It can be seen from table 8.3 that the PB method is the most common method used amongst UK, Indian, Malaysian, Chinese, South African, Sudanese and Libyan firms. On the other hand, discounted cash flow (DCF) methods are perceived as being of more interest in US, Swedish, Dutch and Australian firms. PB and ARR methods have depended on the concept of traditional income, whereas DCF methods have been based on the concept of the time value of money.

In terms of non-discounted cash flow methods, 58% and 57% of manufacturing and oil companies operating in Libya considered the PB and ARR to have high priority in the process of CB (respectively). On the other hand, Libyan companies have not paid attention to the use of discounted cash flow methods, with only 19% and 10% of Libyan manufacturing and oil firms using NPV and IRR, respectively. Conversely, 85% of US firms and 94% of Canadian firms always or often used the NPV in CB decisions (Bennouna et al. 2010; Ryan and Ryan, 2002). Similarly, 89% of Dutch firms and 84% of the largest UK firms employed the IRR method in their capital budgets (Arnold and Hatzopoulos, 2000; Hermes et al., 2007).

Table 8.3: Percentage of using the financial appraisal techniques by businesses

No	Firm size/ details	Year and country of survey	The sample	The type of answer	% The use of the financial appraisal techniques				
					PB	ARR	NPV	IRR	PI
Current study (2016)									
1	Small, medium and large firms.	2008-2010 Libya	69 firms	An essential and high priority	58	57	19	10	4
Drury et al. (1993)									
2	Small, medium and large firms.	1993 UK	278 firms	Always/often used	63	41	43	57	NA
Pike (1996)									
3	Large	1992 UK	100 firms	Used	94	50	74	81	NA
Arnold and Hatzopoulos (2000)									
4	Small firms Medium firms Large firms	1997 UK	100 firms 100 firms 100 firms	Used	71 75 66	62 50 55	62 79 97	76 83 84	NA
Ryan and Ryan (2002)									
5		USA	205 firms	Always/often used	52.6	14.7	85	76.7	NA
Graham and Harvey (2001)									
6		2001. USA and Canada	392 CFOs	Always/almost always used	57	20	75	75.7	12
Bennouna et al. (2010)									
7		2010 Canada	88 firms	Used	NA	NA	94	87.7	NA
Holmen and Pramborg (2009)									
8		2009 Sweden	143 firms FDI	Always/almost always	57	38	49	34	NA
Daunfeldt and Hartwig (2014)									
9		2005-2008 Sweden	193 listed firms	Frequently or always	54.4	46	61	30	12.4
Hermes et al., (2007)									
10	- Dutch CFOs - Chinese CFOs	2007 Netherlands	42 firms 45 firms	Always/ almost always used	79 84	2 9	89 49	74 89	NA NA
Truong et al. (2008)									
11		2004 Australia	87 firms	Moderately important and very important	79	50	82	70	NA
Verma et al. (2009)									
12		2009 India	30 firms	Often/ always used	80	26.7	63	76.7	NA
Chan et al. (2001)									
13		2001	54 firms	Primary use	13	66.7	89	40.7	46.3
Anuar (2005)									
14		2005 Malaysia	88 firms	Very often and often used	69.4	25	60	61.4	NA
Brijlal and Quesada (2009)									
15		2009 South Africa	211 interviews	Used	39	22	36	28	28
Eljelly and AbuIdris (2001)									
16	-Private firms -Public firms	2001 Sudan	31 37	Used	52 38	5 14	12 24	14 19	6 8
Obi and Adeyemo (2014)									
17		Nigeria	228 firms	Used	39.5	17.5	20.2	13.2	8.8

* PB: Payback period; ARR: Accounting rate of return; NPV: Net present value; IRR: Internal rate of return; PI: Profitability index; DCFM: Discounted cash flow methods (including NPV, IRR and PI); SML: small, medium and large firms; NA: Not applicable.

In contrast to the findings of this study, it seems that CB practices in the Asia-Pacific region (China and India) applied DCF methods combined with non-discounted cash flow methods to evaluate investment projects. In this regard, Indian firms were interested in using the non-DCF and DCF methods. In particular, 80%, 63.3% and 76.7% of these firms often/always used the PB, NPV and IRR respectively (Verma et al., 2009). Similarly, ARR and IRR were primarily employed by Chinese companies (66.7% and 88.9%, respectively). Graham and Harvey (2001) and Brounen et al. (2004) found that NPV, IRR and PB are the most popular methods among North American and Western European firms. In comparison, most companies in Libya, Malaysia and Sudan primarily used non-discounted cash flow methods (PB and ARR) in CB decisions.

Secondly, risk appraisal techniques were divided into six categories: subjective assessment (SAS), cost-volume-profit (CVP) analysis, sensitivity analysis (SA), scenario analysis (SCA), shortening the PB period (SPB) and raising the discount rate (RDR). Table 8.4 shows the percentage of businesses using the risk appraisal techniques.

Table 8.4: Percentage of using the risk appraisal techniques by businesses

No	*Author*	*Country and year of survey*	*The sample*	*The type of response*	*% use of the risk appraisal techniques**					
					SAS	*CVP*	*SA*	*SCA*	*SPB*	*RDR*
1	Current study (2016)	Libya 2008-2010	69 SML* firms	An essential & high priority	68.1	42	5.8	5.8	5.8	1.5
2	Drury et al. (1993). SML firms	UK 1993	278 firms	Often or always used	NA	NA	51	NA	37	18
3	Pike (1996) (large firms)	UK 1992	100 firms	Used	NA	NA	88	NA	60	65
4	Arnold and Hatzopoulos, 2000 - Small firms - Medium firms - Large firms	UK 1997	 100 100 100	Used	 44 33 55	 NA NA NA	 82 83 89	 ®	 15 42 11	 42 71 50
5	Ryan and Ryan (2002)	USA	205 firms	Always or often used	NA	NA	65.1	41.6	NA	NA
6	Graham and Harvey (2001)	USA and Canada 2001	392 CFOs	Always or almost always used	NA	NA	52	NA	NA	NA
7	Singh et al. (2012)	India 2010	166 firms	Used	NA	NA	96	7.69	11.5	11.5
8	Daunfeldt and Hartwig (2014)	Sweden 2005-2008	193 listed firms	Frequently or always	NA	NA	45	NA	NA	NA

*SAS: Subjective assessment; CVP: Cost-volume-profit analysis; SA: Sensitivity analysis; SCA: Scenario analysis; SPB: Shorten the PB period; RDR: Raise the discount rate; SML: Small, medium and large firms; NA: Not applicable; ® Arnold and Hatzopoulos, 2000 used the SA and SCA in a combined variable

Table 8.4 shows that 68.1% of the manufacturing and oil companies operating in Libya depended on subjective assessment (SAS) in appraising investment projects, while the majority of US, UK, Canadian and Indian firms applied SA, SPB and RDR, which were commonly used in large firms in the UK – 88%, 60% and 65% respectively (Pike, 1996). DCF methods incorporate the risk-adjusted discount rate in CB decisions, because these methods are based on the theory of the time value of money, while non-discounted cash flow techniques (PB and ARR) do not take into account the time value of money.

Subsequently, Graham and Harvey (2001) found that more than 50% of US firms did not adjust their rates (RDR) to assess the risk surrounding their international projects. In this regard, sensitivity analysis was the dominant assessment technique used to assess the project risk in multinational enterprises (Shao and Shao, 1996). Nevertheless, “there is such low usage of sophisticated risk analysis methods such as the sensitivity, scenario and Monte Carlo analyses” (Burns and Walker, 2009, p.85).

Operations research techniques are often referred to as management science techniques, and are often used when firms have limited funds. According to Beraldi et al. (2012), capital rationing is a special case of the CB that exists whenever the firm's capital budget is not adequate to fund all profitable projects. In accountancy and finance literature, several mathematical models are suggested for solving capital rationing problems. Weingartner (1974) presented the original mathematical formulation to solve the capital rationing problem in CB. In this thesis, the researcher determined three techniques commonly used to solve the capital rationing problems in empirical literature. Table 8.5 presents the percentage of using the operations research techniques by businesses.

Table 8.5: Percentage of using the operations research techniques by businesses

No	Author	Country and year of survey	The sample	The type of answer	% The use of the operations research techniques*		
					MAP*	DT*	PERT/CPT*
1	Current study (2016)	Libya 2008-2010	69 firms	Moderate, high and essential priority	8.7	17	12
2	Pike and Sharp (1989) (large firms)	UK 1986	100 firms	Often, almost and always used	9	13	32
3	Ryan and Ryan (2002)	USA 2002	205 firms	Always, often or sometimes used	16.8	31	31
4	Khan (2008)	USA 2008	Case study 9 projects	Mathematical modelling solutions	Optimal projects	NA	NA

* MAP: Mathematical programming consists of the linear, integer, goal and dynamic programming; DT: Decision tree or theory; PERT: Program evaluation and review technique; CPA: Critical path analysis

Table 8.5 indicates that Libyan firms had little interest in the uses of mathematical programming (MAP), decision trees (DT), program evaluation and review techniques (PERT) or critical path analysis (CPA) in CB decisions. A much larger percentage of UK firms (32%) and US firms (31%) used PERT or CPA (Pike and Sharp, 1989; Ryan and Ryan, 2002).

The use of MAP in empirical literature received extensive attention in CB research, albeit usually for specific CB problems (Benjamin, 1985; Bhaskar, 1978; Keown and Taylor, 1980; Khan, 2008). Similarly, Khan (2008) stated that the mathematical programming models used in solving CB problems are perceived to be more common in the private sector. Indeed, the capital rationing problem in the public sector occurs due to limited funds, legal constraints of borrowing, limitation of public expenditures and the concentration of sample projects rather than complex projects requiring large budget allocations (Ibid).

In empirical literature, most studies applied the linear, integer and goal program to prepare the CB (Acharya et al. 1982; Benjamin, 1985; Bhaskar, 1978; Keown and Martin, 1976; Keown and Taylor, 1980; Rychel, 1977). For instance, Ras Lanuf Oil and Gas processing Company used linear programming in appraising investment projects (Linsley and Fotouh, 1979). Nevertheless, traditional and linear programming techniques have faced a lot of criticisms in the methods used in the preparation of CB, as these methods are used in static and linear situations (Alsharif, 2004). The practical reality has required searching for a new model to solve current problems. Bellman and Dreyfus (1962) assume that the practice of DP is more effective than LP. Dynamic programming (DP) was used in the preparation of CB of Ras Lanuf oil and gas processing company; this model (DP) provided an optimal investment plan under limited funds (Alsharif, 2004). In addition, DP can apply in linear and non-linear situations. The DP technique provides a solution to the problem of divisibility in investment projects rather than LP models (Ibid). Moreover, Beraldi et al. (2012) presented a stochastic model to solve the capital rationing problem under uncertainty. They consider that the objective function of this model is to maximize the total value of projects while accounting for risk.

8.3 Findings related to the cash flow forecasting process in capital budgeting decisions

As discussed in chapter five, previous studies have not addressed the relationship between the forecasting process variables and the CBT. In this research, the forecasting process has been identified as the procedures and methods used in forecasting the components of cash flow and determine the role of CFF in CB decisions. In this regard, Danese and Kalchschmidt (2011a, p.204) depicted the forecasting process as follows:

> *"Three factors that characterize the forecasting process: whether structured techniques are adopted, whether information from different sources is collected to elaborate forecasts and the extent to which forecasting is used to support decision-making processes".*

Based on this, three main features related to the CFFP in CB decisions can be determined for the purposes of this study:

- The procedures and methods used in forecasting (PMUF)
- The information/the components of cash flow, which are the financial, marketing and production factors created by the PMUF
- The role of forecasting procedures and methods in capital budgeting decisions

The first three hypotheses of this study tested the forecasting process in CB decisions in terms of the three factors as mentioned above. In the first hypothesis, the statistical results established that there is a significant and positive relationship between the use of forecasting procedures and methods, and the financial, marketing and production factors ($p<0.001$). It was found that borrowing of funds, tax consideration and administrative expenses are important financial factors related to the forecasting procedures and methods (significant at $p<0.01$ and $p<0.001$).

In the same way, direct manufacturing costs, overhead, and research and development expenses are positively correlated with forecasting procedures and methods (significant at $p<0.10$ and $p<0.001$). Contrary to marketing factors, it can be seen that 98.5% of manufacturing and oil firms operating in Libya consider sales forecast factor as being associated with the forecasting process. Even so, the sales forecast variable did not appear in PLS path model 1, because this variable contains the same values meaning that respondents' answers are identical. As a result, the variance ratio is close to zero. This procedure can be applied to the other variables, which had identical answers.

Consistent with the results of the previous studies, Pohlman et al. (1988, P.74) stated that tax consideration is a significant factor affecting the CFFP in investment decisions made by US firms (p<0.05) and they asserted that the firms "with larger capital expenditures" are positively associated with the use of multiple forecasting methods.

Table 8.6 shows the differences and similarities between the current study and prior studies addressing the financial, marketing and production factors in the USA, Cyprus and Greece. The descriptive results indicated that sales forecast and direct manufacturing costs are the most important factors affecting the forecasting process in the USA, Greece, Cyprus and Libya.

Table 8.6: Differences and similarities between the current study and prior studies in terms of financial, marketing and production factors (FMPF)

The financial, marketing and production factors (FMPF)	Symbol	This survey (2008-2010)*1	Pohlman et al., 1988. (1986)*2	Lazaridis, 2002. (2002)*2	Lazaridis, 2006. (2002)*2
		69 firms, Libya, %	232 US firms, %	100 Cypriot firms, %	573 Greek firms, %
The financial factors:					
Borrowing and repayment of funds	FF1	39	37.5	69	+67
Foreign exchange rate	FF2	91	NA	NA	NA
Tax considerations	FF3	35	77.6	30	50
Working capital requirements	FF4	88	69	61	72
Investment expenditures	FF5	88	41.3	48	+50
Administrative overhead	FF6	22	25.4	48	+50
The marketing factors:					
Sales forecast (revenues)	MF1	99	93.5	90	84
Selling expenses	MF2	35	36.7	47	47
Competitive expenses	MF3	28	74.6	64	56
The production factors:					
Direct manufacturing costs*	PF1	100	90	82	80
Manufacturing overhead expenses	PF2	49	76.3	53	61
Research and development expenses	PF3	19	28	43	
Depreciation costs	PF4	23	NA	NA	NA

*1The type of response: Significantly or considerably associated; *2 The type of response: The most important or important;
*Direct manufacturing costs are often referred to the operating expenses

From table 8.6, it can be seen that 88% of manufacturing and oil companies in Libya consider working capital requirements to be significantly and considerably associated with the forecasting procedures and methods. Similarly, US, Cypriot and Greek firms paid more attention to the working capital requirements in the forecasting process (69%, 61% and 72% respectively). In the same way, borrowing and repayment of funds was of less concern to US and Libyan firms (37.5% and 39%respectively), while more than two-thirds of Cypriot and Greek firms considered this to be a vital factor in investment decisions. Subsequently, this study confirms that the use of official forms (PUF3) in collecting information about future cash flow is significantly associated with financial factors (significant at p<0.001). In this study, the researcher found that the applications of regression models (QM2) in forecasting are positively associated with financial factors (significant at p<0.001).

In the second hypothesis, the statistical results of this study found that the use of forecasting procedures and methods are positively associated with the extent of use of CBT (significant at p<0.01). Consistent with the results of previous studies, Lazaridis (2002 and 2006) and Pohlman et al. (1988) addressed the role of forecasting techniques in estimating future cash flow in CB decisions. In other words, Pohlman et al. (1988) and Lazaridis (2002, 2006) only concentrated on the CFF stage in CB and did not examine the relationship between the CFFP and the evaluation and selection stage (the extent of use of CBT). This confirms that this thesis is a unique study to establish whether forecasting procedures and methods may be associated with investment appraisal techniques. In terms of financial appraisal techniques, the use of forecasting procedures and methods is perceived to be more highly associated with the extent of use of discounted cash flow methods (NPV, IRR and PI) instead of using the payback period and accounting rate of return methods (significant at p<0.001).

Similarly, the use of forecasting procedures and methods is significantly linked with the extent of use of CVP, sensitivity and scenario analysis techniques (p<0.001). In contrast, shortening the PB period (SPB) and raising the discount rate (RDR) were widely applied in UK firms (Pike, 1989, 1996). Moreover, the extent of use of the operations research techniques (MAP, DT and PERT/CPA) is considerably associated with the use of forecasting procedures and methods, especially the regression analysis models, Delphi method and the formal and standard procedures (significant at p<0.001). Consistent with the results of Pohlman et al. (1988) and Lazaridis (2002, 2006), forecasting methods have played an important role in forecasting future cash flow in CB decisions.

In the third hypothesis, the results of this study provided robust evidence that financial, marketing and production factors (FMPF) are significantly and positively associated with the extent of use of CBT. It is known that the FMPF (components of cash flow) are created/shaped by the procedures and methods used in forecasting (PMUF). None of the previous studies have addressed the relationship between financial, marketing and production factors and the extent of use of CBT. Even so, Pohlman et al. (1988) and Lazaridis (2002, 2006) examined the importance of financial, marketing and production factors relating to cash flow estimation practices in US, Cypriot and Greek firms, as mentioned in the first hypothesis. The findings of this study present strong statistical evidence that financial and production factors are the most important factors related to the extent of use of discounted cash flow methods, risk appraisal techniques and operations research techniques. Specifically, the results of this thesis report that the borrowing of funds, administrative expenses, manufacturing overhead and research and development expenses are significantly associated with the extent of use of discounted cash flow methods, risk appraisal techniques (CVP, SA and SCA) and operation research techniques ($p<0.001$).

8.4 Findings related to the key factors influencing the procedures and methods used in forecasting

8.4.1 The data sources used in forecasting

The use of multiple sources is one factor related to the forecasting process, particularly forecasting procedures and methods. In line with the fourth hypothesis, the results of this study stated that the use of multiple data sources in forecasting is positively associated with the use of forecasting procedures and methods (significant at $p<0.001$).

In descriptive analysis, 61%, 59% and 51% of respondents consider that the firm's departments, suppliers and the customers' sales plans, respectively, are always and often used as the main sources in forecasting cash flow in CB decisions made by manufacturing and oil firms operating in Libya. Statistically, the results of this study reveal that firm's departments (DS_1), university research centres (DS_4) and chartered accountants (DS_5) are significant sources used in forecasting ($p<0.001$, $p<0.10$ and $p<0.05$). Subsequently, most of the petrochemical and oil investment projects in Libya depend on feasibility studies conducted by foreign consulting firms (DS_6) using information based on the global oil markets. In this respect, 20.3% of manufacturing and oil firms operating in Libya always or often used foreign consultants and companies to forecast future cash flow in CB decisions. Foreign consultants (DS6) used in forecasting process are not statistically supported ($p>0.10$). Even so, external data sources are applied to acquire information for forecasting process in Libyan manufacturing and oil firms. Similarly, two-thirds of US firms used causal forecasting models incorporated external data in their forecasts (Cerullo and Avila, 1975). To support this result, Rothe (1978) stated that 55% of US firms (mainly larger ones) used macroeconomic data in their quantitative models.

On the other hand, Danese and Kalchschmidt (2011a) reveal that there is a negative relationship between the use of multiple sources and forecast accuracy (mediated variable). Even so, this relationship is significant at the level of 10%. In this regard, Danese and Kalchschmidt (2011a, p.209) determined three items of data sources used to acquire information for the forecasting process: "current economic conditions, sales plan, suppliers and market research". Similarly, Fildes and Hastings (1994) established that the historical data related to sales history, products and prices are the most important information utilized in market forecasting and they found that the scarcity of market research information is an essential determinant in forecast accuracy. Consistent with these results, Wotruba and Thurlow (1976, p.11) emphasize that sales force (DS_3) is an important source of market forecasting information, "especially under unique economic conditions which make historical data unreliable". In multinational companies, sales force, historical data and marketing research department are regularly used; whereas, the management of other subsidiaries, trade sources and commercial suppliers are less important (Hulbert et al., 1980, p.10).

8.4.2 Forecasting horizon (FH)

As discussed in chapter five, the forecasting horizon is the length of the forecasting period, which differs from one firm to another. According to Pohlman et al. (1988, P.74), the forecasting horizon represents "the average economic life of a project". In terms of the fifth hypothesis, the results of this study state that the forecasting horizon is positively associated with the use of forecasting procedures and methods. In line with this result, long term (6-10 years) and extensive term (over 11 years) forecasts are statistically significant ($p<0.01$ and $p<0.001$, respectively).

In contrast, the descriptive results of this study indicate that 94% of the manufacturing and oil companies operating in Libya (65/69) always or often used the lowest period of forecasting horizon, which ranges from 1 to 5 years (FH_1). Even so, this indicator has been cancelled from PLS path model 3, because of the identical answers of respondents. While, only 10% of Libyan manufacturing and oil companies always or often employed the longest period (6-10 years), and 88.4% of respondents confirmed that Libyan manufacturing and oil companies never or rarely utilized the forecasting period exceeding 11 years (FH_3). To support this, results from prior studies such as the study by McHugh and Sparkes (1983) established that short-term forecast is the most important factor for firms operating in highly competitive markets.

According to Winklhofer, et al., (1996, p.217), there is a strong relationship between short-term forecasts and the number of forecasts needed in order to assess the accuracy of forecasting in UK manufacturing firms (exporters).

Contrary to the previous results, 27% of respondents in US firms stated that the forecasting horizon used in calculating cash flow of investment projects is greater than ten years (Pohlman et al., 1988). In line with this, Sanders and Manrodt (1994) confirmed that US managers used various forecasting techniques for multiple forecast horizons. According to Klassen and Flores (2001), judgmental methods are more commonly used with different time horizons. In this regard, Naylor (1981) stated that the longest forecast horizon (more than seven years) is associated with the use of econometric forecast models. In the same way, Small (1980) stated that the type of industry, and forecasting techniques have a positive correlation with the forecasting horizon.

8.4.3 The qualifications of forecasters (QUA)

As discussed in the fifth chapter, the responsibility for the forecasting process can be determined by qualified and official personnel who prepare and coordinate cash flow estimates in CB decisions. The findings of this study enhanced the role of qualified persons in the forecasting process, particularly the use of forecasting procedures and methods. In terms of the sixth hypothesis, the results of this thesis assert that the presence of qualified persons responsible for preparing cash flow estimates is positively and significantly associated with the use of forecasting procedures and methods. In this regard, the presence of academic qualifications (PhD, MA/MSc and BA/BSc) are significantly associated with the use of forecasting procedures and methods ($p<0.05$ and $p<0.01$). Consistent with the descriptive analysis of this study, 91.3% of respondents in manufacturing and oil firms operating in Libya relied on graduates (BA/BSc) to prepare cash flow estimates of CB decisions. Likewise, Bennouna et al. (2010) found that 50% of qualified persons in Canadian firms held a Master’s degree and 9.7% had other postgraduate qualifications.

Verma et al. (2009, P.13) established that the relationship between the use of CBT and the CEO’s qualification is not significant except for the payback period method, which is significant at the level of p value ($p<0.05$), where 87.5% of CEOs with an MBA often or always used the payback period method in Indian firms. In the same way, Batra and Verma (2014, p.339) examined the impact of CFO education levels on “the level of difficulty of different stages of CB" and found that the education of the CFO is significantly associated with the level of difficulty of the evaluation and selection of investment projects at the level of p value ($p<0.001$). Besides, there is a significant relationship between the education of the CFO and the CFF stage at the level of 10% (Ibid).

