

CHAPTER 3

Conceptual Framework and Evolution of Research Design

3.1 Introduction

This chapter outlines the Enterprise Performance Measurement and Management System (EPMS) and its dimensions of measurement. The model is intended to depict the effectiveness of EPMS incorporating flexibility framework. In this research, EPMS effectiveness is measured in terms of EPMS strategic alignment, strategic monitoring, financial perspective, customer perspective, internal business process perspective and learning & growth perspective. A conceptual model has been developed that captures the factors impacting effectiveness of enterprise performance management system of the firms. All these variables are controllable by the management. Practical application of this research can lead to effectiveness of EPMS.

3.2 Conceptual Framework for the Study

Based on extensive literature review, the macro and micro variables have been identified, which will define the conceptual model. The conceptual model assumes that integration of various influencing variables would enhance the effectiveness of enterprise performance management system for the organizations.

3.2.1 Components of the Model and their Relationships

Performance measurement is the process of assessing progress toward achieving predetermined goals. Performance management is building on that

process, adding the relevant communication and action on the progress achieved against these predetermined goals.

Performance management system is a set of processes that help businesses discover efficient use of their business units, financial, human and material resources. Its focus is on creating methodical and predictable ways to improve business results, or performance, across organizations.

Enterprise performance management helps organizations achieve their strategic goals. Traditional performance measures based only on financial or productivity analysis are no longer appropriate in today's competitive global market. Alternative performance management systems have been proposed by many authors that incorporate variety of performance measures/ key performance indicators (KPI) such as EVA, activity based costing, management audit, budgeting, TQM, six sigma, ISO, Skandia's intellectual capital navigator, performance benchmarking.

Next generation of EPMS focused on strategic perspective and tried to incorporate comprehensive view of the business performance such as balanced scorecard (BSC) proposed by Kaplan and Norton (1992) and performance prism by Neely and Adams (1998), and flexible strategy game-card by Sushil (2010).

In face of globalization, business organizations are facing uncertainty, competition and turbulence in its environment. This has forced organizations to adopt various types of flexibilities so that not only they survive but also to outperform.

Researchers have suggested different models with different measures and dimensions and also suggested various factors/variables influencing the effectiveness of EPMS.

Factors influencing EPMS effectiveness can be broadly categorized as macro and micro variables. The macro variables influencing EPMS effectiveness are described as under:

- (i) *Strategy planning* is an organizations' process in defining strategic vision, setting objectives, and crafting strategy to chalk out direction, its short-range and long-range performance targets, the competitive moves and making decisions on allocation of resources to pursue the strategy to achieve targeted business results.
- (ii) *Strategic flexibility* refers to the ability to precipitate intentional changes and adapt to environmental changes through continuous rethinking of current strategies, asset deployment and investment strategies.
- (iii) *Strategy implementation* is an operation-oriented to convert strategic plans into actions and results by staffing, developing budgets, building competencies and competitive capabilities of the organization, creating strategy-supportive work culture and climate, motivating people, and directing organizational change to meet and beat performance targets.
- (iv) *EPMS design* refers to how comprehensively enterprise performance management system has been designed incorporating various dimensions of measurements, key performance indicators, performance targets, weight-ages and scores.
- (v) *Performance reporting and feedback* refers to the performance analysis and feedback to top management as well as to the strategy planning stage so as to make corrective action.
- (vi) *Information system flexibility* refers to the flexibility of information system related to system functionality, usage, access, IT personnel,

and efforts required to change or modify these in terms of resources and budgets.

- (vii) *EPMS implementation issues* refer to various implementation issues and critical success factors, which are responsible for success or failure of EPMS and to increase effectiveness of EPMS in measuring and driving performance improvements.