8.4.4 The position of forecasters (POS)

In this study, the position of forecasters (POS) represents the role of those responsible for preparing cash flow estimates in CB decisions. With regard to the seventh hypothesis, the results of this study emphasise the importance of the role of official forecasters in the forecasting process. Statistically, the presence of official persons (POS) in manufacturing and oil firms is significantly and positively associated with the use of forecasting procedures and methods ($p<0.001$). In this regard, the accountant, accounting manager and financial directors are significantly correlated with the use of forecasting procedures and methods (p value<0.001). In descriptive analysis, the results of the study are slightly different, whereby 95.7 of respondents in manufacturing and oil companies operating in Libya considered the executive managers (CEO) to be commonly responsible for preparing cash flow estimates in CB decisions, followed by financial directors. In this case, the reason for the CEO indicator not appearing in the PLS path model is due to the identical respondents' answers. As a result, the variance of the CEO indicator is negligible.

Consistent with the results of the prior studies, Pohlman et al. (1988) and Lazaridis (2002, 2006) asserted that in Greek, Cypriot and US firms, one or more of the following personnel prepare and coordinate cash flow estimates in CB decisions: financial analyst, accountant, treasurer, department manager, controller, vice-president and president. Similarly, 52% of respondents confirm that the controller or vice president in American companies is responsible for the forecasting process (Drury, 1990). In this regard, the larger organizations in British industry relied on planning staff in preparation of new forecasts (Simister and Turner, 1973; Wheelwright and Clarke, 1976). Financial staff are more commonly responsible for forecasting the operations relating to budgets and financial plans (Drury, 1990). Indeed, most organizations depend on top management in the supervision and control of the forecasting process (West, 1994). In addition to this, the responsibility for the forecasting process in Canadian firms falls to CEOs (Klassen and Flores, 2001).

8.5 Findings related to the contingency variables affecting the procedures and methods used in forecasting (PMUF)

As discussed in chapters four and five, contingency factors have received wide attention in the management accounting field, particularly in CB research (Pike, 1984, 1986). The principle of contingency theory is that there is no organizational structure or specific system that can be applied in all firms. In empirical literature, this principle is widely applied in the CB research (Afonso and Cunha, 2009; Haka, 1987; Pike, 1984, 1986). According to Otley (1980, p.413), "A contingency theory must identify specific aspects of an accounting system which are associated with certain circumstances and demonstrate an appropriate matching". Accordingly, this thesis has adopted the combined effect of contingent variables on one dependent variable (Otley, 2016).

Evidence from other studies show that there is a wide variety in CB practices and the use of sophisticated techniques amongst organizations (Klammer, 1972; Pike, 1982, 1983; Scapens and Sale, 1981). This variation can be explained by contextual factors related to the circumstances of firm operations (Lawrence and Lorsch, 1967; Inkson et al., 1970; Woodward, 1965), whereby the fit between the organizational structure and corporate context can be interpreted by contingency theory. Accordingly, the CB processes can be analysed as the contingent perspectives. In other words, the adoption of the CB process is a function of the organizations structure, environmental uncertainty, managerial leadership and financial positions (Pike, 1986). In this regard, the contingency theory assumes that the adoption of the CB process or the use of sophisticated appraisal techniques does not necessarily reflect on the high financial performance in an organizations; this orientation requires the fit between the corporate context and the CB process (Pike, 1986).

Consequently, the forecasting procedures and methods "may be influenced by a number of contingent factors" (Smith and Mentzer, 2010, p.149). For example, organizational characteristics (firm size, financial position, type of industry), technology, strategy, organization design, decentralization, information system, rewards structure and environmental uncertainty are some of the contingent variables (Baines and Langfield-Smith, 2003; Haka, 1987; Pike, 1986).

However, the results of this study establish that there is a significant and positive relationship between combined contingent variables and the use of forecasting procedures and methods at the level of p value 0.001 (eighth hypothesis). The contingent variables tested in this study are the firm size, the type of industry, firm strategy and perceived environmental uncertainty. In this regard, the researcher used average of annual sales (AAS), average of investment expenditures (AIE) and number of employees (NEM) to measure the firm size. The findings presented strong evidence that the predictability of cash flow (PEU5), changes in the financial position strategy (PEU3), depending on the feasibility study (SP3), training staff (SP7), firm size (AAS, AIE and NEM) and the type of industry significantly associated with the use of PMUF ($p<0.001$).

The strategic priorities relating to the existing main activity (SP1), supporting investments with high return (SP2) and focusing on general economic considerations (SP4) are slightly significant, at the level of 0.05. In contrast, the predictability of competitors' actions (PEU3) and demand for existing products (PEU4) are insignificant. Likewise, strategic priorities relating to competitive positions (SP5) and the application of flexible manufacturing systems (SP6) are also not significant. Therefore, the SP5 and SP6 were cancelled from PLS path model 6. In comparison with the descriptive statistics of this study, it can be observed that 59% of respondents strongly agree or agree that competitive position (SP5) represents an essential priority in the strategic decisions of manufacturing and oil firms operating in Libya.

Consistent with the results of prior studies, Pike (1984) relied on the application of the contingency model to test six main variables: firm size (net fixed assets), capital intensity, level of risk, type of industry, the sophistication of CB process and financial performance. In this regard, Pike (1984) asserted that there is a statistically significant and positive relationship between firm size, capital intensity, level of risk (1975-79) and the sophistication of CB processes ($p<0.001$ and $p<0.05$).

Pike (1986) improved his previous model (Pike, 1984) to encompass manager's attitude to CB and the firms' financial position (profitability), demonstrating that the firm size, manager's attitude and the level of risk (environmental uncertainty) are significantly and positively associated with the sophistication of CB ($p<0.001$ and $p<0.05$). Conversely, the financial position (profitability ratio) is negatively related to the sophistication of CB; even so, this relationship is significant at the level of 0.05 (Ibid).

In line with the contingency theory, analytical developments in financial and contingency theories primarily contribute to test the effectiveness of discounted cash flow techniques. In this regard, the results of Haka's study (1987) state that the predictability of financial markets and competitors' actions and the decentralization of CB decisions are significantly and positively associated with the effectiveness of discounted cash flow techniques (DCFT) ($p<0.10$). Although environmental diversity and firm strategy are insignificantly related to the use of DCFT, this relationship has a positive coefficient (Ibid). Accordingly, Haka (1987) presented strong evidence that the effectiveness of using DCFT depends on each firm's characteristics.

Afonso and Cunha (2009) established that contingency variables are associated with the use of capital investment appraisal methods (CIAM), whereby the internal and external variables related to the firm's work were tested as the determinants of the use of capital investment appraisal techniques. Contingent variables, such as firm size, environmental uncertainty, competition, strategy and technology play an essential role in whether CBT is used or not (Ibid). Anuar (2005) tested the influence of contingent variables on the extent of use of CBT employing firm-specific contingencies to explain Malaysian firms' decision to use sophisticated or naive CBT. The most notable results were as follows (Ibid):

- The industry type is not significantly associated with the use of capital investment appraisal techniques (CIAT).
- The relationship between the number of employees and the use of CIAT is not significant.
- There is a significant relationship between average annual sales and the use of internal rate of return (IRR). Even though, the overall regression model does not support this relationship.
- The results confirm that the predictability of government regulations and its situation is significantly and positively associated with the use of the NPV method, but there is a negative relationship between the predictability of the exchange rate and the use of the payback period method. Generally, the relationship between perceived environmental uncertainty and the use of NPV is statistically significant.
- The use of discounted cash flow methods (NPV, IRR and PI) is commonly related to the existence of various environmental circumstances surrounding a firm's work, but this relationship is not statistically supported.

- There is no relationship between a firm's strategy and the use of discounted cash flow methods.
- There is no evidence that there is a relationship between reward structure and the use of financial appraisal techniques (FAT).

In line with results related to the use of the sophisticated CBT, Brunzell et al. (2013) asserted that the use of sophisticated CB methods in Scandinavian countries is significantly and positively associated with firm size, but negatively related to the return on assets (ROA). CFOs who have economic qualifications are significantly and positively associated with the use of sophisticated CB methods (Ibid).

The results of previous studies considered environmental uncertainty to be the dominant contingent variable affecting the extent of CB and forecasting methods' usage. This perspective is consistent with the studies in the period of time (1966-1980), whereby the use of CBT is contingent on simulated environments surrounding the organisation's operations (Schall and Sundem, 1980; Sundem, 1975). To summarize the results reported above, Table 8.7 shows the contingent variables addressed by previous studies related to the CB process.

In terms of the forecasting processes in CB decisions, Zotteri and Kalchschmidt (2007) reported that there is a relationship between a firm's size and its forecasting practices. They used the number of employees and annual sales in measuring the firm size. In addition to this, the forecasting processes in Italian companies are contingent upon their competitive strategies, which have a positive correlation with the forecasting horizon (Ibid). Apparently, it can be observed that smaller Italian companies have devoted more attention to adopting the forecasting processes than larger ones (Ibid). In this regard, Pohlman et al. (1988) asserted that the use of multiple forecasting methods in large US firms is significantly associated with higher capital expenditures.

Table 8.7: The contingency variables addressed by previous studies related to the CB process

Variables	*Findings*
Pike (1984), UK	
Independent variables: 1-The degree of sophistication in capital budgeting systems 2- contingency variables: firm size, risk, capital intensity and type of industry Dependent variable: firm performance	1-The sophisticated in CB systems is positively correlated with less profitable organizations. 2- This study indicates that the fit between the corporate content and the design and operation of CB systems leads to higher performance.
Pike (1986), UK	
Independent variables: Contingency variables: firm size, capital intensity, environmental risk, manager style, financial status and control strategy. Mediated variables: Capital budgeting behaviour (formalization, sophistication, complexity and specialization). Dependent variable: the sophistication and effectiveness of CB process.	The findings indicate that firm size is a vital variable in determining the sophistication of capital budgeting process The application of contingency theory in this study is perceived as the main support to reduce any misfit between the context and capital budgeting process. This study indicates that the fit between the corporate content and capital budgeting process can improve the sophistication and effectiveness of capital budgeting.
Haka (1987), USA	
Independent variables: - Internal contingent variables: degree of decentralization, Information system, reward structure, tools and short vs. long term rewards. - External contingent variables: environmental predictability, firm strategy, environmental diversity and organizational stability Dependent variable: Effectiveness of DCFT.	The results stated that environmental uncertainty and centralization are the mitigated factors in the success of utilizing the DCFT.
Afonso and Cunha (2009), Portugal	
Independent variables: External environment (environmental uncertainty), industry, age, size, investment expenditures, competition, production technology and firm's strategy. Dependent variable: the use of capital investment appraisal techniques	The use of the investment appraisal techniques has been affected by the internal and external contingency variables.
Brunzell et al. (2013), Scandinavian countries	
Independent variables: Real option features in investments and CFO and firm characteristics (age and education), Political risk Dependent variable: the use of capital budgeting methods.	The use of the NPV method is related to the firm and CFO characteristics. Specifically, the use of sophisticated capital budgeting methods is significantly and positively related to firm size, but negatively related to ROA. The CFOs having economic qualifications are significantly and positively associated with the use of sophisticated methods.

In a similar vein, Turner and Guilding (2012, p.520) examined the "factors affecting biasing of capital budgeting cash flow forecasts (CBCFFs) in hotels mediated by a management contract"; they observed that highlighting financial factors rather than non-financial factors in CB are significantly associated with increased bias of CBCFFs ($p<0.01$), but this relationship has a negative coefficient. In this regard, non-financial factors are the strategic, political and intuitive factors.

Subsequently, Yenilmez-Dramali (2013) examined the moderating impact of forecasting methods on the relationship between forecasting criteria and export sales forecasting effectiveness, which reflects on a firm's export performance. In this regard, environmental turbulence was addressed as one of the forecasting criteria. Yenilmez-Dramali's (2013) results asserted that there was a positive and significant relationship between environmental turbulence and the effectiveness of export sales forecasting ($p<0.001$). This relationship depends upon the use of forecasting methods by export managers operating in the UK firms (the moderating role of forecasting methods). Similarly, managerial characteristics had a positive and significant impact on export market performance depending on the firm's characteristics (Ibid).

However, Ntim (2009) addressed seven important factors relating to the firm's characteristics: firm size (total assets), capital expenditure, type of industry, sales growth, audit firm size, technology and capital structure which are studied as the control variables. These contingencies (controls) are tested based on their effects on the South African Corporate Governance Index (SACGI) and financial performance (FP). In this case, the Tobin's Q (Q-ratio) and the return on assets (ROA) were used to measure the FP (Ibid). The results of Ntim's study (2009) revealed that the relationship between the SACGI and firm size is statistically significant ($p<0.01$), based both on ROA and Q-ratio, but this relationship has a negative coefficient. Similarly, the SACGI is statistically significant and positively associated with capital expenditure based on ROA at the level of 0.05. In contrast, there is no significant relationship between the SACGI, capital structure and technology based both on ROA and Q-ratio (Ibid), whereas the relationship between the SACGI and sales growth is significant based on Q-ratio (p value<0.05). Ntim (2009, p.343) concluded that:

> *"The observed variability in the levels of compliance with the SACGI can largely be explained by firm size and moderately by industry, where the average large firm complied with 75% of the 50 corporate governance provisions in comparison with 44% by the average small firm".*

In MA literature, many researchers sought to explain why organizations have adopted different management accounting systems. In line with this, contingency theory is the dominant theory used to answer this question (Abdel-Kader and Luther, 2008; Chenhall, 2003; Gerdin, 2005; Gerdin and Greve 2004, 2008; Gordon and Narayanan, 1984; Haldma and Lääts, 2002; Pike, 1984, 1986; Tillema, 2005).

Otley (2016) determined three dominant contingent variables (environmental uncertainty, firm strategy and national culture) to explain why the adoption of management accounting and control systems is different from one firm to another. In dealing with the results of prior MA research applied to the contingency theory, Abdel-Kader and Luther (2008) found that the application of sophisticated MAPs is significantly and positively related to UK firms that have faced highly uncertain environments (P value$<$0.05). In contrast, Al-Sayed and Dugdale (2016) revealed that the adoption of activity-based innovations in the UK manufacturing sector is not affected by perceived environmental uncertainty (PEU).

Ibrahim (2007) emphasised the role of the contingency theory in management accounting systems when the study reported that the level of cognitive and organizational capacity have a significant impact on the extent of use of standard costing systems (SCS) in Syrian manufacturing public companies. In the same way, sophisticated management accounting systems are significantly applied in large firms with powerful customers and implemented the decentralised systems, advanced manufacturing technology (AMT), total quality management (TQM) and just-in-time (JIT) production systems (Jayaram, et al., 2010).

Table 8.8 identifies the contingent variables that can explain why firms use/do not use specific management accounting systems and how the degree of sophistication in MAPs is dependent on specific contingencies that are different from one firm to another.

Most MA researchers concluded that the differences in MA sophistication are significantly explained by firm size, with larger firms adopting more sophisticated MAPs than smaller ones. According to Al-Omiri and Drury (2007), higher levels of sophisticated cost systems are positively associated with the size of an organization and the type of business sector.

Table 8.8: The contingency variables addressed in management accounting research

No	*Author and published year & country*	*Contingent variables*
1	Child (1973) and Inkson et al. (1970), UK.	Size of organisation, qualifications and organisational structures & controls including standardization, documentation, decentralization, specialization and workflow integration.
2	Mintzberg (1979), USA	Organization's age and size, the technical system used and the external environment
3	Govindarajan and Fisher (1990), USA	Size, age and ownership, organizational structure and the external environment.
4	Merchant (1998) and Drury (2012), UK	Organization size, organization structure, organisational culture, management style, industry, external environment, technology, business strategy variables.
5	Chenhall (2003), USA	Environment, technology, organization size, organizational structure, strategy and culture.
6	Al-omiri and Drury (2007), UK	Organization size, intensity of the competitive environment, extent of the use of production technologies and the type of business sector
7	Ibrahim (2007), UK.	Cognitive & organizational capacity and technological requirements.
8	Abbadi (2013), Jordan	Organization size, age, professional competence and sophistication level of operations
9	Guilding et al. (1998), UK	Comparison between New Zealand and the UK revealed no systematic relationship between industry type and budgeting and standard costing practices
10	Abdel-Kader and Luther (2008), UK	Firms' external environment, organizational strategy and structure, size and the nature of production processes
11	King et al. (2010), Australia	Using differentiation and low cost strategy
12	Dalrymple (1987), USA	Organization size, different strategies, environments, capabilities
13	Small (1980), Canada	Organization size, type of industry
14	Peterson (1993), USA	Type of industry
15	Abugalia (2011), Libya	Firm characteristics (age and size and industrial type and ownership), external environment, firm strategy, manufacturing technology (product complexity and customisation), organizational structure (centralisation and formalisation)

8.6 Findings related to the institutional variables affecting the procedures and methods used in forecasting (PMUF)

As discussed in chapters four and five, and analysed in chapter seven, this thesis uses NIS theory to explain the reasons for the adoption of forecasting procedures and methods used by manufacturing and oil companies. NIS can be used to understand why organizational structures and accounting systems employed in similar sectors may be identical (DiMaggio and Powell, 1983; Scott and Meyer, 1994). The adoption of similar structures or systems is known as an "institutionalization process" (Carruthers, 1995). In this regard, institutional isomorphism is considered the most powerful indicator of the diffusion of MAPs in Libyan companies (Leftesi, 2008). The main objective of this section is to debate the main results presented in the previous chapter in order to explain the institutional pressures affecting the procedures and methods used in forecasting future cash flow in CB decisions.

Testing the ninth hypothesis, the results derived from the seventh chapter show that coercive, mimetic and normative pressures (CMNP) have a significant and positive impact on the use of PMUF ($p<0.001$). Government intervention (CP4), international accounting standards (CP5), the Libyan Commercial Code and tax (CP1), the role of Libyan companies (MP1) and multinational and foreign firms (MP2) and chartered accountants (NP2) are the most significant variables at the level of $p<0.001$, and these variables are positively correlated with the use of PMUF. Consistent with the results of the application of the CB process in Libya, Mohammed (2013) revealed that government policies, regulations on the banking sector, personal experience and state development plans are significant factors affecting the CB process in Libyan firms (p-values<0.05). Nevertheless, Libyan firms have not been receiving any benefits from global developments in CB systems/processes reflecting on firms' investment policies and competitors' behaviour (Harris, 2000). This is due to the legacy of the political system in Libya, which was once dominated by socialism.

Comparing these results with the descriptive statistics of this thesis, 99% of respondents in manufacturing and oil firms strongly agree that political instability (CP6) in Libya undermines the use of PMUF. Nevertheless, this variable was eliminated from the PLS path model 7 because of the identical answers of respondents. Therefore, the variance index of CP6 is close to zero. In addition, 29%, 38% and 30% of the respondents strongly agree that Libyan commercial code and tax (CP1), financial constraints/banking system (CP2) and state intervention (CP4), respectively, have an impact on the use of PMUF. In a similar way, 28%, 25% and 26% of respondents in manufacturing and oil firms strongly agree and agree that chartered accountants (NP2), Libyan companies (MP1) and multinational and foreign companies operating in Libya (MP2), respectively, have a direct impact on the use of PMUF. In contrast, only 6% and 7% of respondents in Libyan manufacturing and oil firms strongly agree and agree that international accounting standards (CP4) and Libyan universities, respectively, have an impact on the use of the PMUF.

Most respondents' answers confirmed that coercive, mimetic and normative pressures (CMNP) have little impact on the use of PMUF except for political instability (CP6), which undermines the use of PMUF. Contrary to the contingent variables, the statistical and descriptive analysis of this thesis provided robust evidence that strategic priorities (SP), perceived environmental uncertainty (PEU) and firm size (AAS, AIE and NEM) have crucial impact on the use of forecasting procedures and methods.

Consistent with prior studies, Hussain and Hogue (2002) employed NIS theory to expose the influence of economic conditions and institutional pressures on performance measurement practices (PMPs) in four Japanese banks. To compare between the descriptive results of this thesis and Hussain and Hogue's study (2002), the following aspects can be identified:

- Economic conditions and competition have a high impact on the PMPs.
- In terms of coercive pressures, Japanese Central Bank regulations have a moderate influence on the PMPs. This is compatible with the results of this thesis, which reports that only 38% of Libyan manufacturing and oil firms considered the banking system to influence on the PMUF. On the other hand, socioeconomic-political institutions' pressures have a low impact on the PMPs, whereas political instability (CP6) in Libya has diminished the use of PMUF.
- Financial legislation and international accounting standards (IAS) have no effect on the PMPs. This is similar to the results of this thesis, where only 7% of manufacturing and oil firms in Libya consider international accounting standards to have an impact on the use of forecasting procedures and methods.
- With regard to the normative pressures, the characteristics of Japanese banks and management strategies have played an important role in the performance measurement systems. On the other hand, the influence of top management culture on the systems of banking performance measurement has a moderate effect.
- There is no evidence that copying the best costing and performance measurement systems from other organizations leads to the adoption of the same systems of performance measurement in most Japanese banks. Similarly, the descriptive results of this thesis stated that approximately 25% of manufacturing and oil firms operating in Libya considered local companies (MP1) and the multinational and foreign companies (MP2) operating in Libya to have an impact on the use of forecasting procedures and methods.

Subsequently, Liang et al. (2007) tested the impact of coercive, mimetic and normative pressures (CMNP) on the use of enterprise resource planning (ERP) systems through the ability of top management in assimilating ERP. ERP systems are considered to be a tool of management accounting procedures (Scapens and Jazayeri, 2003). In this regard, Liang et al. (2007) found that government and industrial regulations (coercive pressures) have a significant and positive impact on top management participation in the ERP assimilation process in the US firms ($p<0.05$). In a similar way, Ibrahim (2007) revealed that coercive pressures and perceived legitimacy and self-interest have a significant effect on the extent of use of standard costing systems (SCS) in Syrian manufacturing public companies.

Consistent with the results of this thesis, the influence of Libyan government regulations (commercial and tax law) on the use of forecasting procedures and methods is statistically significant ($P<0.001$) and has a positive relationship with the use of PMUF. Nevertheless, the descriptive results indicate that only 29% of respondents in manufacturing and oil firms consider Libyan government regulations to have an impact on the use of forecasting procedures and methods. In this regard, Mohammed (2013) revealed that Libyan government policies have a significant effect on the capital budgeting process in Libyan firms ($p<0.05$).

In terms of the normative pressures, the adoption of ERP systems by suppliers and customers in the US is statistically significant and has a positive direct relationship with the use of ERP systems at the level of p value<0.05 (Liang et al., 2007). Compared with the results of this thesis, wherein the adoption of forecasting procedures and methods by Libyan universities has a low effect on the use of PMUF in manufacturing and oil firms (7%), but the adoption of PMUF by chartered accountants (NP2) was moderate (28%). Statistically, these relationships are supported at the level of p values ($p<0.001$ and $p>0.01$ respectively).

With regard to the mimetic pressures, the assimilation of ERP systems by US associates (main competitors) is statistically significant and positively related to the use of ERP systems in US firms at the level of p value ($p<0.05$) (Liang et al., 2007). In the same way, the adoption of PMUF by Libyan, multinational and foreign companies has a significant and positive effect on the use of PMUF in the manufacturing and oil firms operating in Liby; even so, only 25% of respondents confirmed this effect (the descriptive analysis).

8.7 Findings related to the financial performance of firms

As discussed in chapter five, this study addressed the relationship between the use of the forecasting procedures and methods, the extent of use of capital budgeting techniques and the financial performance of firms. The investment appraisal process specifies that the capital budgeting decision is based on four main stages: the identification of investment opportunities, development and forecasting future cash flow, evaluation and project selection, implementation and project review (Hall and Millard, 2010). As a consequence, the investment appraisal stage in capital budgeting process depends on the cash flow forecasting stage in selecting the investment projects. For this reason, the tenth hypothesis assumes that the relationship between the use of the forecasting procedures and methods (PMUF) and the firms' financial performance (PERF) is mediated by the extent of use of CBT.