The micro variables influencing EPMS effectiveness derived from factor analysis of survey data in chapter 4, are described briefly as under:

- (i) *Vision and mission clarity.*
- (ii) *Strategic goal setting.*
- (iii) *Impact of globalization and liberalization.*
- (iv) *In-house capabilities.*
- (v) *External drivers (Government policies, market forces, merger and acquisition etc).*
- (vi) *E-business impact.*
- (vii) *Alignment with operational goals.*
- (viii) *Resources allocation.*
- (ix) *Selection of dimensions and performance measures.*
- (x) *Customized performance measurement system design.*
- (xi) *Performance reporting and feedback.*
- (xii) *EPMS functionality (functionality, automation including ERP).*
- (xiii) *Information technology flexibility.*
- (xiv) *Effective EPMS implementation.*
- (xv) *Top management support.*
- (xvi) *Quality of data flowing to EPMS.*

The micro variables measuring EPMS effectiveness are described in brief as follows:

- (xvii) *Strategic alignment* refers to the extent of alignment of EPMS with strategy and strategy execution.
- (xviii) *Strategic monitoring* refers to the extent EPMS is able to monitor strategic initiatives and activities. Monitoring may go off-track and it may not be able to track performance of intended strategic objectives.
- (xix) *Financial perspective* refers to the achievement of financial goals of the organization to satisfy various stakeholders.
- (xx) *Customer perspective* refers to the value creation for the customers.
- (xxi) *Internal business process perspective* refers to the efficiency and effectiveness of internal business processes of the organization to deliver the desired strategic goals.
- (xxii) *Learning and growth perspective* refers to the skill and competencies development of personnel to be able to carry out operations to meet strategic objectives of the organization.

Based on literature review, the conceptual model for the research has been developed (Figure 3.1).

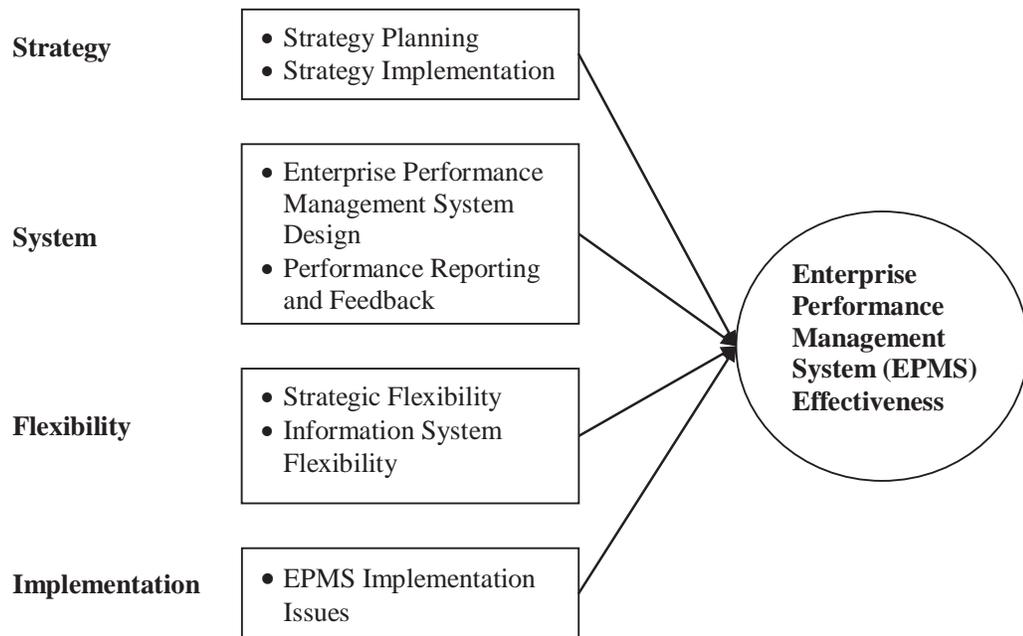


Figure 3.1: Conceptual Model of Research

3.3 Problem Conceptualization

3.3.1 Problem Attributes

Every research problem is unique, for which it may not be possible to adopt one particular method by the researcher. However, research methodology can be evolved by integrating two or more methods.