Testing the tenth hypothesis, the results derived from all of the PLS path models mentioned in the previous chapter asserted that the indirect relationship between the use of forecasting procedures and methods and the firms' financial performance (PERF) is slightly positive, but this relationship is not statistically supported (p-value>0.10). Therefore, the assumption of the tenth hypothesis is rejected. Nevertheless, the researcher found that the use of forecasting procedures and methods has a direct and significant impact on the firms' financial performance at the level of p-value ($p<0.05$). Even though, this effect has a negative path coefficient. For more details, the negative relationship between the use of PMUF and firms' financial performance is because most of the Libyan manufacturing and oil companies depend on personal estimates (PUF1) for forecasting future cash flow (70% of Libyan companies applied this procedure). Consequently, the path PUF1->PMUF has a negative path coefficient ranging from -0.644 to -0.685, even though, this path is statistically significant. Subsequently, most of the PMUF indicators are statistically significant at the level of 0.001, except the sales force composite (JM3), which is insignificant in the fifth and seventh PLS path models ($p>0.10$). Table 8.9 shows the direct relationship between the use of forecasting procedures and methods (PMUF) and the firms' financial performance (PERF) for all of the PLS path models (1-7).

Table 8.9: Direct relationship between the use of forecasting procedures and methods (PMUF) and the firms' financial performance (PERF)

PLS path models	*Path*	*PC**	*T statistics*	*P values*
PLS path model 1	PMUF->PERF	-0.172	1.732	0.083
PLS path model 2	PMUF->PERF	-0.176	1.992	0.047
PLS path model 3	PMUF->PERF	-0.184	1.951	0.051
PLS path model 4	PMUF->PERF	-0.179	1.867	0.062
PLS path model 5	PMUF->PERF	-0.176	1.918	0.056
PLS path model 6	PMUF->PERF	-0.182	1.980	0.048
PLS path model 7	PMUF->PERF	-0.178	2.001	0.046

*PC: Path coefficient

In comparison with prior studies, Kalchschmidt et al. (2010) stated that the effect of forecasting techniques on a firm's performance is mediated by the manufacturing layout and process (flexible enablers), where the firm's performance is measured by customer satisfaction and cost efficiency. The results of the study by Kalchschmidt et al. (2010) demonstrated that the use of forecasting techniques has a significant effect on cost efficiency (performance) at the level of p. value ($p<5\%$). Similarly, the relationship between forecasting techniques and customer satisfaction is significantly enhanced ($p<0.05$) through the manufacturing process; while the manufacturing layout is not effective in mediating between forecasting techniques and customer satisfaction. Even though, Kalchschmidt et al. (2010) found that there is a direct relationship between forecasting techniques and customer satisfaction.

On the other hand, Danese and Kalchschmidt (2011a) found that the relationship between forecasting methods and firm performance is not due to forecast error (mediated variable). In a similar way, they revealed that the relationship between forecasting techniques and forecast errors is not significant. This result is consistent with the results of this thesis where the researcher indicated that the mediating role of CBT in the relationship between forecasting techniques and the firms' financial performance is not statistically supported. Even so, the direct relationship is strengthened. Danese and Kalchschmidt (2011a) assert that the use of forecasting techniques has a significant and direct impact on cost and delivery performance at the level of 0.01. This result is compatible with the results of the prior study (Kalchschmidt et al., 2010).

The purpose of using forecasting techniques is to reduce subjective judgments and the effects of asymmetrical information collected from different sources (Makridakis et al., 1998). In any case, the use of sophisticated forecasting methods may not increase forecast accuracy (Dalrymple, 1987; Lawrence et al., 2000; Mentzer and Cox, 1984; Sanders, 1997; Sanders and Manrodt, 1994). Hence, the efficacy of forecasting techniques depends on the fit between the type of techniques adopted and the contextual factors surrounding an organization's operations (Makridakis et al., 1998; Sanders and Manrodt, 2003; Wright et al., 1996).

Consequently, an improved forecast accuracy is required to manage and design an optimal forecasting plan to address forecasting issues, which produces better information for planning future cash flow. Improved forecast accuracy is an essential means for reducing forecast errors that strengthen performance (Enns, 2002; Kalchschmidt et al., 2003; Ritzman and King, 1993;

Zhao and Xie, 2002). Forecast accuracy can be improved by using a combination of forecasting methods, which in turn improves the firm's performance (Armstrong, 1989; Clemen, 1989; Sanders and Ritzman, 2001).

The mediating role of forecast accuracy in the relationship between the forecasting process and firm performance is theoretically important. Even though, forecast accuracy is not the dominant factor, it is instrumental in improving the forecasting process (Barratt and Oliveira, 2001; Småros, 2007).

Furthermore, the eleventh hypothesis tests the direct relationship between the extent of use of CBT and the firms' financial performance. The findings of this thesis confirmed that there is a slightly positive relationship between the extent of use of CBT and firms' financial performance (PERF), but this relationship is not statistically supported (p value>10%). Table 8.10 shows the insignificant direct relationship between the extent of use of CBT and the firms' financial performance (PERF).

Table 8.10: Direct relationship between the extent of use of capital budgeting techniques (CBT) and the firms' financial performance (PERF)

PLS path models	*Path*	*PC**	*T statistics*	*P values*
PLS path models 1	CBT->PERF	0.163	1.327	0.185
PLS path models 2	CBT->PERF	0.158	1.270	0.205
PLS path models 3	CBT->PERF	0.164	1.242	0.214
PLS path models 4	CBT->PERF	0.161	1.241	0.215
PLS path models 5	CBT->PERF	0.159	1.230	0.219
PLS path models 6	CBT->PERF	0.159	1.248	0.213
PLS path models 7	CBT -> PERF	0.160	1.313	0.190

*PC: Path coefficient

Consistent with previous studies, Klammer (1973) found that the use of sophisticated CBT is negatively correlated with performance (PERF). This is similar to the findings indicating that there is no evidence that sophistication in CB processes leads to higher levels of performance (Farragher et al., 2001; Pike, 1984, 1986). Irungu (2014) asserted that the relationship between the use of CBT and financial performance of firms listed in Nairobi is not significant. In line with these results, achieving the best performance is not necessarily linked with the use of sophisticated CBT (Alzoubi and Alazawi, 2010; Jakovicka et al., 2003).

On the other hand, these results can be changed because the use of CBT is contingent on structural and contextual factors, such as firm size, uncertainty and the CFFP (Klammer, 1973). Based on the financial theory, the use of sophisticated CBT leads to an improvement in firm performance (Copeland and Weston 1988). To support this orientation, senior finance executives have confidence in the uses of sophisticated CBT, which plays an important role in improving the effectiveness of large investment projects (Pike, 1988). As a consequence, the fit between the CB process and structural and contextual factors may lead to better performance (Klammer, 1973; Pike, 1984, 1986). In this regard, Haka (1987) tested the fit between the contingent variables and the effectiveness of using the discounted cash flow techniques (DCFT) and concluded that the use of DCFT leads to an improvement in firm performance. In line with this argument, the predictability of financial markets, competitive actions and decentralization system have a significant effect and a positive association with the effectiveness of using the DCFT at the level of 10% (Ibid). Likewise, the reward structure, tools and the short-term vs. long-term reward system have a significant impact on the effectiveness of using the DCFT ($p<0.05$ and $p<0.10$), but this effect has a negative coefficient (Ibid).

Consistent with these results, Pike (1989) provided robust support that the use of sophisticated investment appraisal techniques leads to an improvement in the effectiveness of CB. The results of Pike's study reported that the use of DCFT, risk appraisal methods and operations research techniques has a positive coefficient on the effectiveness of CB ($0.186<$ path coefficient <0.325). Conversely, the use of payback period and accounting rate of return has a negative coefficient on the effectiveness of CB (Ibid). Similarly, the results of this thesis state that the use of the accounting rate of return method has an insignificant link with the CBT construct and a weak coefficient (p value>0.10 and PC <0.10). While the use of the payback period method is significantly associated with the CBT construct ($p<0.10$), but this relationship has a negative path coefficient.

Several studies are related to measuring firm performance when utilizing the CB process. Rubinstein (1973) and Haka (1987) used firms' market returns to measure performance utilizing the discounted cash flow techniques (DCFT), where the effectiveness of DCFT was measured by comparing the firm's returns of "using DCFT and non-DCFT" (Haka, 1987, p.42). In the same way, Klammer (1973) and Pike (1984, 1986) utilized the operating rate of return (ORR) to measure the financial performance of US and UK firms using CBT. Proponents of this approach consider that ROI is not a reliable measure of a firm's ability to reward its shareholders (Bernstein, 1993), because its use depends on traditional income concepts, such as investment expenditures and net income. Therefore, the appropriate alternative is ORR, which equals the operating profit divided by total operating assets. It is supported by previous studies (Klammer, 1973; Pike 1984, 1986).

Kim (1981) used operating cash flow instead of operating profit. Operational cash flow is defined as "income after taxes, but before financing expenses, depreciation and non-recurring items and operating assets are defined as tangible assets" (Jakovicka et al., 2003, p. 40). According to Pike (1984, 1986), the average operating rate of return (AORR) is applied to measure the performance of firms using the CB processes; they examined the influence of the degree of sophistication in the CB process and contingency variables on corporate performance.

However, the results from this thesis offer strong evidence that the average operating rate of return (AORR) is the best ratio compared to return on sales (EB..AAS) and return on investment (EB..AIE) ratios. Table 8.11 presents the significance of profitability ratios used to measure firms' financial performance (PERF) when manufacturing and oil firms adopt CBT.

Table 8.11: The significance of AORR, EB..AAS and EB..AIE ratios used to measure the PERF

Path / model 1:	*Path coefficient*	*T statistics*	*P values*
AORR -> PERF	0.755	8.328	0.000
EB..AAS -> PERF	0.228	2.043	0.041
EB..AIE -> PERF	0.209	1.701	0.089
Path/ model 2:			
AORR -> PERF	0.773	9.298	0.000
EB..AAS -> PERF	0.258	2.698	0.007
EB..AIE -> PERF	0.142	1.466	0.143
Path / model 3:			
AORR -> PERF	0.771	9.432	0.000
EB..AAS -> PERF	0.262	2.592	0.010
EB..AIE -> PERF	0.141	1.461	0.144
Path / model 4:			
AORR -> PERF	0.770	9.548	0.000
EB..AAS -> PERF	0.261	2.588	0.010
EB..AIE -> PERF	0.143	1.494	0.135
Path / model 5:			
AORR -> PERF	0.770	10.022	0.000
EB..AAS -> PERF	0.259	2.714	0.007
EB..AIE -> PERF	0.145	1.470	0.142
Path / model 6:			
AORR -> PERF	0.773	10.063	0.000
EB..AAS -> PERF	0.260	2.756	0.006
EB..AIE -> PERF	0.139	1.531	0.126
Path / model 7:			
AORR -> PERF	0.771	9.509	0.000
EB..AAS -> PERF	0.260	2.618	0.009
EB..AIE -> PERF	0.142	1.438	0.151

It can be seen from table 8.11 that the results of this thesis generally corroborate the findings of previous studies. In terms of using the AORR to measure the PERF, this thesis confirms that the AORR is strongly significant ($p<0.001$) and has a positive coefficient on the PERF construct ($PC>0.70$). The AORR is ranked as the best ratio followed by the return on sales (EB..AAS). This result is consistent with the findings of prior studies (Klammer, 1973; Pike, 1984, 1986). On the other hand, this thesis asserts that the return on investment expenditures (EB..AIE) is not appropriate to use in measuring the financial performance of firms. As shown in table 8.11, most PLS path models (except PLS path model 1) demonstrate that the relationship between the EB..AIE (ROI) indicator and PERF is insignificant ($p>0.10$) and has a weak coefficient on the PERF construct ($PC<0.20$). Accordingly, the use of ROI based on the traditional concept of profitability may not be an appropriate method to fit with the views held by firm's shareholders and owners (Bernstein, 1993). That is required to maintain their available resources for making decisions on the basis of cash flow rather than on an accrual basis.

This thesis uses earnings before interest, taxes, depreciation and amortization (EBITDA) as a control variable, which is considered the most important factor directly affecting the profitability ratios. The results provide robust evidence that EBITDA is statistically significant and has a positive coefficient on the PERF. Table 8.12 shows the significant relationship between the EBITDA and firms' financial performance (PERF).

Table 8.12: The significance of relationship between the EBITDA and PERF

PLS path models	*Path coefficient*	*T statistics*	*P values*
PLS path model 1	0.808	16.985	0.000
PLS path model 2	0.812	16.984	0.000
PLS path model 3	0.811	16.532	0.000
PLS path model 4	0.808	16.596	0.000
PLS path model 5	0.807	16.204	0.000
PLS path model 6	0.811	16.798	0.000
PLS path model 7	0.809	17.227	0.000

Consistent with the previous studies as mentioned in chapter five, firm size, type of industry and financial statements and ratios are commonly used as control variables (Ntim, 2009).

8.8 Chapter summary.

This chapter discussed the findings of this thesis with respect to the results of prior studies. The researcher sought to achieve six main objectives. Firstly, this thesis aims to describe the CBT and the CFFP, particularly forecasting procedures and methods. It was found that 70% of manufacturing and oil companies operating in Libya depend on personal estimates for forecasting future cash flow generated by investment projects. In addition, the management's subjective estimates (the executives' opinions) were commonly used in most firms. Most Cypriot, Greek and Libyan firms paid little attention to quantitative methods used in forecasting, such as mathematical models. In comparison, approximately 50% of US firms used sophisticated mathematical techniques to forecast future cash flow (Pohlman et al., 1988).

In terms of the use of financial appraisal techniques, most Libyan manufacturing and oil companies used the PB and ARR as their main criteria for evaluating and selecting investment projects. On the other hand, discounted cash flow methods (NPV, IRR and PI) are the dominant methods used in the US, UK, Canada, Netherlands and Sweden. Nevertheless, some UK, Australian and Dutch firms applied the PB in their investment decisions (Hermes et al., 2007; Holmen and Pramborg, 2009; Pike, 1996; Truong et al. 2008). Similarly, Nigerian and Sudanese firms utilized the PB method in CB decisions, whereas South African companies focused on the NPV and IRR as the preferred methods used in the investment appraisal process. Observably, there is no consistent evidence for a universally preferred method. Each company can use the specific appraisal method according to the environmental circumstances surrounding the company's work. Therefore, contingency theory is the appropriate theory to explain why CB processes may differ from company to another.

With regard to risk appraisal techniques, most Libyan companies used subjective assessment to assess the project risk inherent in the CB decisions. In contrast, shortening the PB period, sensitivity analysis, scenario analysis and risk-adjusted discount rate techniques were perceived to be more common in UK, US and Canadian firms than in Libyan firms. Subsequently, most Libyan companies did not use the operations research techniques (MAP, DT and PERT/CPT) in CB decisions, whereas one-third of US firms employed the decision trees (DT), program evaluation and review technique (PERT) and critical path analysis (CPA) in investment decisions. In empirical literature, it can be observed that mathematical programming techniques are applied according to specific environmental conditions, such as financial constraints on the available funds, known as the capital rationing problems in CB (Bhaskar, 1978; Benjamin, 1985; Keown and Taylor, 1980; Khan, 2008).

Secondly, the researcher sought to compare the findings of this thesis and prior studies in terms of the forecasting process, understood as the procedures and methods used in forecasting. The first three hypotheses relate to the forecasting process. Testing the first hypothesis, the findings provided strong evidence that the use of forecasting procedures and methods (PMUF) are significantly and positively associated with financial, marketing and production factors (FMPF). This thesis established that the borrowing of funds, tax consideration and administrative expenses are significantly associated with the use of forecasting procedures and methods ($p<0.01$ and $p<0.001$), followed by direct manufacturing costs, overhead and research and development expenses, which are positively correlated with the use of forecasting procedures and methods ($p<0.10$ and $p<0.01$).

Consistent with the results of the previous studies, sales forecast and direct manufacturing costs are the highest important factors relating to the forecasting process, although the sales forecast indicator was shown in the PLS path model 1 with weak coefficient, because the respondents' answers are identical. Similarly, US, Cypriot, Greek and Libyan firms have paid more attention to working capital requirements in the forecasting process (69%, 61%, 72% and 88% respectively).

In the second hypothesis, the statistical results of this thesis emphasized that the use of forecasting procedures and methods is positively associated with the extent of use of CBT (significant at $p<0.01$). Consistent with the results of previous studies, the researcher found that most previous studies have only focused on the forecasting stage of CB, and the relationship between the CFFP and the evaluation stage of CB (the extent of use of CBT) was not examined by Pohlman et al. (1988) and Lazaridis (2002, 2006). This thesis is therefore a unique study, exploring this relationship to establish whether the forecasting procedures and methods should be associated with the investment appraisal techniques. Furthermore, with regard to the third hypothesis, the results of this study provided evidence that financial, marketing and production factors (FMPF) are significantly and positively associated with the extent of use of CBT. No previous studies have addressed the relationship between financial, marketing and production factors and the extent of use of CBT. The factors associated with the forecasting procedures and methods were addressed to determine the data sources, forecasting horizon and the qualifications and position of forecasters, who are responsible for preparing cash flow estimates.

Upon testing the fourth hypothesis, the researcher discovered that the use of multiple data sources in forecasting is significantly and positively associated with the use of forecasting procedures and methods (significant at $p<0.001$). In descriptive analysis, this thesis revealed that firm's departments (DS_1), suppliers (DS_2) and the customers' sales plans (DS_3) are used as the main sources in forecasting future cash flow in CB decisions made by the manufacturing and oil companies operating in Libya (61%, 59% and 51% respectively). DS_2 and DS_3 are not statistically supported, therefore, these variables are not encompassed in the PLS path model. Statistically, the firms' departments (DS_1), university research centres (DS_4) and chartered accountants (DS_5) are significant sources used in the forecasting processes implemented by manufacturing and oil companies operating in Libya ($p<0.001$, $p<0.10$ and $p<0.05$ respectively). In contrast to prior studies, the information collected from the suppliers and the sales plans are commonly used in the forecasting process (Danese and Kalchschmidt, 2011a; Wotruba and Thurlow, 1976). Moreover, 20.3% of manufacturing and oil firms operating in Libya used information collected by foreign consultants and companies (DS_6) to forecast future cash flow in CB decisions. Even so, the DS_6 is not statistically significant ($p>0.10$).

Assessing the fifth hypothesis, the length of the forecasting horizon is positively associated with the use of the forecasting procedures and methods (PMUF). In line with this result, only long term (6-10 years) and extensive term (over 11 years) forecasts are significant at the level of p values ($p<0.01$ and $p<0.001$, respectively). In descriptive statistics, the lower period of forecasting horizon (1-5 years) is often or always used by most of the manufacturing and oil firms operating in Libya (94%). Similarly, the lower period of forecasting horizon (1-5 years) is a familiar period used in firms operating in highly competitive markets (Winklhofer et al., 1996; McHugh and Sparkes, 1983). The length of the forecasting horizon used in calculating the cash flow of investment projects should generally be more than 10 years (Pohlman et al., 1988).

With regard to the sixth hypothesis, the results of this study state that the use of the forecasting procedures and methods is strongly associated with academic qualifications (PhD, MA/MSc and BA/BSc qualifications) at the level of P values ($p<0.05$ and $p<0.01$). In terms of the responsibility for preparing cash flow estimates, the majority of manufacturing and oil firms operating in Libya depended on personnel with BA/BSc, whereas 50% of such decision makers in Canadian firms held Master's degrees (Bennouna et al., 2010).

Moreover, the results of this study highlighted the role of official persons in the forecasting process. Testing the seventh hypothesis, the researcher found that Libyan manufacturing and oil firms have an accountant, accounting manager and financial director significantly associated with the use of forecasting procedures and methods (p value<0.001). Compared with the descriptive analysis, 95.7% of respondents in manufacturing and oil companies operating in Libya considered executive managers (CEO) to be commonly responsible for preparing cash flow estimates in CB decisions, followed by financial directors (CFO). Even though, the executive managers is not significantly associated with the use of forecasting procedures and methods ($p>0.10$). In line with previous studies, most organizations depended on top management (vice president and CEOs) in the supervision and control of the forecasting process (Drury, 1990; Klassen and Flores, 2001; West, 1994).

Studies on the role of contingency theory in explaining the differences in the CB processes have attracted much interest (Afonso and Cunha, 2009; Drury, 2012; Haka, 1987; Pike, 1984, 1986). This thesis adopted the combined effect of contingent variables on the use of the forecasting procedures and methods in the CB process. With regard to the eighth hypothesis, the results of this study confirmed that combined contingent variables have a positive and significant impact on the use of forecasting procedures and methods at the level of 0.001. The contingency variables tested in this thesis are the firm size (AAS, AIE and NEM), the type of industry, firm strategy and perceived environmental uncertainty.

Statistically, firm size (AAS, AIE and NEM) is strongly associated with the use of forecasting procedures and methods. Consistent with the previous studies, it can be observed that the forecasting process is commonly affected by a firm's size, the size of capital expenditures and environmental turbulence (Pohlman et al., 1988; Yenilmez-Dramali, 2013; Zotteri and Kalchschmidt, 2007). However, previous studies did not specifically survey the relationship between the use of forecasting procedures and methods and the contingency variables, although a number of studies addressed the influence of the contingent variables on the CB process (Afonso and Cunha, 2009; Brunzell et al., 2013; Haka, 1987; Pike, 1984, 1986).

Pike (1984, 1986) revealed that firm size, capital intensity and project risk have a significant impact on the sophistication of the CB process. In this regard, the researcher found that the influence of the contingent variables differs from one organization to another. This depends on the fit between the design of the CB process and corporate content. To support this, the results derived from the multi-group analysis provided strong evidence that contingency theory is the appropriate theory to be applied in capital budgeting research, where the relationship between the use of forecasting procedures and methods and the contingency variables are significantly different from public to private companies. Nevertheless, the PLS multi-group analysis exposed opposite result in terms of the manufacturing and oil companies.

The findings related to the influence of institutional variables on the use of forecasting procedures and methods was tested in the ninth hypothesis. The results reported that the coercive, mimetic and normative pressures (CMNP) have a significant and positive impact on the use of the forecasting procedures and methods at the level of P value ($p<0.001$). In line with this result, the researcher confirmed that Government intervention (CP4), international accounting standards (CP5), Libyan companies (MP1) and chartered accountants (NP2) played an important role in the adoption of forecasting procedures and methods concerning CB decisions. In comparison with the descriptive analysis, most of the coercive, mimetic and normative pressures (CMNP) have a little impact on the use of PMUF except political instability (CP6), which was cited by 99% of respondents as undermining the use of PMUF. Even so, the influence of political instability on the PMUF is not statistically supported.

Consistent with the results of previous studies, the application of CB processes in Libyan firms is significantly affected by government policies, banking sector regulations, personal experience and state development plans at the level of p<5% (Mohammed, 2013). Similarly, Hussain and Hogue (2002) established that Japanese Central Bank regulations have a moderate influence on performance measurement practices (PMPs). This is comparable with the results of this thesis, where only 38% of Libyan manufacturing and oil firms considered the banking system to have an effect on the use of PMUF. On the other hand, financial legislation and international accounting standards (IAS) have no effect on performance measurement practices (Ibid). This is similar to the results of this thesis, where only 7% of manufacturing and oil firms operating in Libya consider international accounting standards to have an impact on the use of forecasting procedures and methods.

However, no previous study has addressed the influence of coercive, mimetic and normative pressures (CMNP) on the use of forecasting procedures and methods in CB decisions. Most studies focused on the relationship between institutional variables and changes in MAPs/MA systems. As a result, the CFFP in CB requires further research.

Lastly, findings related to the firms' financial performance (PERF) have been studied in two different directions. First, the indirect relationship between forecasting procedures and methods and the firms' financial performance (PERF) mediated by the extent of use of CBT was tested in the tenth hypothesis. Then, the direct relationship between the extent of use of CBT and the firms' financial performance (PERF) was examined as well in the eleventh hypothesis.

In terms of the tenth hypothesis, the results of this thesis provide evidence that the indirect relationship between the use of forecasting procedures and methods and a firms' financial performance (PERF) is not statistically significant (p>0.10), but the path coefficient "PMUF->CBT->PERF" is slightly positive (PC<0.10). Although the direct relationship between the use of PMUF and PERF is significant, the coefficient on the PERF is consistently negative.

In comparison with prior studies, Kalchschmidt et al. (2010) stated that the effect of forecasting techniques on firm performance is mediated by the manufacturing layout and process (flexible enablers). Financial theory regarding the investment appraisal process specifies that the appraisal stage of CB depends on the forecasting process to evaluate the investment opportunities. For this reason, the tenth hypothesis assumes that the influence of the use of forecasting procedures and methods on the firms' financial performance (PERF) is mediated by the extent of use of CBT. Danese and Kalchschmidt (2011a) confirmed that forecasting techniques have a statistically significant correlation and direct relationship with cost and delivery performance.

With regard to the eleventh hypothesis, the findings of this thesis state that the extent of use of CBT has slightly positive association with the firms' financial performance (PERF), but this relationship is not statistically supported (p value>10%). Consistent with the results of previous studies, it can be observed that there is no evidence that the use of sophisticated CBT leads to higher levels of performance (Farragher et al., 2001; Klammer, 1973; Pike, 1984, 1986). Similarly, Irungu (2014) asserted that the use of CBT in Nairobi listed firms has no significant impact on financial performance. Indeed, based on the financial theory, the use of sophisticated CBT leads to an improvement in firm performance (Copeland and Weston 1988). In line with this, the fit between the CB process and the structural and contextual factors may lead to better performance (Klammer, 1973; Pike 1984, 1986). In this regard, Haka (1987) tested the fit between the contingent variables and the effectiveness of using discounted cash flow techniques (DCFT); the results of Haka's study (1987) proved that the use of DCFT leads to an improvement in financial performance.

However, the results of this thesis provide strong evidence that ORR is an appropriate ratio to measure the financial performance of firms using the forecasting procedures and methods and the capital budgeting techniques. In line with this result, the ORR was commonly used in capital budgeting research (Klummer, 1973; Pike, 1984, 1986). The following chapter presents a summary of the research findings, contributions, practical implications and limitations of this study.

9 CHAPTER NINE: CONCLUSIONS

9.1 Introduction.

This final chapter presents the conclusions of the research presented in this thesis. It addresses five main objectives. Firstly, it summarises the research findings, focusing on the results deriving from the testing of the main research hypotheses. Secondly, the potential contributions of the study are outlined and which involve several conclusions related to forecasting and CB processes. The theoretical and logical reasons for conducting this study are also discussed. Thirdly, the practical implications of the research findings are outlined. It is argued the research has useful implications for financial directors, accountants, analysts and academicians. Fourthly, the limitations of the study will be considered with respect to data collection, statistical analysis techniques, and the research findings. Finally, suggestions and recommendations for further research are proposed with regard to forecasting processes and CB research.

9.2 Summary of research findings

This section summarises the results obtained from this study within the scope of its theoretical approach and the results of the statistical analysis, which can be divided into both descriptive and applied results.

Firstly, the descriptive results specify a description of the forecasting procedures and methods and the CBT practiced in manufacturing and oil companies operating in Libya. In terms of the forecasting procedures and methods, the researcher indicated that most Libyan manufacturing and oil companies used personal estimates to forecast future cash flow. Also, the subjective estimates of management personnel (the executives' opinions) were commonly used in most firms. Regarding the extent of use of CBT, most Libyan manufacturing and oil companies used the PB and ARR as the main techniques for evaluating and selecting investment opportunities. Otherwise, a combination of discounted and non-discounted cash flow techniques is used by Libyan manufacturing and oil companies. Additionally, most Libyan companies rely on subjective methods in evaluating the project risk affecting their CB decisions. There is little interest in the use of operations research techniques; only 7%, 8.7% and 10% of Libyan manufacturing and oil companies use MAP, DT and PERT/CPT (respectively) in their CB decisions. It is evident that no specific appraisal technique can be applied universally among all manufacturing and oil companies, because the choice of technique to be adopted will be affected by environmental circumstances surrounding the company's work. Therefore, the contingency theory is appropriate for explaining why forecasting methods and CBT may differ from one company to another.

Secondly, the statistical results from this thesis present strong evidence that there is a significant relationship between: the forecasting procedures and methods, factors related to forecasting process, contingent and institutional variables, CBT, and firms' financial performance. In respect of this, the first three hypotheses of this thesis relate to forecasting processes. Upon testing the first hypothesis, the results provided strong evidence that the financial, marketing, and production factors (FMPF) are significantly and positively associated with the use of forecasting procedures and methods. The borrowing of funds, tax considerations, and administrative expenses are all significantly associated with the use of forecasting procedures and methods ($p<0.01$ and $p<0.001$), followed by direct manufacturing costs, overheads, and research and development expenses, which are all positively correlated with forecasting procedures and methods ($p<0.10$ and $p<0.01$).

Regarding the second hypothesis, the statistical results produced in this thesis suggest that the use of forecasting procedures and methods is positively associated with the extent of use of CBT (significant at $p<0.01$). In testing the third hypothesis, this thesis found evidence that financial, marketing and production factors (FMPF) are significantly and positively associated with the extent of use of CBT.

In respect of the factors relating to the forecasting process, the use of multiple data sources in forecasting is significantly and positively associated with the use of forecasting procedures and methods. This result supports the fourth hypothesis of this research. This thesis also revealed that firms' departments (DS_1), suppliers (DS_2) and customer sales plans (DS3) are commonly used to forecast cash flow generated by investment projects in manufacturing and oil companies operating in Libya. However, DS2 and DS3 are not statistically supported, and are not accounted for in the PLS path model 2. Moreover, 20.3% of manufacturing and oil companies operating in Libya depend on foreign consultants and companies (DS_6) to forecast future cash flow in CB decisions. Even so, DS_6 is not statistically supported ($p>0.10$).

In assessing the fifth hypothesis, the forecasting horizon is positively associated with the use of forecasting procedures and methods. Statistically, only long term (6-10 years) and extensive term (over 11 years) forecasts are significant at the level of p values ($p<0.01$ and $p<0.001$, respectively). The lower forecasting horizon period (1-5 years) is either often, or always used by most manufacturing and oil companies operating in Libya (94%), but this indicator (FH1) is not statistically significant.

In terms of the sixth hypothesis, the results of this study stated that the presence of qualified persons possessing a PhD, MA/MSc and BA/BSc is significantly associated with the use of forecasting procedures and methods. Testing the seventh hypothesis, this thesis reported that the use of forecasting procedures and methods is significantly associated with the presence of accountants, accounting managers and financial directors in Libyan manufacturing and oil companies ($p<0.001$). In comparison with the descriptive analysis, executive managers (i.e. CEOs) are commonly responsible for preparing the cash flow estimates used in CB decisions made by top management in manufacturing and oil companies operating in Libya (95.7%). However, this indicator (CEO) is not statistically significant.

With regard to the eighth hypothesis, this study found that the firm's contingent variables have a positive impact on the use of forecasting procedures and methods at the level of 0.001. The contingent variables tested in this study include the firm size (AAS, AIE and NEM), the type of industry, firm strategy, and perceived environmental uncertainty. Findings revealed that the influence of the contingent variables differs between the public and private sectors. In terms of multi-group analysis, the results of this thesis stated that the relationship between the contingency variables (CV) and the use of forecasting procedures and methods (PMUF) is significantly stronger for public companies than for private ones. Conversely, there are no significant differences between the manufacturing and oil companies in accordance with the eighth hypothesis.

In testing the ninth hypothesis, results reported that the use of forecasting procedures and methods is significantly affected by coercive, mimetic and normative pressures (CMNP). Statistical findings revealed that Government intervention (CP4), international accounting standards (CP5), Libyan companies (MP1) and chartered accountants (NP2) have all played an important role in the adoption of forecasting procedures and methods when addressing CB decisions. In comparison with the descriptive analysis, most coercive, mimetic and normative pressures (CMNP) have little impact on the use of forecasting procedures and methods, with the exception of political instability. In this case, 99% of respondents in manufacturing and oil companies stated that political instability (CP6) in Libya undermines the use of PMUF. Even so, the influence of political instability on the use of forecasting procedures and methods is not statistically supported. Moreover, the results from multi-group analysis confirmed that the influence of CMNP on the extent to which forecasting procedures and methods (FPM) are used is not significantly stronger in public companies than in private ones. Furthermore, the descriptive results illustrated that international accounting standards have little impact on the use of forecasting procedures and methods in Libyan manufacturing and oil companies (7%).

Testing the tenth hypothesis, the results revealed that the indirect relationship between the use of forecasting procedures and methods and the firms' financial performance (PERF) is not statistically significant ($p>0.10$), but the path coefficient "PMUF->CBT->PERF" is slightly positive ($PC<0.10$). In this regard, it is certain that the direct relationship between the use of PMUF and PERF is significant; even so the coefficient on the PERF is consistently negative.

Regarding the eleventh hypothesis, this thesis found that the extent of use of CBT is slightly associated with firms' financial performance (PERF). However, this relationship is not statistically supported because the p value is above 10%. This is consistent with findings from previous studies, which found no evidence that the use of sophisticated CBT leads to high levels of performance (Klammer, 1973; Farragher et al., 2001; Pike, 1984, 1986).

Overall, the results of this thesis provide strong evidence that the ORR is an appropriate measure of firms' financial performance as a factor in determining the effectiveness of their CB decision process.

9.3 Contributions of the study

As discussed in chapters one and five, the researcher provides theoretical and logical reasons for conducting this thesis. Most previous studies focused on the evaluation and selection stage in the capital budgeting process, whereas the cash flow forecasting stage has received less attention (Turner and Guilding, 2012). No prior studies examined the impact of cash flow forecasting processes on capital budgeting decisions, especially the relationship between the use of forecasting procedures and methods and the extent of use of CBT. Furthermore, no previous study has addressed the influence of contingent and institutional variables on the procedures and methods used in forecasting future cash flow generated by investment projects. In the Libyan context, no other study has been found, which examines the key factors that influence the cash flow forecasting process, such as data sources, forecasting horizon, and the educational qualifications and positions of forecasters. This study seeks to address this gap in empirical literature.

This thesis has made a number of contributions to existing knowledge. For instance, this is the first study to focus on the second and third stages of the capital budgeting process (cash flow forecasting and appraisal stages) in a developing country context (i.e. Libya). Therefore, this thesis is certainly a unique study in having explored the relationship between the forecasting process and the use of capital budgeting techniques in such circumstances. This research confirms that investment appraisal techniques are part of the capital budgeting process, not vice versa, and that Libyan manufacturing and oil companies use such forecasting procedures and methods, and capital budgeting techniques.

The theoretical framework developed in this study identifies the factors related to cash flow forecasting in the capital budgeting process and presents a causal model to analyse interrelated elements of the independent, mediated and dependent variables. It also addresses the specific variables related to the cash flow forecasting process in capital budgeting decisions. Contingency and institutional theoretical perspectives have been applied to explain the reasons for adopting forecasting procedures and methods, which, in turn, may reflect upon firms' financial performances.

Regarding statistical techniques, the PLS-SEM used in this study is a sophisticated multivariate technique of great repute in business research. Using the PLS multi-group analysis, the results of the study reported that the relationship between the use of forecasting procedures and methods and the contingency variables differs significantly between public and private companies. This provides strong evidence that contingency theory is appropriate for application in capital budgeting research.

9.4 Practical implications

In line with the contributions and findings of the study, this study has practical implications in improving the ability of financial directors, accountants, analysts and academicians to build effective capital budgets based on optimal plans of future cash flow forecasts. Additionally, this study also provides useful information about cash flow forecasting processes that can be used as a practical guide for decision makers in Libyan firms. Moreover, the results derived from the reliability and validity of assessment provided strong evidence that most of the indicators used to measure the research variables are reliable and valid. This enables the researcher to generalize the findings of the study.

The results from the multi-group analysis present strong evidence that contingency theory is appropriate for use in capital budgeting research. The research findings present important criteria for regulators and the Libyan government authorities to reconsider previous investment projects, which do not pursue optimal options, and which have resulted in the cessation of production in several factories between 2000 and 2010 (PIB, 2012). Hence, the forecasting process is the main consideration when evaluating investment projects and the Libyan government authorities must account for the key criteria and factors related to the cash flow forecasting process when making capital budgeting decisions.

The benefits gained from this thesis will assist financial directors in exploring the circumstances affecting the investment appraisal process in order to select effective appraisal techniques. In other words, the benefits gained from using specific appraisal techniques, such as discounted cash flow methods (DCFM), might be affected by the firm's characteristics as well as contextual factors, such as firm size, strategic priorities, industry type, environmental uncertainty, and the factors related to the CFFP.

This study improves the ability of Libyan financial directors in cash flow forecasting. This means that financial directors in Libyan manufacturing and oil companies can improve their ability to predict future cash flow by using advanced forecasting methods, especially considering the importance of accurately estimating future cash flow as being the determinant factor in capital budgeting decisions. Using sophisticated capital budgeting and forecasting techniques can help decision makers in Libyan manufacturing and oil companies to survive in the global competitive market.

9.5 Limitations

The main aim of this thesis is to establish the role of cash flow forecasting processes in capital budgeting decisions. It also identifies important factors related to the forecasting process.

Moreover, this study aims to investigate the impact of forecasting processes on the firms' financial performance in different circumstances.

Respondents included financial directors and other officials who participate in preparing the capital budgeting process in manufacturing and oil companies operating in Libya. Other personnel have had different perspectives, and indeed these top management personnel may have delegated the practical responsibilities of budgeting to other staff members. Furthermore, the manufacturing and oil companies chosen as the target population, does not reflect the potential diversity of firms operating in Libya, including joint ventures operating in the same field. Moreover, only two foreign firms participated, both of which were affiliated to the NOC.

In addition to the lack of diversity in the sample, methodological limitations were significant due to the extraordinary political instability in Libya during the time of fieldwork (because of the ongoing conflict since 2011). Thus, the sample size is relatively small due to being confined to safe areas of the country that were functioning with a degree of normality. The reasonable procedures used in data collection have been carried out based on the safe districts and the reasons for using convenience sampling were discussed in detail. Moreover, the researcher determined the relevant years of data collection as being 2008, 2009 and 2010, as this was period for which information was available. Hence, the civil war in the eastern and southern areas of Libya did not affect the study's findings. This geographical limitation did not prevent the researcher from accessing the key industrial areas of Libya, which are located in the north of the country, particularly in Tripolitania and its surroundings.

Subsequently, the data collected in this survey used a cross-sectional approach and the relationships among the research variables were formulated based on causal and conceptual models. Furthermore, investment appraisal techniques were used synonymously with capital budgeting techniques. The researcher deals only with variables related to cash flow forecasting and the investment appraisal process in capital budgeting decisions. An alternative methodology could have analysed other areas or issues in greater depth. Furthermore, while this study explored forecasting procedures and methods, and investment appraisal techniques implemented by Libyan industrial companies, it did not seek to evaluate their effectiveness.

PLS-SEM was selected for good reasons (Hair et al., 2014; Lowry and Gaskin, 2014), but alternative modelling might have illuminated alternative areas of interest. The PLS multi-group analysis (PLS-MGA) is employed for the relationship between the use of forecasting procedures and methods and the contingent and institutional variables in PLS path models 6 and 7. Besides, the PLS-MGA allows for a defined range of other groups when the researcher focuses on a comparison between research variables. In this study, the researcher used PLS-MGA to reveal that the use of forecasting procedures and techniques is significantly different between public and private companies, in accordance with the eighth and ninth hypotheses, as well as to test the differences between manufacturing and oil companies in accordance with the contingency variables.

However, the risks associated with the cash flow forecasting process have not been addressed in this research, as this is a different topic of the forecasting process. This would shed light on directions for further research in the cash flow forecasting field.

9.6 Further research and recommendations

As discussed in chapters five and eight, this is a pioneering study in adopting the second and third stages of the CB process, particularly the cash flow forecasting and evaluation and selection of investment projects, in a developing country such as Libya. Most studies focus on the methods used in appraising investment opportunities, whereas the CFFP in CB has received less attention (Turner and Guilding, 2012).

In terms of CB problems, Wilkes (1977) referred to three areas of investment problems: those related to investment proposals and cash flow, those associated with the evaluation and selection of investment projects, and those concerned with providing available funds to be allocated in capital budgets. Nevertheless, McIntosh (1990) argues that the main problem in organizational systems is in how to forecast future cash flow generated by investment opportunities. Similarly, Krishnan and Largay (2000) stated that cash flow information is a useful indicator in appraising investment projects.

Subsequently, this study aimed to ascertain the role of the CFFP in CB decisions. Hence, the researcher formulated the primary research question: To what extent can the CFFP play an important role in CB? To attain its main aim, this study sought to identify the procedures and methods used in forecasting. The forecasting process begins with identifying the procedures and methods used in forecasting and concludes by estimating the components of cash flow or the cash flow information. As discussed in chapters five and eight, the factors related to CFF practices in CB decisions have not been studied sufficiently. In terms of the factors affecting the criteria for selecting investment opportunities, it is evident that CFF is a substantial determinant for selecting and evaluating investment projects “for all firms and has the highest impact on large and new firms” (Devereux, 1990, p.138). Moreover, forecasting variables are perceived to be more important factors in affecting firms’ performance (Danese & Kalchschmidt, 2011a, 2011b and Lapide, 2002).

In fact, the role of the CFFP in CB has not attracted great interest in management accounting research. Based on the potential contributions and implications of this study, it can be argued that the findings of the study have opened up several avenues for further research to test other contextual factors affecting forecasting and CB processes, including:

- Are there differences between the use of discounted cash flow techniques and the forecasting methods based on industry type and investment?
- Do sensitivity and scenario analyses, and risk-adjusted discount rate techniques used in assessing the risk associated with an investment project have a direct effect on improving the firm performance?
- Do operations’ research techniques play an important role in solving the capital rationing problem in capital budgeting decisions, which, in turn, may have an effect on improving the firm performance?
- Do investment ethics require more detailed analyses about cash flow estimates to account for multiple data resources?
- What are the available data resources for use in forecasting future cash flow generated by investment projects?
- Does the diversity of data sources lead to the use of multiple capital budgeting and forecasting techniques?
- What are the appropriate criteria used in evaluating the forecast accuracy of future cash flow estimates generated by investment projects?

Overall, various topics related to the CFF and CB, which are highlighted by this thesis, are worthy of further case studies, including the CFFP to reinforce the findings of this study and attempt to close the theory-practice gap. Following the results of this thesis, it is evident that a number of possible relations among research variables were not incorporated in the research hypotheses. Even so, this study’s results permit researchers to test the following relationships:

1. The relationship between the PMUF and CBT as mediated by FMPF. This refers to the mediating role of the components of cash flow (FMPF)[10] in influencing the relationship between the procedures and methods used in forecasting (PMUF), and the use of the capital budgeting techniques (CBT).
2. The relationship between the data sources (DS) used in forecasting, and the use of CBT is mediated by PMUF.
3. The relationship between the forecasting horizon (FH) and the use of CBT is mediated by PMUF.
4. The relationship between the qualifications of forecasters (QUA) and the use of CBT is mediated by PMUF.
5. The relationship between the positions of forecasters (POS) and the use of CBT is mediated by PMUF.
6. The relationship between the contingent variables (CV) and the use of CBT is mediated by the use of forecasting procedures and methods (PMUF).
7. The relationship between coercive, mimetic and normative pressures (CMNP) and the use of CBT is mediated by the use of forecasting procedures and methods.
8. There is a direct relationship between the procedures and methods used in forecasting (PMUF) and firm performance (PERF).
9. The EBITDA ratio may be used as an effective measure of firm performance (PERF).

Table 9.1 shows the significant and insignificant relationships among the research variables not incorporated in the research hypotheses, in more detail. All of the following have the potential for more detailed study.

[10] FMPF: Financial, marketing and production factors.

Table 9.1: Significant and insignificant relationships among the research variables not in hypotheses

The relationships among research variables	*Path*	*PC**	*T statistics*	*P values*
The indirect relationship between the PMUF and CBT (Path model 1).	PMUF->FMPF->CBT	0.268	3.703	0.000
The indirect relationship between the DS and CBT (Path model 2).	DS->PMUF->CBT	0.344	6.209	0.000
The indirect relationship between the FH and CBT (Path model 3).	FH->PMUF->CBT	0.214	2.865	0.004
The indirect relationship between the POS and CBT (Path model 5).	POS->PMUF->CBT	0.342	4.779	0.000
The indirect relationship between the QUA and CBT (Path model 4).	QUA->PMUF->CBT	0.295	3.960	0.000
The indirect relationship between the CV and CBT (Path model 6).	CV->PMUF->CBT	0.453	6.147	0.000
The indirect relationship between the CMNP and CBT (Path model 7).	CMNP->PMUF->CBT	0.360	6.335	0.000
The direct relationship between the PMUF and PERF (Path model 2)	PMUF->PERF	-0.176	1.992	0.047
The impact of EBITDA (control variable) on PERF (Path model 2).	EBITDA->PERF	0.808	16.985	0.000
The indirect relationship between the FMPF and PERF (Path model 1).	FMPF->CBT->PERF	0.072	1.156	0.248
The indirect relationship between the DS and PERF (Path model 2).	DS->PMUF->PERF	-0.046	0.954	0.340
The indirect relationship between the FH and PERF (Path model 3).	FH->PMUF->PERF	-0.029	0.931	0.352
The indirect relationship between the QUA and PERF (Path model 4).	QUA->PMUF-> PERF	-0.039	0.934	0.350
The indirect relationship between the QUA and PERF (Path model 5).	POS->PMUF->PERF	-0.046	0.914	0.361
The indirect relationship between the CV and PERF (Path model 6).	CV->PMUF->PERF	-0.065	1.054	0.292
The indirect relationship between the CMNP and PERF (Path model 7).	CMNP->PMUF-> PERF	-0.048	0.912	0.362

In Libya, the CFFP in CB decisions is still a new concept and its application is not widespread, even though most manufacturing and oil companies use the PB and ARR methods in their CB decisions. Conversely, the use of DCF, risk analysis and operations research techniques is negligible among Libyan firms. No research has sought to understand why Libyan firms prefer to use specific techniques when appraising their investment opportunities. In addition, the results of this study confirm that Libyan government regulations have little impact on the forecasting process. Only 29% of Libyan manufacturing and oil companies consider that the Libyan Commercial Code and tax system have an impact on the forecasting process, and most manufacturing and oil companies consider that international accounting standards have not affected the procedures and methods used in forecasting (PMUF).

Accordingly, the Libyan government decision-makers should carefully consider the forecasting procedures and methods when Libyan firms and investors prepare feasibility studies for their investments. In doing so, the Libyan government should apply the "CB process as a key management control mechanism" (Seward, 2003, p.255). Moreover, Libyan analysts and practitioners responsible for preparing feasibility studies should pay increased attention to the factors affecting the CFF stage, upon which the use of investment appraisal methods depends.

The case studies conducted in CB research can improve the ability of practitioners and academicians to apply advanced techniques in CB decisions. In line with this study, there is only one case study applied in the Libyan oil sector (specifically Ras Lanuf Oil and Gas processing Company, a subsidiary of the NOC), which provides strong evidence that it is possible to apply mathematical programming techniques effectively, while under capital rationing constraints in CB decisions made by Libyan decision makers (Alsharif, 2004). Based on the potential contributions and implications of this study, it can be asserted that this study has opened new avenues for further research. Therefore, the researcher suggests that other researchers in the Libyan business environment should investigate the following issues:

- The major hindrances to the application of discounted cash flow methods.
- The evaluation of the procedures and methods used in forecasting future cash flow generated by investment projects in Libya.
- Cash flow forecasting errors are the primary cause in the collapse of several industrial projects.
- The assessment of investment project risk based on the sensitivity analysis of future cash flow (case study).
- The extent to which operations research techniques can be applied in investment decisions made by Libyan decision makers.