Enterprise performance management involves EPMS design incorporating various dimensions of measurement such as strategic alignment, strategic monitoring, financial, customer, internal business process and learning and growth perspectives. Other factors influencing performance management such as strategy planning, strategic flexibility, strategy implementation, comprehensiveness of EPMS design, performance reporting and feedback, information system flexibility, and EPMS implementation issues are to be incorporated.

This shows the multidimensional nature of the problem, encompassing multitude of issues. The problem of performance management is complex and is concerned with top, middle and operational managers in design, implementation, monitoring and decision making for deriving results.

3.3.2 Variables for the Study

The effectiveness of enterprise performance measurement and management identified from literature survey is presented in the conceptual model as shown in Figure 3.1.

Based on literature review, the variables for investigation in the study have been identified (Tables 3.1 and 3.2). These variables have been measured with the help of scales developed by different researchers.

The definition of different variables for the purpose of this study are placed in Appendix-I. These variables have been used for data collection through survey and case studies.

Table 3.1: Independent Variables Influencing Enterprise Performance Management System Effectiveness for Investigation in the Study

Macro Variables Influencing EPMS Effectiveness	Micro Variables Influencing EPMS Effectiveness	Author(s)
Strategy Planning (SP)	<ul style="list-style-type: none"> • Vision and Mission Clarity • Setting of Strategic Goals 	Kaplan and Norton (1992, 1996, 2004), Neely and Adams (1998)
Strategic Flexibility (SF)	• Impact of Globalization/Liberalization	Toni and Tonchia (2001, 2005), Sushil (2005)
	• In-house Capabilities	Sushil (2005)
	• External Drivers	Sushil (2005)
	• E-Business Impact	Sushil (2005)
Strategy Implementation(SI)	<ul style="list-style-type: none"> • Alignment with Operational Goals • Resources Allocation • Sensitivity to Time and Cost over runs 	Kaplan and Norton (1992,1996, 2004), Lynch and Cross (1988), Neely and Adams (1998)
EPMS Design (SM)	<ul style="list-style-type: none"> • Selection of Measures • Weightages and Reviews of Measures • Customised EPMS 	Sink and Tuttle (1989), Kaplan and Norton (1992,1996, 2004)

Performance Reporting (PR)	<ul style="list-style-type: none"> • Performance Reporting and Feedback 	Kaplan and Norton (1992,1996,2004), Neely and Adams (1998)
Information System Flexibility (IF)	<ul style="list-style-type: none"> • EPMS Functionalities • IT Flexibility 	Bititci et al. (2000), Gebauer and Lee (2008)
EPMS Implementation Issues (MI)	<ul style="list-style-type: none"> • Effective EPMS Implementation • Top Management Support • Quality of Data 	Martinez and Kennerley (2005), Ittner and Larcker(2003)

Table 3.2: Dependent Variables Measuring Effectiveness of Enterprise Performance Management System for Investigation in the Study

Micro Variables of EPMS Effectiveness	Author(s)
Strategic Alignment (SA)	Kaplan and Norton (1992,1996,2004), Neely and Adams (1998), Skinner (1974), Sushil (2010)
Strategic Monitoring (SM)	Kaplan and Norton (1992,1996,2004), Neely and Adams (1998),
Financial Perspective (FP)	Kaplan and Norton (1992,1996), Neely and Adams (1998),
Customer Perspective (CP)	Kaplan and Norton (1992,1996), Neely and Adams (1998), Eccles (1992),
Internal Business Process Perspective (BP)	Kaplan and Norton (1992,1996), Neely and Adams (1998), Chakravarthy (1986), Eccles (1992),
Learning and Growth Perspective (LP)	Kaplan & Norton (1992,1996), Neely and Adams (1998), Chakravarthy (1986), Eccles (1992), Hayes et al. (2002),

3.4 Hypotheses Formulation

Based on conceptual framework developed in section 3.3, the set of macro hypotheses formulated is given in Table 3.3. The micro variables describe the macro variables. The micro hypotheses formulated for each variable are given in Table 3.4.