To sum up, the use of sophisticated forecasting techniques can improve strategic policies for planning and monitoring future cash flow generated by investment projects. Therefore, the use of forecasting and CB techniques should be combined with firms' strategic policies and other contextual factors to improve financial performance. According to Danese and Kalchschmidt (2011a), the effectiveness of different forecasting techniques in improving forecast accuracy depends on contextual factors. Therefore, future research must consider the potential influence of possible contingent factors upon the forecasting and CB processes. This study tested and hypothesized the combination of four key contingent variables which include firm size (AAS, AIE and NEM), strategic priorities (SP), perceived environmental uncertainty (PEU) and industry type (IND). In Libya, further research that accounts for the following contingencies is required:

- The degree of centralisation in capital budgeting decision.
- Information systems.
- Reward structure.
- Organizational stability.
- Manufacturing technology (the degree of product complexity and product design technologies).
- Managerial characteristics (leadership and managerial behaviour).
- Corporate culture.

9.7 Concluding remarks

The main aim of the study is to establish the role of cash flow forecasting process in CB. This thesis examined forecasting process variables and their relationship with the extent of use of CBT. Institutional and contingency theory were applied in this research to explain the similarities and differences between forecasting procedures and methods. In this regard, the results of this thesis are consistent with the principles of contingency theory, which indicates that the use of forecasting procedures and methods differs from one firm to another, and in accordance with ownership structure. In support of this, the thesis found that the influence of contingency variables (CV) on the use of forecasting procedures and methods is significantly stronger in public companies than in private ones. However, this result was not supported when institutional variables were considered. On the other hand, there are no significant differences between manufacturing and oil companies in accordance with the relationship between the CV and the use of PMUF. Overall, the results of the study emphasised the importance of CFF in CB. Specifically, the role of procedures and methods used in forecasting the components of future cash flow is significant. The study's findings asserted a strong relationship between forecasting procedures and methods, and the extent of use of CBT.

As has been discussed in the contributions and practical implications of this study, the results of this study provide important financial information to decision makers, financial directors, accountants, researchers, analysts and investors. The study's useful implications are contextualised with regards to the study's limitations. The suggestions and recommendations for further research address various issues, such as forecasting procedures and methods, diversity of data sources used in forecasting, criteria used for evaluating the forecasting processes, and the influence of forecast accuracy on performance and CBT.

APPENDICES:

Appendix A: Questionnaire Covering Letter

Dear Participant, Dated on 15/09/2015

I am a PhD candidate at the University of Huddersfield, UK. This questionnaire is part of my doctoral research project. The main aim of this research is to establish the role of CFF in CB. The forecasting process starts with specifying the procedures and methods used in forecasting and ends by estimating the components of cash flow. Specifically, this study examines the influence of factors related to the firm characteristics, legislation, government regulations, educational and professional organizations and local and foreign firms on the forecasting procedures and methods used in manufacturing and oil companies operating in Libya. In addition, this study investigates the effect of the forecasting process on firms' performance through the use of CBT.

Please attempt to answer all the questions and make any additional comments using the provided space or additional sheets if necessary. As well you can pass the questionnaire to the appropriate colleague/person within your company. Moreover, you have a right to withdraw from this survey at any time until the collected data is analysed. We confirm that the collected data will be used for purely academic purposes.

Thank you very much for participating in this survey.

Please do not hesitate to contact us if you require any further clarification.
Yours sincerely,

Ali Alsharif
Ph.D Candidate
Mobile: 00447806810480
E-mail: U1071205@hud.ac.uk
Professor Collins Ntim, main supervisor. E-mail: c.ntim@hud.ac.uk
Mr Wayne Fiddler, co-supervisor. E-mail: w.fiddler@hud.ac.uk
University of Huddersfield Business School
Huddersfield, West Yorkshire, UK

Appendix B: Research Questionnaire

[This questionnaire is filled by the persons who prepare/participate/supervise the investment appraisal process or capital budgeting].

Section A: General information about the respondents:

Please tick [✓] all relevant answers (1-4,7): Professional Qualification

1. Job title and position: [ ] Executive director [ ] Chief financial officer [ ] Other.............
2. Qualification: [ ] PhD [ ] MA/MSc [ ]BA/BSc [ ]Other……………………….
3. Area of study: [ ] Accounting [ ] Management [ ] Finance [ ] Economy
[ ] Other (please specify)……………………
4. Experience: [ ]1-5 year [ ]6-10 years [ ]11-15 years [ ]Over16 years
5. What is the name of your company (optional)? ……………………………………….
6. What is the value of your company's capital (optional)?..............................Libyan dinar
7. Age of your company: Pease tick [✓] the relevant answer (Numbers in years).
[ ]1-5 [ ]6-10 [ ]11-15 [ ]16-20 [ ]over 21years.

Section B: Firm's characteristics:

Firm[11] size, type of manufacturing, firm ownership, strategic priorities of firm and environmental predictability.

B1. Firm size: Please tick [✓] the relevant answers:

B1.1 The average annual sales over the recent three years (Numbers in Million Libyan Dinar):

[ ]0-<200TLD [ ]200TLD-<1MLD [ ]1-<5MLD [ ]5-<10MLD [ ]10-<20MLD
[ ]20-<40MLD [ ]40-<80MLD [ ]80-<160MLD [ ]160-<320MLD
[ ]320-<640MLD [ ]Over 640 MLD

* TLD: Thousands of Libyan Dinar MLD: Millions of Libyan Dinar **<:** refers to Less than

B1.2 The approximate number of employees of your company over the recent three years*:

[ ] Less than 100 [ ] 100-<200 [ ] 200-<400 [ ] 400-< 800 [ ] 800-<1600
[ ] 1600-<3200 [ ] Over 3200

*The recent three years are 2008, 2009, 2010 which should be compatible with the years as it will be mentioned in the question No. C5.1

B2: Type of industry: Please tick [✓] the relevant answer.

1	Food production & beverages.		5	Cement & building materials	
2	Sponge, plastic & chemical industries		6	Textiles, paper &furniture	
3	Metal, steel and iron industries		7	Petrochemical, oil & gas & marketing oil	
4	Engineering & electronic industries		8	Other:..........................	

B3: Type of ownership: please tick [✓] the relevant answers

1	Private company (100% owned)	
2	State company (100% owned)	
3	Foreign company (100% owned)	
4	Joint venture (shared between the state and a foreign partner). [ ] Please specify the percentage of state-owned.….%	
5	Joint venture (shared between the private sector and a foreign partner). [ ] Please specify the percentage of private sector …..%	
6	Joint venture (shared between the state and private sector). [ ] Please specify the percentage of state-owned ....%	
7	Joint venture (shared between the state, foreign and private sectors). [ ] Please specify the percentage of state-owned ....%	

[11]In this questionnaire, the term "**firm**" is often used in the same way as a synonym of company.

B4. Strategic priorities: Please circle the appropriate answer related to the following strategic priorities, which have been conducted by the top management in your company over the recent three years:

Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5

No	Strategic priorities:					
1	The firm's strategy aims to protect the existing main activity which may be exposed to the risk of plant or project shut down.	1	2	3	4	5
2	The firm's strategy has a strong tendency to the investments associated with high return	1	2	3	4	5
3	The firm's strategy depends on the feasibility study for making the investment decisions	1	2	3	4	5
4	The firm's strategy towards the industrial future depends on the general economic considerations linked to the state.	1	2	3	4	5
5	The firm's strategy aims to improve market share and competitive position rather than to maximize short-term profit.	1	2	3	4	5
6	The firm's strategy relies on flexible manufacturing system rather than automated systems.	1	2	3	4	5
7	The firm's strategy is based on the training of human resources for planning and evaluating the investment projects.	1	2	3	4	5

B5. Perceived environmental uncertainty: This part of a questionnaire relates to the perceived environmental uncertainty in terms of environmental predictability. Using the 5-point scale below, please circle the number that refers to the extent to which the predictability of the environmental conditions surrounding your company over the recent three years:

Never Predictable 1	Rarely 2	Sometimes 3	Often 4	Always Predictable 5

No	**Perceived environmental uncertainty:**					
1	Actions of the primary suppliers of raw materials	1	2	3	4	5
2	Competitors' actions.	1	2	3	4	5
3	Changes in financial position of your company.	1	2	3	4	5
4	Demand for existing products.	1	2	3	4	5
5	Expected cash flow generated by the investment expenditures.	1	2	3	4	5

Section C. Capital budgeting process:

C1. The type and number of investment projects:

Please tick [√] the relevant answer to indicate the type and number of investment projects implemented by your company over the recent three years and please specify the year of implementation:

No	Type of Investment project	√	No.	Year of implementation
1	New investment projects (new plant / production line)			
2	Renewal and development of existing project.			
3	Expansion of existing capacity.			
4	Replacement of equipment			
5	Change in production or activity			
6	Cases of non-regular maintenance			

C2. The available sources used in financing the investment projects

Please tick [√] the available sources used in financing the investment projects as mentioned above:

No	The sources used in financing the investment projects.	√
1	Self-Funding	
2	Government Bodies	
3	Foreign Investor	
4	Banks	
5	Shares	

C3. The average of investment expenditures:
Please tick [√] the relevant answer to indicate the approximate investment expenditures for projects as mentioned in **C1**:

The investment expenditures (Numbers in Millions of Libyan dinars): [ ]0-<200TLD [ ]200TLD-<1MLD [ ]1-<5MLD [ ]5-<10MLD [ ]10-<20MLD [ ]20-<40MLD [ ]40-<80MLD [ ]80-<160MLD [ ]160-<320MLD [ ]320-<640MLD [ ]Over 640 MLD

* TLD: Thousands of Libyan Dinar. MLD: Millions of Libyan Dinar * **<:** means Less than

C4. Capital budgeting techniques used in your company over the recent 3 years (Ref: the assistant guide): The capital budgeting techniques consist of financial & risk appraisal techniques and the operations research techniques used over the recent three years. Please tick [√] all relevant answers to indicate the capital budgeting techniques used by your company, and if your company uses more than one appraisal technique; please, **circle** the appropriate number to indicate the appraisal techniques often used according to their importance or priorities. For example, number 5 refers to an essential priority, and 4 refers to high priority and so on, 3, 2, 1.

Not priority	Low priority	Moderate priority	High priority	An essential priority
1	2	3	4	5

No	The appraisal techniques used in capital budgeting:	√					
No	**Financial appraisal techniques:**		**Ranking1,2...5**				
1	Payback period (PB).		1	2	3	4	5
2	Accounting rate of return (ARR)		1	2	3	4	5
3	Net present value (NPV).		1	2	3	4	5
4	Profitability index (PI)=1+[NPV ÷ initial investment cost].		1	2	3	4	5
5	Internal rate of return (IRR).		1	2	3	4	5
No	**Risk appraisal techniques**		**Ranking1,2...5**				
1	Subjective Assessment		1	2	3	4	5
2	Cost-Volume-Profit (CVP) Analysis		1	2	3	4	5
3	Sensitivity analysis.		1	2	3	4	5
4	Scenario Analysis		1	2	3	4	5
5	Shorten the PB period		1	2	3	4	5
6	Raise the discount rate.		1	2	3	4	5
No	**Operations research techniques:**		**Ranking1,2...5**				
1	Mathematical Programming		1	2	3	4	5
2	Decision Theory		1	2	3	4	5
3	Program evaluation and review technique & Critical path analysis		1	2	3	4	5

C5: The effectiveness (performance) of capital budgeting*: To determine the effectiveness of capital budgeting, this depends on the operating profits (**EBITDA**), total operating assets, the years used in calculating the EBITDA:

C5.1 Determine the actual working years used in the calculation of EBITDA: Please tick [√] the recent three years in the on-going operations of your company: **[ ]** 2008, 2009, 2010 **[ ]** Otherwise: Please specify:………., ………….., …………
C5.2 Earnings before interest, taxes, depreciation and amortization (EBITDA): Please tick [√] in front of the average of the EBITDA indicator/statement over the recent three years* as mentioned in Q5.1: **[ ]** Unacceptable **[ ]** Very weak **[ ]** Weak [ ] Below the average [ ] Moderate **[ ]**Acceptable **[ ]** Desirable **[ ]** High **[ ]** Very high
C5.3 Total Operating Assets (total current & fixed assets which create the operating profits): Please tick [√] the relevant answer to indicate the average total operating assets over the recent three years* as mentioned in Q5.1: [ ]200TLD-<1MLD [ ]1-<5MLD [ ]5-<10MLD [ ]10-<20MLD [ ]20-<40MLD [ ]40-<80MLD [ ]80-160MLD [ ]160-<320MLD [ ]320-<640MLD [ ]640-<1280MLD [ ]Over1280MLD

* TLD= Thousands of Libyan Dinar. * MLD= Millions of Libyan Dinar. *The recent three years are 2008, 2009, 2010.

C5.4 The Operating rate of return (**ORR**)=the value of EBITDA/Total value of operating assets: Please tick [√] in front of the approximate percentage of the average operating rate of return (ORR) for the years mentioned in the C5.1: [ ] Less than 1% [ ] 1-5% [ ] 6-10% [ ]11-15% [ ] 16-20% [ ] 21-25% [ ] 26-30% [ ] 31-35% [ ] Over 36%

Section D: The Institutional factors:

D1. The influence of legislation and political situation on capital budgeting process over the recent three years in Libya; using the scale below ranged from 1 to 5, Please circle the appropriate number for each statement:

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

No	The influence of legislation & the political situation on the adoption of capital budgeting process in Libya	Forecasting procedures & methods (PMUF)					Capital Budgeting techniques "CBT"				
1	Commercial code and taxation system in Libya require our firm to use the PMUF & CBT.	1	2	3	4	5	1	2	3	4	5
2	The influence of financial constraints (Banking law) on financing requires our firm to use the PMUF & CBT	1	2	3	4	5	1	2	3	4	5
3	The system used in the privatization of state-owned firms requires our firm to use PMUF & CBT	1	2	3	4	5	1	2	3	4	5
4	The intervention of the Libyan Government in determining the size of capital budgeting requires our firm to use the PMUF & CBT	1	2	3	4	5	1	2	3	4	5
5	The adoption of international accounting standards (IAS) requires our firm to use the PMUF & CBT.	1	2	3	4	5	1	2	3	4	5
6	The political instability in Libya undermines / diminishes the use of the PMUF & CBT.	1	2	3	4	5	1	2	3	4	5

D2. The influence of the educational, professional, local and foreign organisations on the adoption of the capital budgeting process

Using the scale below; **Please circle** the appropriate number for each statement:

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

No	The adoption of the capital budgeting process (CBP) by the educational, professional, local and foreign organisations:	Forecasting procedures & methods (PMUF)					Capital Budgeting techniques "CBT"				
	The influence of educational system and professional organisations on the adoption of PMUF & CBT.										
1	The education system in Libyan universities has a direct impact on the selection and use of PMUF & CBT.	1	2	3	4	5	1	2	3	4	5
2	The adoption of capital budgeting process by the Libyan chartered accountants has a direct impact on the selection and use of PMUF & CBT	1	2	3	4	5	1	2	3	4	5
	The influence of the local and foreign organisations on the adoption of PMUF & CBT.										
3	The adoption of the capital budget process by Libyan companies has a direct impact on the selection and use of PMUF & CBT	1	2	3	4	5	1	2	3	4	5
4	The adoption of the capital budget process by multinational and foreign companies has a direct impact on the selection and use of PMUF & CBT	1	2	3	4	5	1	2	3	4	5

Section E: Cash flow forecasting process (Ref: the assistant guide):

E1. Data sources used in cash flow forecasting in capital budgeting decisions over the recent three years: Using the scale below, please circle the data sources used in cash flow forecasting process:

Never Used	Rarely used	Sometimes used	Often used	Always used
1	2	3	4	5

1- Firm's departments.	1	2	3	4	5
2- The suppliers of raw materials, equipment and machinery.	1	2	3	4	5
3- Customers' sales plans.	1	2	3	4	5
4- University research centres.	1	2	3	4	5
5- Local analysts (Chartered Accountants).	1	2	3	4	5
6- Foreign consultants and companies.					
7- Other:........................	1	2	3	4	5

E2. Forecasting horizon:

Using the scale below, please circle the appropriate number to indicate the period often used in the cash flow forecasting process in capital budgeting decision over the recent three years:

Never Used	Rarely used	Sometimes used	Often used	Always used
1	2	3	4	5

Forecasting horizon (period):					
1-5 years	1	2	3	4	5
6-10 years	1	2	3	4	5
Over 11 years	1	2	3	4	5

E3. The financial, marketing and production factors:

Using the scale below, please circle the appropriate number, which refers to the extent of association of the financial, marketing and production factors with the cash flow forecasting process and the evaluation of investment projects (capital budget process) over the recent three years:

No	Not Associated	Slightly Associated	Moderately Associated	Significantly Associated	Considerably Associated
	1	2	3	4	5

No	Factor					
	Financial factors:					
1	Borrowing & repayment of funds.	1	2	3	4	5
2	Foreign Exchange Rate.	1	2	3	4	5
3	Tax considerations					
4	Working capital requirements	1	2	3	4	5
5	Impact of investment expenditures on firm's liquidity	1	2	3	4	5
6	Administrative expenses.	1	2	3	4	5
7	Other:	1	2	3	4	5
No	**Marketing factors:**					
1	Sales or revenues forecast.	1	2	3	4	5
2	Selling expenses	1	2	3	4	5
3	Competitive and promotional expenses	1	2	3	4	5
4	Other:					
No	**Production/operational factors:**					
1	Direct manufacturing costs or direct operating expenses.	1	2	3	4	5
2	Manufacturing overhead expenses	1	2	3	4	5
3	Research and development expenses	1	2	3	4	5
4	Depreciation costs	1	2	3	4	5
5	Other:..	1	2	3	4	5

E4. Preparing the cash flow forecasting process (Forecasters):

Please tick [√] all the relevant answers to indicate the qualifications & positions of forecasters who are responsible for preparing and supervising the cash flow estimates over the recent three years:

E4.1 The qualifications of forecasters	[√]	**E4.2** The positions of forecasters.	[√]
Ph.D.		An accountant	
MA/MSc		Accounting manager	
BA/BSc		Financial director	
Other (please specify):…………......		Executive manager	
………………………………………………		Vice-president or president	
		Chartered Accountant	
		Others:....................	

E4.3 The total number of forecasters

In order to specify the total number of forecasters (persons) who prepare/supervise the cash flow estimates over the recent three years; please select [√] one of these options:

[ ]1-3 forecasters [ ]4-6 forecasters [ ]7-9 forecasters [ ]More than 10 forecasters

E5. The procedures and methods used in forecasting:

There are several procedures and methods applied in forecasting the future cash flow generated by investment projects in capital budgeting decisions; these procedures often start with personal estimates and end with using the computer technology (software).

Using the scale below, please circle the appropriate number to indicate the following procedures and methods used in forecasting future cash flow in your company over the recent three years*:

Never Used	Rarely used	Sometimes used	Often used	Always used
1	2	3	4	5

Forecasting procedures and methods used in forecasting the cash flow:						
<u>Procedures used in forecasting:</u>						
1	Personal estimates	1	2	3	4	5
2	Standard procedures for estimating the items of cash flow	1	2	3	4	5
3	Official forms or worksheets used to collect the cash flow data.	1	2	3	4	5
<u>Judgmental methods:</u>						
1	Top Managers' Judgments (Executive's opinions).	1	2	3	4	5
2	Delphi method (Panel of experts' opinions).	1	2	3	4	5
3	Sales force composite	1	2	3	4	5
<u>Quantitative methods</u>						
1	Time-Series models (simple and weighted moving average models).	1	2	3	4	5
2	Regression analysis models (simple and multiple regression models)	1	2	3	4	5
<u>A Software package used in forecasting:</u>						
1	Software developed by your company	1	2	3	4	5
2	Commercial software packages (e.g. Excel).	1	2	3	4	5

*The recent three years are 2008, 2009, 2010 which should be compatible with the years as mentioned in C5.1

Additional comments: (Please use this space for any comments you wish to make).

………

If you would like to have a copy of the aggregated results of this survey, you can contact the University of Huddersfield as the address below:

Business School
The University of Huddersfield
Queensgate, Huddersfield, HD1 3DH, West Yorkshire, UK
Ali Alsharif.
E-mail: u10712052@hud.ac.uk
Mobile: 0044780681048

Appendix C: Assistant Guide for Respondents

Section (A): General information about respondents and the firms in which they work.

Section (B): Firm characteristics: includes the firm size, the type of industry and ownership, strategic priorities and the environmental uncertainty. These items are clear and based on approximate digital information; in addition, the section depends on the firm policy and strategy.

Section (C): CB is the process for planning and control of investment expenditure. This section focuses on the investment appraisal process. In this section, the research questions in the questionnaire are identified as:

C1. Type and number of investment projects: Specify the investment projects implemented in your companies. Where you can, choose more than one item and determine the years of implementation (2008, 2009 and 2010 or other, please specify).

C2. Specify the sources used in financing the investment projects; you can choose more than one source.

C3. The approximate value of investment expenditures for the implemented projects over the last three years: You choose only one answer from the multiple options.

C4: The investment appraisal techniques:

C4.1: The financial appraisal techniques:

C4.1.1 The payback period (PB).

The payback period (PB) is considered as a period of time required for recovering the funds invested in a project (Peterson and Fabozzi, 2002; Gitman and Zutter, 2012); PB can be calculated from the traditional net profits or cash flow generated by the project. In textbooks, the PB equation can be formulated in its traditional form, as follows:

$$\textbf{PB period} = \frac{\text{The required investment costs}}{\text{Net annual cash flow of the Project*}}$$

* Firms can use the net annual profits instead of cash flow

In this case, the calculation is conducted depending on the assumption of equal annual cash flow and regularity of its flow. In contrast, in the case of irregular cash flow, the payback period is calculated by the cumulative method. PB is extensively used by multinational companies to appraise the feasibility of their investments, particularly projects with high risk.

For more details, the PB criterion is used to compare between the investment opportunities based on the investment, which is quickly recoverable; this model is considered as a line of defence for reserve against risks. Therefore, the PB is preferred to use as a complement to other models, such as ARR, NPV and IRR.

C4.1.2 The accounting rate of return (ARR)

This method is called the rate of return on investment, which is used to evaluate investment opportunities; it is consistent with the conventional accounting concepts of income and investment. Therefore, it can be calculated the ARR by using the accounting measures for the traditional net income as follows:

$$\textbf{ARR} = \frac{\text{The average of annual net profits}}{\text{The initial investment*}}$$

*The initial investment or required investment costs

On the other hand, the discounted cash flow techniques consist of the following methods:

- Net present value (NPV)
- Profitability index (PI)
- Internal Rate of Return (IRR)

These methods are based on the discounted cash flow generated by the investment projects and the desirable discount rate is usually referred to the cost of capital in the case of the capital invested by the owners or the cost of financing in the case of borrowing. These methods take into account the time value of money.

C4.1.3 Net present value (NPV)

This method is based on the concept of the time value of money; the net present value method is the direct application of the concept of present value, which is determined by the following steps:

1) Choose the expected interest rate (discount rate desirable).

2) Calculate the present value of the expected profits generated by the investment.

3) Calculate the present value of the required investment costs.

The calculation of the NPV method starts with finding the present value of expected cash flow generated by the investment and discounting these flows based on a specific rate (e.g. Cost of capital) and then discount the initial investment costs. Mathematically, the NPV model can be formulated by the following equation (Weston& Brigham, 1993):

$$\text{NPV} = \sum_{t=0}^{n} \frac{F_t}{(1+R)^t} - I_0$$

Where:
Ft= Net cash flow in year t
n= Number of years that represent the expected economic life of the project
n= 0, 1, 2, 3 ...,t year
R= The cost of capital (discount rate)
I0= Initial investment costs occurred in the established year (0)

In businesses, the NPV method is used as a criterion for accepting or rejecting the investment opportunities where it is accepted the investment that achieves a positive NPV. In this regard, the project that achieves the greatest net present value is ranked in the first, followed by the project that achieves the second-largest NPV and so on.