Macro Hypotheses

- (i) **H0:** Independent macro variables are not a predictor of EPMS effectiveness.
- (ii) **H1:** Independent macro variables are a predictor of EPMS effectiveness.

Table 3.3: The Macro Hypotheses for Research

Independent Macro Variables	Hypotheses	Hypotheses Code
Strategy Planning (SP)	Extent of Strategy planning influences EPMS effectiveness positively	H _{SP}
Strategic Flexibility (SF)	Strategic flexibility influences EPMS effectiveness positively	H _{SF}
Strategy Implementation (SI)	Effective Strategy implementation influences EPMS effectiveness positively	H _{SI}
EPMS Design (SM)	Comprehensiveness of EPMS design influences EPMS effectiveness positively	H _{SM}
Performance Reporting and Feedback (PR)	Performance Reporting and feedback influences EPMS effectiveness positively	H _{PR}
Information System Flexibility (IF)	Information system flexibility influences EPMS effectiveness positively	H _{IF}
EPMS Implementation/ Management Issues (MI)	EPMS implementation issues influences EPMS effectiveness positively	H _{MI}

The macro hypothesis H_{SP} means that extent of strategy planning does not influence the EPMS effectiveness. Similarly other macro hypothesis can be explained.

Micro Hypotheses

Micro hypothesis are defined as null and not null as follows:

- (i) **H₀F_iE_j (i=1,...,16, j=1,...,6)**: ith type of factor does not influence jth type of effectiveness area.
- (ii) **H_FF_iE_j (i=1,...,16, j=1,...,6)**: ith type of factor influences jth type of effectiveness area.

The codes for independent micro variables after confirmatory factor analysis are as given in Table 4.2, wherein vision and mission clarity (SP1), setting of strategic goals (SP2) etc. are micro factors. The codes for dependent micro variables of effectiveness of EPMS are strategic alignment (ESA), strategic monitoring (ESM), financial perspective (EFP), customer perspective (ECP), internal business process perspective (EBP), and learning and growth perspective (ELP). The coding of the micro hypotheses of EPMS effectiveness are given in Table 3.4.