In the case of multiple investment projects and the existence of conflicting projects (motley), it can be arranged based on the project obtaining the greatest net present value being ranked the first, followed by the project that achieves the second-largest net present value and so on.

The NPV method is a conservative approach which assumes that the cash flow generated by the investment project can be reinvested using the rate of return, which is similar to the discount rate used in appraising the investment projects. It represents the minimum rate of return that should not be less than the return of any desired project.

C4.1.4: Profitability Index (PI)

The NPV method considers that the project is economically feasible if the difference between the current value of the net cash flow and the invested amount is positive, regardless of the differences in value and the ratio relative to the invested amount; therefore, NPV is a failure to select the optimal investment projects. This deficiency is not clear when the assessor evaluates only one project or in the process of trade-offs between different investment alternatives required an equal investment amounts, but this shortcoming appears when the trade-offs between the different alternatives require different investment amounts. The comparison between the net present value of a specific alternative and other alternative proposals makes us choose an alternative achieving a lower return relative to the invested amount based on the net present value criterion. Out of this shortage, the use of profitability index provides a solution in case of trade-offs of investment alternatives required different investment amounts; the profitability index (PI) equals the present value of cash inflows divided by the initial investment costs. Subsequently, the PI model can be formulated as follows (Weston& Brigham, 1993):

$$PI = \sum_{t=0}^{n} \frac{F_t}{(1+R)^t} / I_0$$

OR: $PI = 1 + [NPV \div I_0]$

C4.1.5 Internal rate of return (IRR)

IRR is defined as the rate that makes the present value of expected net cash flow of the investment equal to the current value of the initial investment costs required for this project; in other words, IRR is the interest rate that makes the net present value of the investment equal to zero. The aim of this method is to maximize the owners' wealth during the productive life of the investment project. In literature, the calculation of IRR can be implemented as the following steps:

- Estimate the net annual cash flow during the productive life of the project.
- Determine the initial investment costs
- Calculate the "IRR" rate that makes the net present value of the project equal to zero; as below.

$$\sum_{t=0}^{n} \frac{F_t}{(1+IRR)^t} - I_0 = 0$$

In general, Weston and Brigham (1993) offered more detail about the differences between NPV and IRR.

C4.2 The risk appraisal methods (if there is a certain lack of clarity, you can contact the researcher). In this part, a brief explanation of the sensitivity and scenario analysis methods can be determined as below:

Sensitivity Analysis (SA) is used to evaluate the results from the mathematical models; it is allowed to change in the input values (independent variables) and then it measures the effect of this change on the outcomes (DV). For example, the changes in future cash flow depend on changes in the sales forecast.

Scenario analysis (SCA) is one of the important developments of the SA. SCA assumes that the changes in the outcomes are contingent upon the available options relating to the firm's work; this method considers that the change in the dependent variable is a function of the changes in the input values based on the several scenarios. For example, the changes in the future cash flow (dependent variable) are contingent on the changes in production technology alternatives and the changes in the available financial resources used in financing the investment opportunities (independent variables).

C4.3 The operations research techniques (if there is a certain lack of clarity, you can contact the researcher):

C5: The effectiveness of capital budgeting (CB):

The effectiveness of capital budgeting is used as a synonym of the financial performance of company using the capital budgeting process .

Measurement of the financial performance of firms depends on the operating profits (EBITDA), total operating assets, years used in calculating the EBITDA and the operating rate of return (ORR):

C5.1 Determine the actual working years used in the calculation of EBITDA: Please tick [√] the recent three years in the ongoing operations of your company: [ ] 2008, 2009, 2010 [ ] Otherwise: Please specify.

C5.2 Earnings before interest, taxes, depreciation and amortization (EBITDA): Please tick [√] in front of the average of the EBITDA indicator/statement over the recent three years as mentioned in Q5.1

C5.3 Average of Total Operating Assets: total current and fixed assets which create the operating profits.

C5.4 Calculate the average operating rate of return (AORR)

ORR= The value of EBITDA ÷ Total Operating Assets.

Example:

Year	EBITDA	Total Operating Assets	ORR
2008	200000	1000000	0.2
2009	300000	1200000	0.25
2010	180000	1200000	0.15
Total	680000	3400000	0.60

Calculate the average operating rate of return (AORR) for the years 2008, 2009, 2010:

$$\text{AORR} = \frac{680{,}000}{3{,}400{,}000}$$

$$Or\text{: AORR} = \frac{0.60}{3}$$

$$\text{AORR} = 0.20$$

Section D: The Institutional factors:

D_1. The influence of legislation and political situation on CB process over the recent three years in Libya.

D_2. The influence of the educational, professional, local and foreign organizations on the adoption of the CB process.

Using the scale below ranged from 1 to 5, circle the appropriate number for each statement as offered in D_1 and D_2.

Section E: CFFP:

E1. Data sources: the respondents were asked to specify the data sources used in the CFFP. From any sources from which the firm derives its data: Does the firm use the historical data derived from the firm's departments or future data that can be derived from outside the company, such as university centres and chartered accountants? In this regard, the data sources are presented in the question E1, where you can choose more than one source.

E2. Forecasting horizon: the last three years is the period often used to forecast the future cash flow generated by the investment projects.

E3. The financial, marketing and production factors (clear).

E4. The persons performing the preparation or supervision of the forecasting process; this question relates to the qualified and official persons responsible for the forecasting process in CB and determines their number.

E5. The procedures and methods used in forecasting: these procedures and methods start with the personal estimates and ends by using the computer technology. Using the scale ranged from

1 to 5, circle the appropriate number which indicates to the procedures and methods used in the CFFP within the company.

E5.1 The procedures used in forecasting (PUF):

- Individual estimates that do not rely on scientific methods.
- Standard procedures used to estimate the components of cash flow: these indicate to the use of the standard measures similar to those used by other firms, such as standard cost system.
- The official forms/worksheets used to collect the future cash flow data; this means that the company has designed its own forms in order to collect the future cash flow data resulting from investment projects.

E5.2 Judgmental methods (JM) used in forecasting:

- Top Managers' Judgments (Executives' opinions): this method is usually based on the opinions of executives within the company. Such views combine the use of statistical methods and the experience to predict the future cash flow, such as sales and the production units, operating expenses, etc.
- Delphi method: this is a systematic method based on the views of a panel of experts, with the principle that collective judgments are more accurate than individual estimates. When quantitative methods fail in the interpretation and analysis of behavioural factors that affect the forecasting process, such factors cannot quantified. As a result, it becomes necessary to use only experts' opinions, whether from within the company or outside. Generally, the Delphi method combines personal experience with statistical results in order to achieve more accurate forecasts.
- Sales force composite: this method is based on estimating the sales force; it is commonly used in businesses. The marketing managers can apply this technique to predict the future sales of goods; therefore, the estimated sales force depends on the "salesmen". For example, sellers estimate the goods sold in their area, which in turn leads to the determination of the total sales of the company.

E5.3 Quantitative methods:

5.3.1 Time-series models: time-series (simple and weighted moving average models) consider time as a key variable in the estimation of the predictor. In line with this method, it is assumed that the predictable component is steadily changing based on the change of time. Time-series models are divided into simple and weighted average models, whereby these models are based on the basis of the moving average.

$$\text{Moving average} = \frac{\sum \text{ Observed values during the time period n}}{n}$$

$$\text{Weighted moving average} = \frac{[\sum(\text{observed value in period t}) * (\text{weight of observed value in period t})]}{\sum \text{weights during the time period n}}$$

Where: n=1,2,3………t
*Adapted from Render and Stair (2000)

5.3.2 Regression analysis models:

Simple regression analysis models are similar to the time-series models (Least Squares Equation). Nevertheless, the independent variable is not a time as stated in the time series. In contrast, the difference between simple and multiple regression analysis models is that the first one includes one independent variable, while the multiple regression models take account of more than one independent variable to predict the dependent variable. Mathematically, the multiple regression model can be expressed as:

$$\hat{Y} = \alpha + \beta_j \sum_{j=1}^{n} X_j$$

Where:
$\hat{Y}$: Dependent variable or predictor variable
α: A constant or a value that crosses Y axis
Xj: Independent variables; n=1,2,3……j
β_j: Coefficients or regress X on $\hat{Y}$; mathematically, it means $\frac{\Delta y}{\Delta x}$

E5.4: The software used in cash flow forecasting:

You can select any of the following options:

- Software is developed by your company
- Commercial software packages (e.g. Excel).

It is a pleasure to explain the questionnaire and I am ready to explain and provide any further clarification according to your request.

Ali Alsharif;

Mobile No: 00447806810480;

Email: U1071205@hud.ac.uk

Appendix D: Arabic Translation of the Questionnaire Covering Letter

السيد العزيز/ المشارك في الاستبيان

السلام عليكم

أنا طالب دكتوراه في جامعة هدرسفيلد، المملكة المتحدة. هذا الاستبيان هو جزء من مشروع بحث دكتوراه، والذي يهدف إلى تحديد دور عملية التنبؤ بالتدفق النقدي في قرارات الموازنة الرأسمالية. حيث تبدأ عملية التنبؤ بتحديد الإجراءات والأساليب المستخدمة في التنبوء وتنتهي بتقدير بنود التدفقات النقدية. بالاضافة الى ذلك، تبحث هذه الدراسة تأثير مدى ارتباط عملية التنبؤ، بخصائص الشركة (حجم الشركة، ونوع الصناعة، والملكية، والأولويات الاستراتيجية، وعدم التأكد البيئي المحيط بعمل الشركة)، وتأثير التشريعات واللوائح الحكومية، والمؤسسات المهنية والعلمية، والشركات المحلية والأجنبية على الإجراءات والأساليب المستخدمة في التنبوء بالشركات الصناعية والنفطية العاملة في ليبيا. علاوة على ذلك، سوف يتم اختبار تأثير عملية التنبؤ على أداء الشركات من خلال استخدام أساليب الموازنة الرأسمالية.

يرجى محاولة الإجابة على جميع الأسئلة وإبداء أي تعليقات إضافية باستخدام المساحة المتوفرة أو أوراق إضافية إذا لزم الأمر، كما انه يمكنك تمرير هذا الاستبيان للشخص المناسب داخل شركتكم.

علاوة على ما ذكر، لديك الحق في الانسحاب من هذه الدراسة في أي وقت، ولكن قبل تحليل البيانات التي تم تجميعها. كما نؤكد بأن البيانات التي سيتم تجميعها سوف تستخدم فقط لأغراض أكاديمية.

شكرا جزيلا على المشاركة في هذا الاستطلاع.

لا تترددوا في الاتصال بنا اذا كنت بحاجة لأية توضيحات أخرى.

تفضلوا بقبول فائق الاحترام

علي الشريف.

Ali Alsharif.
Ph.D. Candidate.
Business School
University of Huddersfield
Huddersfield, West Yorkshire, UK
Mobile: 00447806810480
E-mail: U1071205@hud.ac.uk
or: alsharif62@gmail.com

Professor Collins Ntim, Main supervisor
E-mail: c.ntim@hud.ac.uk
Mr Wayne Fiddler, Co-supervisor,
E-mail: w.fiddler@hud.ac.uk

Appendix E: Arabic Translation of the Research Questionnaire

(يعباء هذا الاستبيان من قبل الأخوة المختصين في مجال تقييم المشروعات الاستثمارية أو الموازنة الراسمالية بالشركة)

القسم (أ) : معلومات عامة:

يرجى وضع علامة [√] أمام الإجابات الملائمة للاسئلة من 1-4 و7:

1. الوظيفة: [ ] مدير مالي [ ] مدير عام [ ]
أخرى:..
2. المؤهل: [ ] دكتوراة [ ] ماجستير [ ] بكالوريوس [ ]
أخرى:..
3. مجال الدراسة: [ ] محاسبة [ ] إدارة [ ] تمويل ومصارف [ ] اقتصاد [ ] أخرى:........................
4. الخبرة : 1-5 سنوات [ ] 6-10 سنوات [ ] 11-15 سنوات [ ] أكثر من 16 سنة [ ]
5. الرجاء تحديد اسم الشركة التابع لها (**اختياري**):..
6. الرجاء تحديد رأسمال شركتكم (**اختياري**): ....دينار ليبي
7. عمر الشركة التابع لها : يرجى وضع علامة [√] أمام الإجابة المناسبة:

1- 5 سنوات [ ] 6-10 سنوات [ ] 11-15 سنوات [ ] 16-20 سنة [ ] أكثر من 21 سنة [ ]

القسم (ب) خصائص الشركة: ويشتمل على حجم الشركة، ونوع التصنيف، والملكية، واستراتيجية الشركة، وعدم التأكد البيئي المحيط بعمل الشركة.

ب1. حجم الشركة: يرجى وضع علامة [√] أمام الأجابة المناسبة:

1. متوسط المبيعات السنوية بالدينار الليبي عن أخر 3 سنوات عمل فعلية* :
0- < 200 ألف دينار [ ] 200 ألف دينار- <1مليون [ ] 1- < 5مليون [ ] 5- <10 مليون [ ]
10- < 20 مليون [ ] 20- <40 مليون [ ] 40- <80 مليون [ ] 80- <160مليون [ ] 160- <320مليون [ ]
320- <640 مليون [ ] أكبر من640 مليون [ ]

<: تعني أقل من... * آخر 3 سنوات عمل فعلية حصلت ب 2008، 2009، 2010 على أن تكون مطابقة مع السنوات المشار لها لاحقاً في السؤال رقم 1.5 في القسم ج.

2. متوسط عدد الموظفين الرسميين عن أخر 3 سنوات عمل فعلية بالشركة:
أقل من 100 موظف [ ] 100- <200 موظف [ ] 200- <400موظف [ ] 400- <800 موظف [ ]
800- <1600موظف [ ] 1600- <3200 موظف [ ] أكبر من3200موظف [ ]

<: تعني أقل من...

ب 2. نوع الصناعة : يرجى وضع علامة [√] أمام الإجابة المناسبة:

1	صناعة الأغذية والمشروبات		5	صناعة النسيج والأحذية والورق والطباعة...	
2	صناعات البلاستيك والأسفلت والكيماويات		6	صناعة وانتاج النفط والغاز والبتروكيماويات	
3	صناعة المعادن الهيكلية والحديد والصلب		7	أخرى:..	
4	الصناعات الهندسية والالكترونية والأسمنت ومواد البناء				

ب3. نوع ملكية الشركة : يرجى وضع علامة [√] أمام الإجابة المناسبة وتحديد نسبة الملكية للبنود4-7.

م	نوع الملكية:	√
1	ملكية عامة (الدولة) بنسبة 100 %	
2	ملكية خاصة بنسبة 100 %	
3	ملكية اجنبية بنسبة 100 %	
4	مشروع مشترك بين القطاع العام والشريك الأجنبي: يرجى تحديد نسبة ملكية الدولة [ ] %.	
5	مشروع مشترك بين القطاع الخاص والشريك الأجنبي: يرجى تحديد نسبة ملكية القطاع الخاص [ ] %.	
6	مشروع مشترك بين القطاع العام والقطاع الخاص: يرجى تحديد نسبة ملكية الدولة [ ] %.	
7	مشروع مشترك بين القطاع العام والخاص والأجنبي: يرجى تحديد نسبة ملكية الدولة [ ] %.	

ب4.استراتيجية الشركة : يرجى وضع دائرة امام الاجابة المناسبة المتعلقة بالأوليات الاستراتيجية المنفذة بالشركة عن أخر 3 سنوات عمل فعلية:

اوافق بشدة	اوافق	محايد	لا اوافق	لا اوافق بشدة
5	4	3	2	1

م	الأوليات الاستراتيجية					
1	تهدف استراتيجية الشركة الى حماية النشاط الرئيسي الحالي الذي قد يتعرض الى خطر غلق المصنع	1	2	3	4	5
2	استراتيجية الشركة عندها ميل قوي للاستثمارات المرتبطة بتحقيق عوائد عالية	1	2	3	4	5
3	استراتيجية الشركة تعتمد على دراسة الجدوى لإتخاذ القرار الاستثماري	1	2	3	4	5
4	استراتيجية الشركة تجاه التصنيع تتوقف على اعتبارات اقتصادية عامة مرتبطة بالدولة	1	2	3	4	5
5	تهدف استراتيجية الشركة لتحسين حصتها في السوق والوضع التنافسي بدلا من تعظيم الأرباح	1	2	3	4	5
6	تعتمد استراتيجية الشركة على نظام التصنيع المرن بدلا من نظام التصنيع الآلي	1	2	3	4	5
7	تقوم استراتيجية الشركة على تدريب الموارد البشرية من أجل تخطيط وتقييم المشاريع الاستثمارية.	1	2	3	4	5

* أخر 3 سنوات عمل فعلية محددة بـ 2008، 2009، 2010

ب5. عدم التأكد البيئي: باستخدام التدرج المبين أدناه، يرجى وضع دائرة على الاجابة المناسبة التي تشير إلى مدى القدرة على التنبؤ بالظروف البيئية المحيطة بالشركة عن أخر 3 سنوات عمل فعلية*:

يمكن التنبؤ بها دائما	غالبا ما يتنبأ بها	أحيانا يتنبأ بها	نادرا ما يتنبأ بها	لا يمكن التنبؤ بها
5	4	3	2	1

م	التنبؤ البيئي المطلوب:					
1	أعمال المورد الأساسي للمواد الخام	1	2	3	4	5
2	أعمال المنافسين	1	2	3	4	5
3	التغيرات في الوضع المالي للشركة.	1	2	3	4	5
4	الطلب على المنتجات الحالية	1	2	3	4	5
5	التدفقات النقدية المتوقعة الناتجة عن الانفاق الاستثماري.	1	2	3	4	5

* أخر 3 سنوات عمل فعلية محددة بـ 2008، 2009، 2010

القسم (ج): عملية الموازنة الراسمالية:

ج1. نوع وعدد المشروعات الاستثمارية:

يرجى وضع علامة [√] أمام نوع وعدد المشروعات الاستثمارية المنفذة بالشركة عن أحدث 3 سنوات عمل، راجيا تحديد سنة التنفيذ:

م	نوع المشروع الاستثماري	√	العدد	سنة التنفيذ*
1	مشروع استثماري جديد (مصنع جديد / خط إنتاجي جديد)			
2	تجديد وتطوير المشروع القائم			
3	توسيع القدرة أو الطاقة الانتاجية الحالية			
4	استبدال معدات وآلات قديمة أو متقادمة			
5	التغيير الكامل في نوع الإنتاج أو النشاط			
6	حالات الصيانة غير العادية			
7	أخرى:..............................			

* أخر 3 سنوات عمل فعلية محددة بـ 2008، 2009، 2010 على أن تكون مطابقة مع السنوات المشار لها لاحقا في السؤال رقم 5.1 في القسم ج.

ج2. مصادر تمويل المشروعات الاستثمارية :

يرجى وضع علامة [√] أمام المصادر المستخدمة في تمويل المشروعات الاستثمارية المشار اليها أعلاه:

م	المصادر المستخدمة في تمويل المشروعات	√
1	التمويل الذاتي	
2	الهيئات الحكومية	
3	المستثمر الأجنبي	
4	البنوك التجارية	
5	الأسهم	

ج3. متوسط النفقات الاستثمارية للمشروعات:

يرجى وضع علامة [√] للإجابة المناسبة التي تشير لمتوسط النفقات الاستثمارية للمشروعات المنفذة المذكورة في ج1:

0 < 200 ألف دينار [ ]	200 ألف دينار - <1مليون[ ]	1 - < 5مليون[ ]	5- <10 مليون[ ]	10- < 20 مليون[ ]
20- <40 مليون [ ]	40- <80 مليون[ ]	80- <160مليون[ ]	160- <320مليون[ ]	320- <640 مليون[ ]
اكبر من640 مليون[ ]				

ج4. أساليب الموازنة الرأسمالية المستخدمة في شركتكم عن آخر 3 سنوات عمل فعلية: (الرجوع للدليل المساعد):

أساليب الموازنة الرأسمالية يشار لها أحياناً بأساليب تقييم الأستثمارات والتي تتكون من أساليب التقييم المالي، وأساليب تقييم الخطر، وأساليب بحوث العمليات:

*الرجاء وضع علامة [√] أمام أساليب التقييم المستخدمة في شركتكم، وإذا كانت شركتكم تستخدم أكثر من أسلوب تقييم واحد، يرجى وضع "دائرة" حول الرقم المناسب للدلالة على أساليب التقييم وفقا لأولويتها أو أهميتها في الأستخدام، على سبيل المثال: 5 يشير الى أولوية عالية جداً لأسلوب التقييم، بينما 4 يشير الى أولوية عالية فقط وهكذا 3، 2، 1.

أولوية أساسية /عالية جدا	أولوية عالية	أولوية متوسطة	أولوية منخفضة	لا توجد أولوية
5	4	3	2	1

م	الأسلوب	√					
م	أساليب التقييم المالي :	√	ترتيب هذه الاساليب وفقا لأولويتها				
1	فترة الإسترداد (PB)		1	2	3	4	5
2	معدل العائد المحاسبي (ARR) = صافي الربح المحاسبي ÷ تكاليف الأستثمار		1	2	3	4	5
3	صافي القيمة الحالية (NPV)		1	2	3	4	5
4	مؤشر الربحية (PI) = 1 + [صافي القيمة الحالية ÷ تكاليف الأستثمار]		1	2	3	4	5
5	معدل العائد الداخلي (IRR)		1	2	3	4	5
م	أساليب تقييم الخطر:	√	ترتيب هذه الاساليب وفقا لأولويتها				
1	تقييم شخصي.		1	2	3	4	5
2	تحليل التكلفة والحجم والربحية (تحليل نقطة التعادل).		1	2	3	4	5
3	تحليل الحساسية Sensitivity analysis.		1	2	3	4	5
4	تحليل السيناريو Scenario Analysis		1	2	3	4	5
5	تقصير فترة الاسترداد		1	2	3	4	5
6	رفع معدل الخصم		1	2	3	4	5
م	أساليب بحوث العمليات:	√	ترتيب هذه الاساليب وفقا لأولويتها				
1	أساليب البرمجة الرياضية		1	2	3	4	5
2	نموذج شجرة القرارات		1	2	3	4	5
3	أسلوب تقييم ومراجعة المشروع (PERT) وتحليل المسار الحرج (CPA)		1	2	3	4	5

ج5. فاعلية الموازنة الرأسمالية:

- أن تحديد فاعلية الموازنة الرأسمالية يعتمد على الأرباح أو الخسائر التشغيلية (EBITDA) واجمالي الأصول التشغيلية والسنوات التي تدخل في احتساب الفاعلية، وهي كالتالي:

5.1: تحديد سنوات العمل الفعلية المحتسب عنها متوسط الأرباح التشغيلية EBITDA ، كما انه في حالة عدم توفر البيانات عن السنوات 2008، 2009، 2010 يرجى استبدالها بثلاث سنوات اخرى يكون العمل فيها بصورة اعتيادية. علية يرجى وضع علامة [√] أمام أحد الخيارين التاليين:

السنوات: 2008 و 2009 و 2010[ ]　　غير ذلك [ ] : يرجى تحديدها: ....، ....، ....