Table 3.4: The Micro Hypotheses for Research

Independent Macro Variables	Independent Micro Variables	Dependent Micro Variables					
		SA	SM	FP	CP	BP	LP
Strategy Planning (SP)	Vision and Mission Clarity (SP1)	H _{SP1SA}	H _{SP1SM}	H _{SP1FP}	H _{SP1CP}	H _{SP1BP}	H _{SP1LP}
	Setting of Strategic Goals (SP2)	H _{SP2SA}	H _{SP2SM}	H _{SP2FP}	H _{SP2CP}	H _{SP2BP}	H _{SP2LP}
Strategic Flexibility (SF)	Impact of Globalization/ Liberalization (SF1)	H _{SF1SA}	H _{SF1SM}	H _{SF1FP}	H _{SF1CP}	H _{SF1BP}	H _{SF1LP}
	In-house Capabilities (SF2)	H _{SF2SA}	H _{SF2SM}	H _{SF2FP}	H _{SF2CP}	H _{SF2BP}	H _{SF2LP}
	External Drivers (SF3)	H _{SF3SA}	H _{SF3SM}	H _{SF3FP}	H _{SF3CP}	H _{SF3BP}	H _{SF3LP}
	e-Business Impact (SF4)	H _{SF4SA}	H _{SF4SM}	H _{SF4FP}	H _{SF4CP}	H _{SF4BP}	H _{SF4LP}
Strategy Implementation (SI)	Alignment with Operational Goals (SI1)	H _{SI1SA}	H _{SI1SM}	H _{SI1FP}	H _{SI1CP}	H _{SI1BP}	H _{SI1LP}
	Resources Allocation (SI2)	H _{SI2SA}	H _{SI2SM}	H _{SI2FP}	H _{SI2CP}	H _{SI2BP}	H _{SI2LP}
EPMS Design (SM)	Selection of Dimensions and Measures (SM1)	H _{SM1SA}	H _{SM1SM}	H _{SM1FP}	H _{SM1CP}	H _{SM1BP}	H _{SM1LP}
	Customised EPMS (SM2)	H _{SM2SA}	H _{SM2SM}	H _{SM2FP}	H _{SM2CP}	H _{SM2BP}	H _{SM2LP}
Performance Reporting and Feedback (PR)	Performance Reporting and Feedback (PR1)	H _{PR1SA}	H _{PR1SM}	H _{PR1FP}	H _{PR1CP}	H _{PR1BP}	H _{PR1LP}
Information System Flexibility (IF)	EPMS Functionalities (IF1)	H _{IF1SA}	H _{IF1SM}	H _{IF1FP}	H _{IF1CP}	H _{IF1BP}	H _{IF1LP}
	Information Technology (IT) Flexibility (IF2)	H _{IF2SA}	H _{IF2SM}	H _{IF2FP}	H _{IF2CP}	H _{IF2BP}	H _{IF2LP}
EPMS Implementation Issues (MI)	Effective EPMS Implementation (MI1)	H _{MI1SA}	H _{MI1SM}	H _{MI1FP}	H _{MI1CP}	H _{MI1BP}	H _{MI1LP}
	Top Management Support (MI2)	H _{MI2SA}	H _{MI2SM}	H _{MI2FP}	H _{MI2CP}	H _{MI2BP}	H _{MI2LP}
	Quality of Data (MI3)	H _{MI3SA}	H _{MI3SM}	H _{MI3FP}	H _{MI3CP}	H _{MI3BP}	H _{MI3LP}

Table 3.4 contains the micro-hypotheses with EPMS effectiveness areas as dependent micro variables and factors influencing effectiveness as

independent micro variables. For example, expression H_{SP1SA} in this table means, that vision and mission clarity (SP1) influences EPMS strategic alignment (SA), H_{SP2FP} means strategic goal setting influences financial perspective and so on. Similarly other hypotheses are given in the table above.

3.5 Research Methodology

To develop a balance of check mechanism in the research, the study has been carried out in three phases: empirical study (questionnaire based survey), case study and interpretation, and synthesis and recommendation.

- (i) **Empirical Study:** This part of the study is based on survey method to establish relationship among EPMS effectiveness and factors influencing effectiveness. The questionnaire is designed, pilot tested, validated and finalised. Opinion survey is conducted to collect quantitative data from respondents. Statistical analyses are conducted to arrive at major research findings.
- (ii) **Case Studies and Interpretation:** Case studies of top two companies from upstream oil industry is carried out using dynamic SAP-LAP framework (Sushil, 2000) to verify and enrich the EPMS effectiveness model and its interpretation.
- (iii) **Synthesis and Recommendations:** Findings of the survey and case studies are synthesized and finally a recommended model of EPMS effectiveness with interpretation and implementation guidelines is presented.

The flowchart of research methodology framework is described in Figure 3.2, which shows how the validated EPMS effectiveness model has been developed.