5.2: الأرباح التشغيلية (EBITDA):
يرجى وضع علامة [√] أمام البيان أو المؤشر التقريبي لمتوسط الأرباح قبل خصم مصروفات فوائد القروض والضرائب والاهلاكات أو اي مخصصات أخرى للسنوات المشار اليها في 5.1 :

غير مقبولة نهائيا - بالسالب[ ]　ضعيفة جدا[ ]　ضعيفة[ ]　تحت المتوسط [ ]　متوسطة[ ]
مقبولة الى حد ما [ ]　مرغوبة [ ]　عالية [ ]　عالية جداً [ ]

5.3: اجمالي الأصول التشغيلية (اجمالي الأصول المتداولة والثابتة التي ساهمت في خلق الأرباح التشغيلية).
يرجى وضع علامة [√] امام القيمة التقريبية لمتوسط اجمالي الأصول التشغيلية للسنوات التي ذكرت في س5.1 (القيمة بالمليون دينار الليبي):

200 ألف دينار - <1مليون[ ]	1 - < 5 مليون[ ]	5- <10مليون[ ]	10- <20 مليون[ ]	20- <40 مليون[ ]
40- <80 مليون[ ]	80- <160مليون[ ]	160- <320مليون[ ]	320- <640مليون[ ]	
640 - <1280مليون[ ]	أكبر من 1280مليون[ ]			

5.4: متوسط معدل العائد التشغيلي **AORR** = متوسط الأرباح أو الخسائر التشغيلية مقسوما على/ متوسط إجمالي الأصول التشغيلية:
يرجى وضع علامة [√] أمام النسبة التقريبية لمتوسط معدل العائد التشغيلي **AORR** للسنوات التي ذكرت في 5.1 :
أقل من 1 % [ ]   1-5% [ ]   6-10% [ ]   11- 15% [ ]   16-20% [ ]
21-25% [ ]   26-30% [ ]   31-35% [ ]   تزيد عن 36% [ ]

القسم (د) العوامل المؤسسية: تأثير التشريعات الحكومية والتقلبات السياسية ، والمنظمات التعليمية والمهنية، والشركات المحلية والأجنبية في ليبيا على عملية الموازنة الراسمالية عن آخر 3 سنوات عمل:

أولاً: تأثير التشريعات الحكومية والوضع السياسي في ليبيا على عملية الموازنة الراسمالية:

د1. باستخدام التدرج المبين أدناه يرجى وضع دائرة حول الرقم المناسب لكل بيان:

أوافق بشدة 5	أوافق 4	محايد 3	لا أوافق 2	لا أوافق بشدة 1							
م	تأثير التشريعات، واللوائح الحكومية، والوضع السياسي في ليبيا على عملية الموازنة الراسمالية:	الاجراءات والطرق المستخدمة في التنبؤ (PMUF)					أساليب الموازنة الراسمالية (CBT)				
1	القانون التجاري والنظم الضريبية والتشريعية في ليبيا تتطلب استخدام PMUF* و CBT*	1	2	3	4	5	1	2	3	4	5
2	القيود المالية المفروضة على التمويل (قانون المصارف) تتطلب استخدام PMUF و CBT .	1	2	3	4	5	1	2	3	4	5
3	النظام المستخدم في خصخصة الشركات المملوكة للدولة يتطلب استخدام PMUF و CBT	1	2	3	4	5	1	2	3	4	5
4	تدخل المؤسسات الحكومية الليبية في تحديد حجم الموازنة الراسمالية يتطلب استخدام PMUF و CBT	1	2	3	4	5	1	2	3	4	5
5	تبني معايير المحاسبة الدولية (IAS) الصادرة عن مجلس معايير المحاسبة الدولية (IASB) يتطلب استخدام PMUF و CBT	1	2	3	4	5	1	2	3	4	5
6	عدم الاستقرار السياسي في ليبيا يعرقل / يقوض استخدام PMUF و CBT	1	2	3	4	5	1	2	3	4	5

* CBT: تعني أساليب تقييم الاستثمارات أو أساليب الموازنة الراسمالية.   *PMUF: الاجراءات والطرق المستخدمة في التنبؤ بالتدفقات النقدية.

ثانياً: مدى تبني عملية الموازنة الراسمالية من قبل المنظمات التعليمية والمهنية، والشركات المحلية والأجنبية العاملة في ليبيا:

د2. باستخدام التدرج المبين أدناه، يرجى وضع دائرة حول الرقم المناسب لكل بيان:

أوافق بشدة 5	أوافق 4	محايد 3	لا أوافق 2	لا أوافق بشدة 1							
م	تأثير المنظمات التعليمية والمهنية، والشركات المحلية والأجنبية العاملة في ليبيا على عملية الموازنة الراسمالية:	الاجراءات والطرق المستخدمة في التنبؤ PMUF					أساليب الموازنة الراسمالية CBT				
تأثير المنظمات التعليمية والمهنية الليبية على عملية الموازنة الراسمالية:											
1	نظام التعليم في الجامعات الليبية له تأثير مباشر على اختيار واستخدام PMUF* و CBT*	1	2	3	4	5	1	2	3	4	5
2	تبني عملية الموازنة الراسمالية من قبل المحاسبين القانونيين له تأثير مباشر على اختيار واستخدام CFFP و CBT	1	2	3	4	5	1	2	3	4	5
تأثير الشركات المحلية والأجنبية العاملة في ليبيا على عملية الموازنة الراسمالية:											
3	تبني عملية الموازنة الراسمالية من قبل الشركات الليبية الأخرى له تأثير مباشر على اختيار واستخدام PMUF و CBT	1	2	3	4	5	1	2	3	4	5
4	تبني عملية الموازنة الراسمالية من قبل الشركات الأجنبية والمتعددة الجنسية له تأثير مباشر على اختيار واستخدام PMUF و CBT .	1	2	3	4	5	1	2	3	4	5

* CBT: تعني أساليب تقييم الاستثمارات أو أساليب الموازنة الراسمالية. *PMUF: الاجراءات والطرق المستخدمة في التنبؤ.

القسم (هـ)عملية التنبؤ بالتدفق النقدي CFFP: (الرجوع للدليل المساعد)

هـ 1. مصادر البيانات المستخدمة في عملية التنبؤ بالتدفق النقدي في قرارات الموازنة الرأسمالية عن آخر 3 سنوات عمل: باستخدام التدرج المبين أدناه، يرجى وضع دائرة أمام مصادر البيانات المستخدمة في عملية التنبؤ بالتدفق النقدي :

تستخدم دائماً 5 | تستخدم غالباً 4 | تستخدم أحياناً 3 | نادراً ما تستخدم 2 | لا تستخدم اطلاقاً 1

م	مصادر البيانات المستخدمة في عملية التنبؤ بالتدفق النقدي في قرارات الموازنة الرأسمالية:					
1	أقسام الشركة.	1	2	3	4	5
2	الموردين للمواد الخام ومعدات وآليات المصنع.	1	2	3	4	5
3	خطط مبيعات العملاء.	1	2	3	4	5
4	مراكز البحوث الجامعية.	1	2	3	4	5
5	المحللين المحليين من خارج الشركة (مثل المحاسبين القانونيين).	1	2	3	4	5
6	المستشارين والشركات الأجنبية.	1	2	3	4	5
7	أخرى:..	1	2	3	4	5

هـ 2. أفق أو فترة التنبؤ:

باستخدام التدرج المبين أدناه، يرجى وضع دائرة على الأفق التنبؤي المستخدم في عملية التنبؤ بالتدفقات النقدية في قرارات الموازنة الرأسمالية المنفذة بشركتكم عن آخر 3 سنوات عمل :

تستخدم دائماً 5 | تستخدم غالباً 4 | تستخدم أحياناً 3 | نادراً ما تستخدم 2 | لا تستخدم اطلاقاً 1

م	الأفق التنبؤي المستخدم في عملية التنبؤ بالتدفقات النقدية:					
1	1 - 5 سنوات	1	2	3	4	5
2	6 - 10 سنوات	1	2	3	4	5
3	أكثر من 10 سنوات	1	2	3	4	5

هـ 3. العوامل المالية، والتسويقية ، والانتاجية:

باستخدام التدرج المبين أدناه، يرجى وضع دائرة على العوامل المالية، والتسويقية، والانتاجية لتحديد مدى ارتباطها بعملية التنبؤ بالتدفقات النقدية وتقييم المشروعات الاستثمارية (عملية الموازنة الرأسمالية) المنفذة بشركتكم عن أحدث 3 سنوات:

يرتبط إلى حد كبير 5 | يرتبط بشكل بالغ وذو مغزى 4 | يرتبط باعتدال 3 | يرتبط بشكل طفيف 2 | لا يرتبط 1

م	العوامل المالية، والتسويقية، والانتاجية المرتبطة بعملية الموازنة الرأسمالية:					
	أولاً: العوامل المالية:					
1	الاقتراض ودفع الأموال المقترضة.	1	2	3	4	5
2	مؤشر أو معدل الصرف الأجنبي.	1	2	3	4	5
3	اعتبارات الضرائب.	1	2	3	4	5
4	متطلبات رأسمال العامل.	1	2	3	4	5
5	تأثير النفقات الاستثمارية على سيولة الشركة	1	2	3	4	5
6	المصروفات الإدارية.	1	2	3	4	5
	ثانياً: العوامل التسويقية:					
1	التنبؤ بالمبيعات أو الإيرادات.	1	2	3	4	5
2	مصروفات البيع	1	2	3	4	5
3	مصروفات الاعلان والمنافسة.	1	2	3	4	5
	ثالثاً: العوامل الانتاجية:					
1	تكاليف المصنع المباشرة أو مصروفات التشغيل المباشرة	1	2	3	4	5
2	تكاليف المصنع الإضافية	1	2	3	4	5
3	نفقات البحث والتطوير	1	2	3	4	5
4	تكاليف الإهلاك	1	2	3	4	5

هـ 4. الاشخاص المنفذون لعملية التنبؤ :

يرجى وضع علامة [√] أمام البيان الذي يقابل المؤهل، والمركز الوظيفي للاشخاص القائمون بعملية التنبؤ المنفذة بشركتكم عن أخر 3 سنوات عمل :

م	4.1 :المؤهل العلمي	√	م	4.2: الوظيفة أو المركز الوظيفي	√
1	شهادة دكتوراة		1	محاسب	
2	ماجستير		2	مدير قسم المحاسبة	
3	بكالوريوس		3	المدير المالي	
4	أخرى:...................		4	المدير العام التنفيذي	
	....		5	نائب الرئيس أو رئيس مجلس الادارة	
			6	محاسب قانوني من خارج الشركة	
			7	أخرون:................................	

4.3: عدد المنفذين لعملية التنبؤ:

يرجى وضع علامة [√] أمام العدد الذي يقابل اجمالي عدد الأخوة المكلفين بتقدير التدفقات النقدية الناتجة عن المشروعات الاستثمارية المنفذة داخل الشركة عن أخر 3 سنوات عمل :

1-3 أشخاص [ ]　　4-6 أشخاص [ ]　　7-9 أشخاص [ ]　　أكثر من 10 أشخاص [ ]

هـ 5. الإجراءات والطرق المستخدمة في التنبؤ بالتدفقات النقدية بالشركة عن أحدث3 سنوات عمل:

هناك عدة اجراءات وطرق مطبقة بشأن التنبؤ بالتدفقات النقدية الناتجة عن تقييم المشروعات الاستثمارية تبدأ بالتقدير الشخصي وتنتهي باستخدام تقنية الحاسوب: باستخدام التدرج المبين أدناه، يرجى وضع دائرة حول الرقم المناسب الذي يحدد الإجراءات والطرق المستخدمة في التنبؤ بالتدفقات النقدية داخل الشركة:

تستخدم دائما	تستخدم غالبا	تستخدم أحيانا	نادرا ما تستخدم	لا تستخدم اطلاقا
5	4	3	2	1

م						
م	أولا: الإجراءات المستخدمة في التنبؤ بالتدفقات النقدية:					
1	تقديرات شخصية	1	2	3	4	5
2	إجراءات معيارية مستخدمة في تقدير بنود التدفقات النقدية	1	2	3	4	5
3	نماذج رسمية أو أوراق عمل مستخدمة في جمع بيانات التدفق النقدي المستقبلي	1	2	3	4	5
م	ثانيا: الطرق الحكمية (النوعية) المستخدمة في التنبؤ بالتدفقات النقدية:					
1	تحكيم كبار المديرين (أراء التنفيذيين)	1	2	3	4	5
2	طريقة دلفي (رأي الخبراء)	1	2	3	4	5
3	تركيبة قوة المبيعات	1	2	3	4	5
	ثالثا: الطرق الكمية المستخدمة في التنبؤ بالتدفقات النقدية:					
1	نماذج السلاسل الزمنية (نماذج المتوسط المتحرك البسيط والموزون)	1	2	3	4	5
2	نماذج تحليل الانحدار (نماذج تحليل الانحدار البسيط والمتعدد)	1	2	3	4	5
	رابعا: البرامج المستخدمة في التنبؤ بالتدفق النقدي:					
1	برمجيات مطورة بواسطة شركتكم	1	2	3	4	5
2	حزم البرمجيات التجارية (مثل اكسل)	1	2	3	4	5
*	اجراءات أو اساليب أخرى:..	1	2	3	4	5

معلومات اضافية: يرجى استخدام هذا الجزء من الاستبيان في حالة اقتراح معلومات ذات علاقة بموضوع الدراسة:

* اذا كنت ترغب في الحصول على نسخة من النتائج المجمعة من هذه الدراسة ، يرجى الأتصال بعنوان جامعة هدرسفيلد المبين أدناه:

Business School
The University of Huddersfield
Queensgate, Huddersfield, HD1 3DH
West Yorkshire, UK

شكرا جزيلا على مشاركتكم في هذا الاستطلاع ، لأي استفسار يمكن الاتصال بنا عبر البريد الالكتروني:

AE Alsharif.
Ph.D. Candidate.
Business School
University of Huddersfield
E-mail: u1071205@hud.ac.uk

Professor Collins Ntim, Main supervisor
E-mail: c.ntim@hud.ac.uk
Mr Wayne Fiddler, Co-supervisor.
E-mail: w.fiddler@hud.ac.uk

الألسن
للترجمة القانونية
AL-Alsun For Legal Translation

Appendix F: Arabic Translation of the Assistant Guide for Respondents

القسم (أ): معلومات عامة حول المستجوب والشركة التابعة لها.

القسم (ب): خصائص الشركة: ويشتمل على حجم الشركة، ونوع التصنيع، والملكية، واستراتيجية الشركة، وعدم التأكد البيئي المحيط بعمل الشركة. هذه البنود واضحة وتعتمد على معلومات رقمية تقريبية بالاضافة الى معلومات تعتمد على سياسة واستراتيجية الشركة.

القسم (ج): الموازنة الراسمالية: يقصد بها العملية المتعلقة بتخطيط ورقابة النفقات الأستثمارية (هذا الجزء يركز على عملية تقييم المشروعات الاستثمارية):

وحددت أسئلة الأستبيان في هذا الجزء، على النحو التالي:

ج1 نوع وعدد المشروعات الاستثمارية: تحديد المشروعات الاستثمارية المنفذة، حيث يمكنكم اختيار أكثر من بند، على أن تحدد سنة تنفيذ المشروع الاستثماري للسنوات 2008و2009و2010...أو غير ذلك.

ج2 المصادر المستخدمة في تمويل المشروعات الاستثمارية: الاختيار ما بين المصادر المقترحة، حيث يمكنكم اختيار أكثر من بند.

ج3 القيمة التقريبية للنفقات الاستثمارية للمشروعات المنفذة: يمكنكم اختيار اجابة واحد فقط من ضمن الخيارات المقدمة.

ج4: اساليب تقييم المشروعات الاستثمارية (اساليب الموازنة الراسمالية)

4.1 **اساليب التقييم المالي:**

4.1.1 :فترة الاسترداد Payback Period (PB)

يقصد بفترة الاسترداد الفترة الزمنية اللازمة لاسترداد الأموال المستثمرة في المشروع (التكاليف الاستثمارية المطلوبة) ، وفي ظل هذه الطريقة يتم تحديد الفترة الزمنية اللازمة لاسترجاع الأموال المستثمرة . ويمكن صياغة نموذج فترة الاسترداد في شكله التقليدي، حسب المعادلة التالية:

$$\text{فترة الاسترداد} = \frac{\text{الأموال المستثمرة في المشروع}}{\text{صافي التدفقات النقدية السنوية للمشروع*}}$$

* يمكن للشركات ان تستخدم صافي الربح المحاسبي بدلا من صافي التدفقات النقدية السنوية للمشروع .

هذا في حالة افتراض تساوي قيمة التدفقات النقدية السنوية وانتظام تدفقها، أمّا في حالة عدم انتظام التدفقات النقدية فإنهُ يتم حساب فترة الاسترداد عن طريق الأسلوب التراكمي، وتستخدم هذه الطريقة بشكل مكثف من قبل الشركات المتعددة الجنسية في تقييم جدوى استثماراتها، وعلى الأخص في المشاريع التي تتسم بعنصر مخاطرة مرتفع. لمزيد من التفصيل ، معيارPB يستخدم للمقارنة/المفاضلة بين الفرص الأستثمارية على اساس الأفضلية تكون للاستثمار الذي يتسم بسرعة استرداده. هذا النموذج يستخدم كخط دفاعي للاحتياط ضد المخاطر، لذلك يفضل استخدامة كنموذج مكمل للنماذج الأخرى ، مثل ARR & IRR &NPV .

4.1.2: معدل العائد المحاسبي Accounting Rate of Return (ARR)

تسمى هذه الطريقة بمعدل العائد على الاستثمار لتقييم المشروعات الاستثمارية ، نظراً لأنها تتماثل مع المفاهيم المحاسبية التقليدية للدخل والاستثمار، فالمشروع الاستثماري يتم تقييمهُ – وفقاً لهذه الطريقة – بحساب معدل العائد على الاستثمار باستخدام المقاييس المحاسبية لصافي الدخل المحاسبي:

$$\text{معدل العائد المحاسبي} = \frac{\text{متوسط أو صافي الربح السنوي}}{\text{الاستثمار المبدئي المطلوب}}$$

<u>أساليب التدفقات النقدية المخصومة وتضم الأساليب التالية:</u>

- صافي القيمة الحالية (**NPV**)
- مؤشر الربحية (**PI**)
- معدل العائد الداخلي (**IRR**)

وهي الأساليب التي تقوم على أساس خصم التدفقات النقدية الصافية المترتبة على الاستثمار، بمعدل خصم مرغوب فيه والذي عادة ما يكون تكلفة رأس المال في حالة استخدام رأس المال المستثمر بواسطة الملاك / المساهمين أو تكلفة التمويل في حالة الأقتراض. ولذلك فإن هذه الأساليب تأخذ في الاعتبار القيمة الزمنية للنقود.

4.1.3: أسلوب صافي القيمة الحالية Net Present Value

يستند هذا الأسلوب على مفهوم القيمة الزمنية للنقود، إن أسلوب صافي القيمة الحالية هو تطبيق مباشر لمفهوم القيمة الحالية، الذي يتحدد من خلال الخطوات التالية :-

- اختيار معدل متوقع للفائدة (معدل خصم التدفقات النقدية المرغوب).
- حساب القيمة الحالية للأرباح المتوقعة من الاستثمار
- حساب القيمة الحالية للأموال المطلوبة للاستثمار.

حساب طريقة صافي القيمة الحالية يبدأ مع إيجاد القيمة الحالية للتدفقات النقدية المتوقعة الناتجة عن الاستثمار وخصم هذه التدفقات على أساس معدل معين (على سبيل المثال تكلفة رأس المال)، ثم خصم التكاليف الاستثمارية الأولية *. رياضيا، نموذج صافي القيمة الحالية يمكن أن يصاغ بالمعادلة التالية*:

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*) إذا كانت هذه التكاليف تحدث خلال عدة سنوات في المستقبل، فيجب أخذ ذلك بعين الاعتبار وذلك عن طريق حساب القيمة الحالية لهذه التكاليف بالمعادلة التالية :

$$I = \sum_{t=0}^{n} \frac{I_t}{(1+R)^t}$$

$$NPV = \sum_{t=0}^{n} \frac{F_t}{(1+R)^t} - I_0$$

حيث إن :-

F_t= صافي التدفقات النقدية في السنةt وتمثل t السنوات من سنة التأسيس0 إلى n.

n =عدد السنوات التي تمثل العمر الانتاجي المتوقع للمشروع، حيث n =0، 1، 2، 3...t

R = التكلفة الحدية لرأس المال (معدل خصم التدفقات النقدية المرغوب) .

I_0 = إجمالي التكاليف الاستثمارية المبدئية للمشروع في سنة التأسيس.

* المصــدر: فرد ويســتون و يوجين برجام، التمويل الإداري. الجزء الثاني ، ترجمة : عبد الرحمن دعاله بيلة، عبد الفتاح السيد، (الرياض: دار المريخ للنشر، 1993) ، ص 101 .

وعند استخدام أسلوب صافي القيمة الحالية في قرارات قبول المشروعات الاستثمارية أو رفضها بمنظمات الأعمال، فإنهُ يتم قبول المشروعات التي تحقق صافي قيمة حالية موجبة. وفي حالة تعدد المشروعات الاستثمارية ووجود مشروعات متعارضة (متنافرة) فإنه يمكن ترتيبها ترتيباً تفاضلياً على أساس أن المشروع الذي يحقق أكبر صافي قيمة حالية يكون ترتيبه الأول، ويليه المشروع الذي يحقق ثاني أكبر صافي قيمة حالية وهكذا. ومعيار صافي القيمة الحالية لا يغالي في تقييم مشروعات الاستثمار المقترحة واختيارها، حيث إنه أسلوب متحفظ ومرد ذلك إلى افتراضه الضمني بإعادة استثمار التدفقات النقدية المتولدة عن المشروع الاستثماري عند معدل عائد مساوي لمعدل الخصم المستخدم في تقييم المشروع الاستثماري المقترح، والذي يمثل الحد الأدنى لمعدل العائد الذي لا يجب أن يقل عنه معدل عائد من أي مشروع مرغوب.

4.1.4:مؤشر الربحية (PI) Profitability Index

طريقة صافي القيمة الحالية تعتبر أنَّ المشروع مجدياً اقتصادياً إذا كان الفارق بين القيمة الحالية لصافي التدفقات النقدية والمبلغ المستثمر موجباً بغض النظر عن مقدار هذا الفارق وعن نسبة هذا الفارق إلى المبلغ المستثمر، وهذا يعتبر قصور في هذه الطريقة. هذا القصور لا يعتبر واضحاً إذا كنا بصدد تقييم مشروع واحد فقط أو بصدد المفاضلة بين بدائل استثمارية مختلفة تتطلب مبلغاً استثمارياً موحداً، ولكن يظهر هذا القصور عند المفاضلة بين بدائل مختلفة تتطلب مبالغ استثمارية مختلفة، فإن المقارنة بين صافي القيمة الحالية لبديل وصافي القيمة الحالية لبديل آخر يجعلنا نختار بديلاً يحقق عائداً أقل نسبة إلى المبلغ المستثمر استناداً إلى أنَّ صافي قيمته الحالية أكبر . للخروج من هذا القصور نلجأ إلى استخدام طريقة دليل الربحية في حالات المفاضلة من البدائل الاستثمارية التي تتطلب مبالغ استثمارية مختلفة، ومؤشر الربحية هو عبارة عن نسبة القيمة الحالية لصافي التدفقات النقدية الناتجة عن المشروع الاستثماري إلى الأموال المستثمرة في المشروع الاستثماري (تكاليف الاستثمار المبدئية) التي تحسب بناء على المعادلة التالية :

مؤشر الربحية (PI) = القيمة الحالية ÷ تكاليف الأستثمار المبدئي المطلوب

أو = 1+ [صافي القيمة الحالية ÷ تكاليف الأستثمار المبدئي المطلوب]

4.1.5: معدل العائد الداخلي"IRR"

يعرف بأنهُ ذلك المعدل الذي يجعل القيمة الحالية لصــافي التدفقات النقدية المتوقعة من الاقتراح الاســتثماري مســاوية للقيمة الحالية للاســتثمار المبدئي اللازم لهذا الاقتراح، أو بمعنى آخر هو ســعر الفائدة الذي يجعل صــافي القيمة الحالية للاقتراح الاستثماري مساوية للصفر. أن طريقة التقييم **IRR** تهدف الى تعظيم ثروة الملاك خلال العمر الإنتاجي للمشروع الاستثماري.، ويتطلب احتساب معدل العائد الداخلي القيام بالخطوات الآتية:-

- تقدير صافي التدفقات النقدية السنوية خلال الحياة الإنتاجية للمشروع.
- تقدير وتحديد التكاليف الاستثمارية المبدئية الخاصة بالمشروع المقترح.
- إيجاد المعدل"IRR" الذي يجعل القيمة الحالية لصــافي التدفقات النقدية المتوقعة من المشـروع المقترح مسـاوية تماماً للقيمة الحالية للتكاليف الاســتثمارية المبدئية الخاصــة بالمشـروع المقترح. لذلك يمكن صـياغة نموذج IRR حسـب المعادلة التالية:

$$\sum_{t=0}^{n} \frac{F_t}{(1+IRR)^t} - I_0 = 0$$

- **ولمزيد من التفصيل حول الاختلافات بين NPV و IRR يمكن الرجوع إلى المرجع التالي:**

فرد ويســتون و يوجين برجام، التمويل الإداري. الجزء الثاني ، ترجمة : عبد الرحمن دعاله بيلة، عبد الفتاح الســيد، (الرياض: دار المريخ للنشر، 1993) ، ص 110 – 116

4.2: أساليب تقييم الخطر (في حالة عدم الوضوح يمكن الرجوع للباحث):

توضيح مختصر لطريقتي تحليل الحساسية والسيناريو:

1- تحليل الحساسية Sensitivity analysis تستخدم في تقييم نتائج النماذج الرياضية وذلك بتغيير في قيم المدخلات (المتغييرات التابعة) وقياس أثر هذا التغيير على نتائج النموذج (المتغير المستقل).على سبيل المثال، التغيرات في التدفقات النقدية المستقبلية تعتمد على التغيرات في توقعات المبيعات على مدى فترة زمنية محددة.