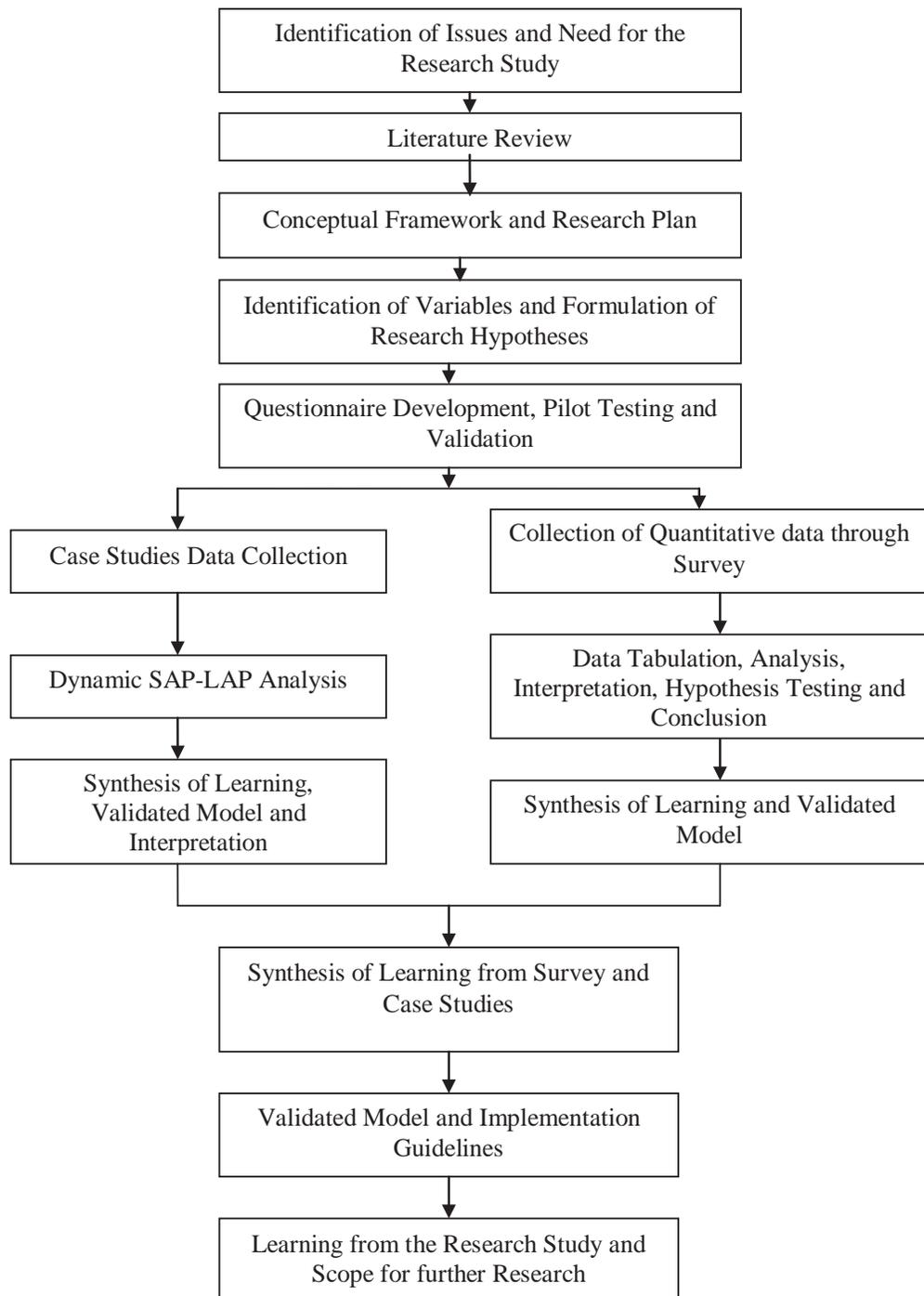


Figure 3.2: Flowchart Showing Framework of Research Methodology

3.5.1 Methodology for the Survey

This part of the study is carried out using scientific method of questionnaire based opinion survey to establish relationship between the research variables involved in the study. It is based on gathering measurable, observable and empirical evidences subject to specific principles of reasoning.

The questionnaire was developed, pre-tested and administered to the executives (senior and middle management) of upstream oil companies in India. To understand the correlation among the variables, correlation analysis has been used. Based on conceptual model evolved in this chapter, the hypotheses have been tested statistically through stepwise multiple regression technique and the results have been synthesized to identify factors influencing EPMS effectiveness. Figure 3.3 explains the flowchart of statistical analyses used in analyzing the survey data.

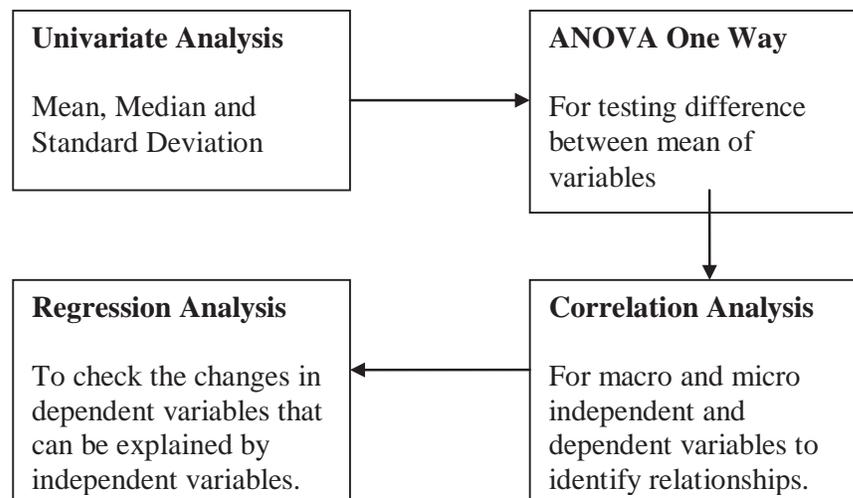


Figure 3.3: Flowchart Showing Statistical Analysis

3.5.2 Methodology for the Case Studies

The aim of the case studies is to understand the impact of comprehensive enterprise performance management system (EPMS) implementation and its

impact on the organization in driving performance improvement. The case studies are useful in understanding following aspects:

- To interpret the validated model in real life cases, which would give better insight on factors influencing EPMS effectiveness in performance enhancement in upstream oil companies in India.
- To interpret relevance of the macro and micro variables and their linkages in case organizations.
- To provide comparison of learning from case studies, synthesis and interpretation of validated model.

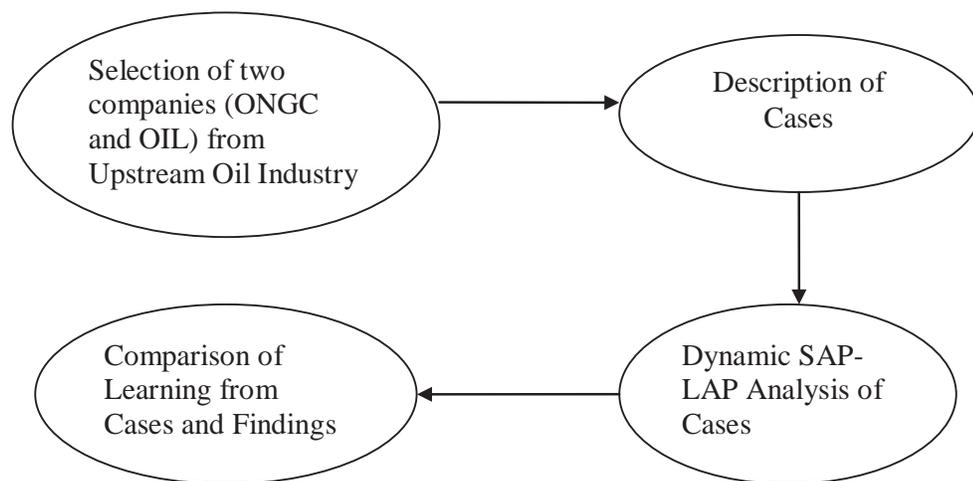


Figure 3.4: Flowchart Showing Case Study

The case studies were carried out using SAP-LAP framework of flexible systems methodology. The flowchart indicating the development and use of two case studies in the thesis is given in Figure 3.4. The learnings from the cases have been synthesized and the findings are presented.