2- تحليل السيناريو Scenario Analysis : تحليل السيناريو (SCA) هي أحد التطورات الهامة لتحليل الحساسية (SA). يفترض SCA أن التغيرات في النتائج تتوقف على الخيارات المتاحة المتعلقة بعمل الشركة. ويعتبر هذا الأسلوب أن التغير في المتغير التابع هو دالة للتغير في قيم المدخلات بناءاً على عدة سيناريوات. على سبيل المثال، التغيرات في التدفقات النقدية المستقبلية (المتغير التابع) تتوقف على التغيرات في بدائل تكنولوجيا الإنتاج والتغيرات في الموارد المالية المتاحة المستخدمة في تمويل الفرص الاستثمارية (المتغيرات المستقلة).

4.5: أساليب بحوث العمليات (في حالة عدم الوضوح يمكن الرجوع للباحث)

س5: فاعلية الموازنة الرأسمالية: ان فاعلية الموازنة الرأسمالية تستخدم كمرادف للأداء المالي للشركة المستخدمة اجراءات الموازنة الرأسمالية.

أن قياس فاعلية الموازنة الراسمالية (الأداء المالي للشركة) يعتمد على الأرباح أو الخسائر التشغيلية (EBITDA) واجمالي الأصول التشغيلية والسنوات التي تدخل في احتساب EBITDA ، ومعدل العائد التشغيلي (ORR):

5.1: تحديد سنوات العمل الفعلية المحتسب عنها الأرباح أو الخسائر التشغيلية EBITDA: يرجي وضع علامة [√] عن أخر ثلاث سنوات يكون العمل فيها بصورة متواصلة بشركتكم:

السنوات: 2008 و 2009 و 2010[ ] غير ذلك [ ]: يرجى تحديدها: ....و..........و..........

5.2 : الأرباح أو الخسائر التشغيلية (EBITDA): يرجى وضع علامة [√] أمام البيان أو المؤشر التقريبي لمتوسط الأرباح قبل خصم مصروفات فوائد القروض والضرائب والاهلاكات أو اي مخصصات حسب أخر 3 سنوات المشار اليها في البند **5.1.**

5.3 : متوسط اجمالي الأصول التشغيلية (اجمالي الأصول المتداولة والثابتة التي ساهمت في خلق الأرباح التشغيلية)

5.4 : م. معدل العائد التشغيلي ORR = م.الأرباح أو الخسائر التشغيلية 5.2 ÷ م.اجمالي الأصول التشغيلية 5.3

مثال : القيمة لأقرب دينار ليبي

السنة	الأرباح التشغيلية EBITDA	اجمالي الأصول التشغيلية	معدل العائد التشغيلي ORR
2008	200000	1000000	0.2
2009	300000	1200000	0.25
2010	180000	1200000	0.15
اجمالي	680000	3400000	00.6

لحساب متوسط معدل العائد التشغيلي AORR للسنوات 2008و 2009و 2010:

متوسط معدل العائد التشغيلي (AORR) $\frac{680000}{3400000}$ أو

متوسطمعدل العائد التشغيلي (AORR)= $\frac{0.60}{3}$

إذاً متوسط معدل العائد التشغيلي AORR = 0.20

القسم (د) العوامل المؤسساتية :

(د1): تأثير التشريعات، واللوائح الحكومية ، والوضع السياسي في ليبيا على عملية الموازنة الراسمالية بالشركات الليبية (عملية التنبؤ بالتدفق النقدي & اساليب تقييم الفرص الأستثمارية).

(د2): تأثير المنظمات التعليمية والمهنية، والشركات المحلية والأجنبية العاملة في ليبيا على عملية الموازنة الراسمالية (عملية التنبؤ بالتدفق النقدي & اساليب تقييم الفرص الأستثمارية):

باستخدام التدرج من 1 الى 5 – بحيث تضع دائرة حول الرقم المناسب لكل بند من البنود المبينة في البنود د1 ، د2.

القسم (هـ): عملية التنبؤ بالتدفق النقدي(CFFP)

E1. مصادر بيانات التنبؤ :

طلب من المشاركين تحديد مصادر البيانات المستخدمة في عملية التنبؤ بالتدفقات النقدية. من أي المصادر تستمد الشركة بياناتها. هل تستخدم الشركة البيانات التاريخية المستمدة من إدارات الشركة أو تستخدم البيانات المستقبلية والتي يمكن أن

تستمد من خارج الشركة، مثل المراكز الجامعية والمحاسبين القانونيين. في هذا الصدد، تقدم مصادر البيانات في هذا السؤال ، بحيث يمكنك اختيار أكثر من مصدر واحد.

E2. افق أو فترة التنبؤ (واضح): يقصد بها المدة المستخدمة في تقدير التدفقات النقدية للمشروع الأستثماري.

E3. العوامل المالية والتسويقية والأنتاجية (واضح)

E4 . الاشخاص المرتبطون بعملية التنبؤ (المتنبئيين): الأشخاص المختصين بالإعداد/الإشراف على تقديرات التدفقات النقدية:

هذا السؤال يتعلق بتحديد مؤهل وظيفية المسؤولين على عملية التنبؤ داخل الشركة، وتحديد عددهم.

E5. الإجراءات والطرق المستخدمة في التنبؤ بالتدفقات النقدية: هذه الإجراءات والطرق تبدأ بالتقدير الشخصي وتنتهي باستخدام تقنية الحاسوب:

باستخدام التدرج من 1 الى 5، يرجى وضع دائرة حول الرقم المناسب الذي يحدد الإجراءات والطرق المستخدمة في التنبؤ بالتدفقات النقدية داخل الشركة:

5.1 الإجراءات المستخدمة في التنبؤ بالتدفقات النقدية:

- تقديرات شخصية أو فردية. وهي لا تعتمد على المنهج العلمي .
- إجراءات معيارية مستخدمة لتقدير بنود التدفقات النقدية: ويقصد بذلك استخدام وسائل قياس معيارية مستخدمة في الكثير من الشركات مثل نظام التكاليف المعيارية.
- نماذج رسمية أو أوراق عمل مستخدمة في جمع بيانات التدفق النقدي المستقبلي، ويعني ان الشركة قامت بتصميم نماذج رسمية خاصة بها تستخدم لجمع بيانات التدفق النقدي الناتجة عن المشروعات الاستثمارية.

5.2: الطرق الحكمية (النوعية) المستخدمة في التنبؤ بالتدفقات النقدية:

5.2.1:تحكيم كبار المديرين (أراء التنفيذيين):

يستند هذا الأسلوب على أراء المديرين التنفيذيين داخل الشركة، هذه الآراء عادة ما تجمع ما بين استخدام الأساليب الإحصائية وخبرة وحكمة المدير(الرئيس التنفيذي) في التنبؤ بالتدفقات النقدية (مثل المبيعات وكمية الإنتاج، ونفقات التشغيل، الخ).

5.2.2:طريقة دلفي (رأي الخبراء).

طريقة دلفي هو أسلوب منهجي يعتمد على آراء لجنة من الخبراء؛ لأنه يقوم على مبدأ أن الأحكام الجماعية هي أكثر دقة من الأحكام الفردية، على أي حال، عندما تفشل الأساليب الكمية في تفسير وتحليل العوامل الذاتية أو السلوكية التي تؤثر على عملية التنبؤ، وحيث ان هذه العوامل لا يمكن قياسها كميا، بالتالي يصبح من الضروري استخدام رأي الخبراء سوى من داخل الشركة أو خارجها. عموماً، فإن طريقة دلفي تجمع بين الخبرة الشخصية مع النتائج الإحصائية من أجل تحقيق توقعات أكثر دقة.

5.2.3: طريقة تركيبة قوة المبيعات:

يعتمد هذا الأسلوب على تقدير قوة المبيعات، وهي أكثر شيوعا في الممارسة العملية، هذه التقنية يمكن استخدامها من قبل مديري التسويق للتنبؤ بالمبيعات المستقبلية من السلع، وبالتالي، فإن تقدير قوة المبيعات تعتمد على "الباعة". على سبيل المثال: يقدر الباعة البضاعة التي ستباع في منطقتهم، لاستخدامها في التنبؤ بالمبيعات الإجمالية للشركة ككل.

5.3: الطرق الكمية المستخدمة في التنبؤ بالتدفقات النقدية:

- نماذج السلاسل الزمنية (نماذج المتوسط المتحرك البسيط والموزون).
- نماذج تحليل الانحدار (نماذج تحليل الانحدار البسيط والمتعدد).

5.3.1: نماذج السلاسل الزمنية: هذه النماذج تعتبر الزمن متغير أساسي في تقدير العنصر المراد التنبؤ به، حيث تعتبر هذه النماذج أن العناصر المراد التنبؤ بها تتغير بشكل مطرد (مستقر) مع تغير الزمن، وقسمت الى نماذج المتوسط المتحرك البسيط والموزون، حيث تعتمد هذه النماذج على أساس المتوسط المتحرك في عملية الاحتساب:

$$\text{المتوسط المتحرك} = \frac{\text{مجموع القيم الملاحظة خلال الفترة الزمنية } \mathbf{n}}{\text{الفترة الزمنية } \mathbf{n} \text{ (آلافق الزمني)}}$$

$$\text{المتوسط الموزون} = \frac{[\text{القيمة الملاحظة للعنصر خلال الفترة الزمنية } t \times \text{الوزن النوعي للعنصر في الفترة } t]}{\text{مجموع الأوزان النوعية خلال الفترة } n}$$

حيث: n = 1، 2، 3......t

5.3.2: نماذج تحليل الانحدار (نماذج تحليل الانحدار البسيط والمتعدد):

نماذج تحليل الانحدار البسيط هي مماثلة لنماذج السلاسل الزمنية (معادلة المربعات الصغرى)، إلا إن المتغير المستقل ليس الزمن كما ورد في السلاسل الزمنية. في المقابل، الاختلاف بين نموذج تحليل الانحدار البسيط والمتعدد هو ان الاول يتضمن متغير مستقل واحد في استكشاف الأحداث المستقبلية، بينما الثاني يتضمن أكثر من متغير مستقل للتنبؤ بالمتغير التابع. رياضيا، يمكن صياغة نموذج الانحدار المتعدد على النحو التالي:

$$\hat{\mathbf{Y}} = \boldsymbol{\alpha} + \boldsymbol{\beta}_{\mathbf{j}} \sum_{j=1}^{n} \mathbf{X}_{j}$$

حيث :

$\hat{\mathbf{Y}}$: المتغير التابع أو المتغير المراد التنبؤ به.

$\boldsymbol{\alpha}$: ثابت وهي القيمة التي تقطع المحور **Y**

$\mathbf{X_j}$: المتغيرات المستقلة: X_1، X_2 ، X_3 ،.......$\mathbf{X_j}$

$\boldsymbol{\beta}_j$: ميل أو انحدار $\mathbf{X_j}$ على Y ، ورياضيا يعني معدل تغير Y عند تغير X.

E5.4 : البرامج المستخدمة في التنبؤ بالتدفق النقدي: يمكن اختيار اي من الأتي:

1. برمجيات مطورة بواسطة شركتكم، ويقصد بها البرامج الخاصة المبرمجة داخل الشركة.
2. حزم البرمجيات التجارية (مثل اكسل).

نأمل أن اكون قد وفقت في تقديم هذا التوضيح البسيط للأستبيان - وأنا مستعد للشرح وتقديم المزيد من التوضيح في حالة الطلب.

علي الشريف

هاتف نقال - بريطانيا: 00447806810480

ايميل : U1071205@hud.ac.uk

Appendix G: The Creation of New Variables (EB..AIE + EB..AAS)

I. EB..AIE variable.

The main variables were used to create EB..AIE variable:

No	Questionnaire's Questions (C5.2, C5.3, C5.4 + C3)			
	EBITDA	**ATOA**	**AORR**	**AIE**
0	Unacceptable	200TLD-<1MLD	<1%	0-<200TLD
1	Very weak	1-<5	1-5%	200TLD-<1MLD
2	Weak	5-<10	6-10%	1-<5
3	Below the average	10-<20	11-15%	5-<10
4	Moderate	20-<40	16-20%	10-<20
5	Acceptable	40-<80	21-25%	20-<40
6	Desirable	80-<160	26-30%	40-<80
7	High	160-<320	31-35%	80-<160
8	Very high	320-<640	>36%	160-<320
9		640-<1280		320-<640
10		>1280 MLD		>640 MLD

The return on investment (ROI) ≈ EB..AIE.
EB..AIE (ROI) = EBITDA/Average of investment expenditures

No	Averages used to calculate the new variables			EB..AIE
	ATOA	AIE	AORR	**Scale**
0	600000	100000	0%	>1%
1	2500000	600000	3%	1-5%
2	7500000	2500000	8%	6-10%
3	15000000	7500000	13%	11-15%
4	30000000	15000000	18%	16-20%
5	60000000	30000000	23%	21-25%
6	120000000	60000000	28%	26-30%
7	240000000	120000000	33%	31-35%
8	480000000	240000000	37%	Over 36%
9	960000000	480000000		
10	1920000000	960000000		

Respond.. ID/Firm*	Respond..A C5.3-4 *		EBITDA Values	Respond..A C3	New variable	
	ATOA	AORR	EBITDA=ATOA*AORR	AIE	EB/AIE	EB..AIE
1	7	1	7200000	5	0.24	**5**
2	5	1	1800000	3	0.24	**5**
3	3	1	450000	1	0.75	**8**
4	2	0	0	0	N.A	**0**
5	8	3	38400000	8	0.16	**4**
6	4	1	900000	3	0.36	**8**
7	4	0	0	1	0.00	**0**
8	4	2	2400000	4	0.16	**4**
9	5	0	0	1	0.00	**0**
10	10	2	153600000	8	0.64	**8**
11	5	3	7800000	4	0.52	**8**
12	3	2	1200000	2	0.48	**8**
13	2	0	0	1	0.00	**0**
14	1	0	0	1	0.00	**0**
15	9	8	316800000	7	2.64	**8**
16	10	6	537600000	9	1.12	**8**
17	10	1	57600000	10	0.06	**4**
18	10	1	57600000	8	0.24	**6**
19	10	2	153600000	10	0.16	**4**
20	10	4	345600000	6	5.76	**8**
21	9	1	28800000	3	3.84	**8**
22	2	2	600000	0	N.A	**0**
23	2	1	225000	2	0.09	**2**
24	2	0	0	1	0.00	**0**
25	3	2	1200000	3	0.16	**4**
26	**2**	2	600000	1	1.00	**8**
27	2	3	975000	2	0.39	**8**
28	3	3	1950000	3	0.26	**6**
29	0	4	108000	0	N.A	**0**
30	1	3	325000	1	0.54	**8**
31	8	1	14400000	3	0.48	**8**
32	1	1	75000	0	N.A	**0**
33	1	4	450000	1	0.75	**8**
34	3	4	2700000	3	0.36	**8**
35	3	1	450000	0	N.A	**0**

Respond.. ID/Firm*	Respond..A C5.3-4 *		EBITDA Values	Respond..A C3	New variable	
	ATOA	AORR	EBITDA=ATOA*AORR	AIE	EB/AIE	EB..AIE
36	8	1	14400000	5	0.24	**5**
37	2	2	600000	1	0.24	**5**
38	3	2	1200000	3	0.16	**6**
39	**2**	1	225000	1	0.38	**8**
40	2	3	975000	0	N.A	**0**
41	9	6	268800000	8	1.12	**8**
42	3	0	0	0	0.00	**0**
43	7	1	7200000	3	0.24	**7**
44	2	2	600000	2	0.24	**5**
45	1	2	325000	1	0.54	**8**
46	0	4	108000	1	0.18	**4**
47	2	4	1350000	3	0.54	**8**
48	0	4	108000	1	0.18	**8**
49	0	4	108000	0	N.A	**0**
50	0	4	78000	0	N.A	**0**
51	2	4	975000	1	1.63	**8**
52	2	5	1350000	1	2.25	**8**
53	1	0	0	1	0.00	**0**
54	10	1	57600000	10	0.06	**2**
55	0	4	108000	0	N.A	**0**
56	1	4	450000	1	0.75	**8**
57	0	5	138000	0	N.A	**0**
58	0	5	138000	1	0.23	**5**
59	1	6	700000	2	0.28	**5**
60	3	2	1200000	2	0.16	**4**
61	5	1	1800000	4	0.12	**3**
62	3	2	1200000	0	N.A	**0**
63	1	5	575000	2	0.23	**5**
64	1	4	325000	1	0.54	**8**
65	8	6	134400000	5	4.48	**8**
66	2	3	975000	2	0.39	**8**
67	1	3	325000	0	N.A	**0**
68	1	3	325000	1	0.54	**8**
69	1	3	325000	0	N.A	**0**

*Respond..A = Respondents' Answers; *Respondents ID .. or Firm number

II. EB..AAS variable.

The main variables were used to create EB..AAS variable:

No	Questionnaire's Questions (C5.2, C5.3, C5.4 + B1)			
	EBITDA	ATOA	AORR	AAS
0	Unacceptable	200TLD-<1MLD	<1%	0-<200TLD
1	Very weak	1-<5	1-5%	200TLD-<1MLD
2	Weak	5-<10	6-10%	1-<5
3	Below the average	10-<20	11-15%	5-<10
4	Moderate	20-<40	16-20%	10-<20
5	Acceptable	40-<80	21-25%	20-<40
6	Desirable	80-<160	26-30%	40-<80
7	High	160-<320	31-35%	80-<160
8	Very high	320-<640	>36%	160-<320
9	....	640-<1280		320-<640
10	....	>1280 MLD		>640 MLD

EBITDA to sales:

EB..AAS = EBITDA/Average of Annual Sales.

No	**Averages used to calculate the new variables**			**EB..AAS**
	ATOA	AAS	AORR	**Scale**
0	600000	100000	0%	<1%
1	2500000	600000	3%	1-5%
2	7500000	2500000	8%	6-10%
3	15000000	7500000	13%	11-15%
4	30000000	15000000	18%	16-20%
5	60000000	30000000	23%	21-25%
6	120000000	60000000	28%	26-30%
7	240000000	120000000	33%	31-35%
8	480000000	240000000	37%	Over 36%
9	960000000	480000000		
10	1920000000	960000000		

Respond.. ID/Firm*	Respond..A C5.3-4 *		EBITDA Values	Respond..A B1	New variable	
	ATOA-A	AORR-A	EBT=ATOA*AORR	AAS	EBT/AAS	EB..AAS
1	7	1	7200000	9	0.06	**2**
2	5	1	1800000	5	0.06	**2**
3	3	1	450000	3	0.06	**2**
4	2	0	0	2	0.00	**0**
5	8	3	38400000	8	0.16	**4**
6	4	1	900000	3	0.12	**3**
7	4	0	0	1	0.00	**0**
8	4	2	2400000	5	0.16	**4**
9	5	0	0	1	0.00	**0**
10	10	2	153600000	10	0.16	**4**
11	5	3	7800000	6	0.13	**3**
12	3	2	1200000	3	0.16	**4**
13	2	0	0	2	0.00	**0**
14	1	0	0	1	0.00	**0**
15	9	8	316800000	10	0.33	**7**
16	10	6	537600000	10	0.56	**8**
17	10	1	57600000	10	0.06	**2**
18	10	1	57600000	9	0.12	**3**
19	10	2	153600000	10	0.32	**7**
20	10	4	345600000	10	0.72	**8**
21	9	1	28800000	7	0.24	**5**
22	2	2	600000	2	0.24	**5**
23	2	1	225000	2	0.09	**2**
24	2	0	0	2	0.00	**0**
25	3	2	1200000	5	0.08	**2**
26	**2**	**2**	600000	3	0.24	**5**
27	2	3	975000	2	0.39	**8**
28	3	3	1950000	3	0.26	**6**
29	0	4	108000	1	0.18	**4**
30	1	3	325000	1	0.13	**3**
31	8	1	14400000	8	0.06	**2**
32	1	1	75000	2	0.03	**1**
33	1	4	450000	2	0.18	**4**
34	3	4	2700000	4	0.18	**4**
35	3	1	450000	2	0.18	**4**

Respond.. ID/Firm*	Respond..A C5.3-4 *		EBITDA Values	Respond..A C3	New variable	
	ATOA	AORR	EBITDA=ATOA*AORR	AIE	EB/AIE	EB..AIE
36	8	1	14400000	10	0.06	**2**
37	2	2	600000	2	0.24	**5**
38	3	2	1200000	2	0.48	**8**
39	2	1	225000	2	0.09	**2**
40	2	3	975000	3	0.13	**3**
41	9	6	268800000	10	0.28	**5**
42	3	0	0	2	0.00	**0**
43	7	1	7200000	5	0.24	**5**
44	2	2	600000	2	0.24	**5**
45	1	2	325000	2	0.13	**3**
46	0	4	108000	2	0.04	**1**
47	2	4	1350000	6	0.02	**1**
48	0	4	108000	2	0.04	**1**
49	0	4	108000	1	0.18	**4**
50	0	4	78000	1	0.13	**3**
51	2	4	975000	2	0.39	**8**
52	2	5	1350000	2	0.54	**8**
53	1	0	0	1	0.00	**0**
54	10	1	57600000	6	0.00	**0**
55	0	4	108000	1	0.18	**4**
56	1	4	450000	2	0.18	**4**
57	0	5	138000	2	0.23	**5**
58	0	5	138000	2	0.06	**1**
59	1	6	700000	3	0.09	**2**
60	3	2	1200000	4	0.08	**2**
61	5	1	1800000	5	0.06	**2**
62	3	2	1200000	3	0.16	**4**
63	1	5	575000	3	0.08	**2**
64	1	4	325000	2	0.13	**3**
65	8	6	134400000	10	0.28	**6**
66	2	3	975000	2	0.39	**8**
67	1	3	325000	2	0.13	**3**
68	1	3	325000	2	0.54	**8**
69	1	3	325000	1	0.13	**3**

*Respond..A = Respondents' Answers; *Respondents ID .. or Firm number

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