SAP-LAP Methodology

Dynamic SAP-LAP framework developed for better insight through case studies has been used (Sushil, 2000, 2001a). Dynamic SAP-LAP analysis application

for auto component manufacturing firms in India has been studied (Sahoo et al., 2010).

SAP-LAP methodology consists of three basic entities namely 'situation', to be dealt with, 'actors', who deal with situation, and 'processes', that recreate the situation. The freedom of choice lies with actor and synthesis of SAP leads to LAP (learning, actions and performance). This model also provides generic and specific model of enquiry and problem solving.

The dynamic SAP-LAP maps the two scenarios namely, before and after comprehensive EPMS implementation taken up by the case organization. The changes which occurred during EPMS implementation in terms of situation, actors, and key processes are mapped. Based on this mapping, LAP synthesis in terms of key learnings, suggested actions and expected performance benefits are carried out in each case.

Case Selection

Two major upstream oil companies having strong presence in upstream business and implemented comprehensive enterprise performance management system namely Oil and Natural gas Corporation Ltd. (ONGC) and Oil India Ltd. (OIL) has been selected for case studies. Though both being high performers, maturity level of EPMS implementation in both organizations are different (high and moderate).

Data Collection Process

The case studies on the two selected organizations have been developed by using the data collected from published reports, websites, and semi-structured interviews from concerned senior executives of ONGC and OIL and observations.

3.5.3 Justification for the Research Methodology Chosen

The research problem deals with the external and internal environmental factors, strategies, leadership, culture, capabilities and competencies, measurement system and procedures of an organization. Thus, the research methods suitable for data collection are a blend of survey study and case studies. Research data has been collected through carefully designed and pre-tested questionnaire mailed to senior and middle level executives to generate quantitative data for statistical testing of causal relationships among variables and evolving a validated model of EPMS effectiveness. The findings of the survey study are further supported and enriched by case studies, where data is collected through both interview and observation methods and analysed using SAP-LAP framework to capture variable linkages and synthesize practical insight and action to improve organization's EPMS effectiveness.

3.5.4 Implementation of Research Methodology

A sample has to be true representation of population. In case of present research problem, population of upstream oil industry in India is around 15 companies including both public sector (majority holding by Government of India) and private sector companies. The response from private sector was relatively poor as they seemingly were not inclined to respond to questionnaire or interviews. Out of around 500 questionnaires distributed, 139 responses were received from ten organizations in India. There are few large corporations namely Oil and Natural Gas Corporation (ONGC), Oil India Ltd (OIL), Gujarat State Petroleum Corporation (GSPC), Essar Oil Ltd(EOL), Cairn Energy India Ltd (CEIL), Reliance Industries Ltd (RIL), and new start-up upstream divisions in the downstream organisations namely Gas Authority India Ltd.(GAIL), Indian Oil Corporation Ltd. (IOCL), Bharat Petroleum Corporation Ltd. (BPCL),

Hindustan Petroleum Corporation Ltd. (HPCL), BG India Ltd (BGIL), and Heramec Ltd. Being the top companies, ONGC and OIL have been selected for the case study.

The research methods and sampling techniques used for various parts of the study is presented in Table 3.5. Upstream oil companies in India have been taken as the unit of analysis for the study. Research analysis techniques used during the study are listed in Table 3.6 with the objective of analysis and relevant references.

Table 3.5: Research Methods and Sampling Techniques Used

Study Phase	Objective of the Study	Research Method Used	Sampling Technique Used
Survey	To bring out the relationships among independent variables and EPMS effectiveness dependent variables	Survey method	Snow-ball random sampling
Case Study	To understand the micro issues of EPMS effectiveness	Case study through interview and observation method	Purposive sampling

The questionnaire contained 107 likert-type questions both on factors influencing effectiveness and EPMS effectiveness on a 6-point scale, where 1 represented strongly disagree and 6 represented strongly agree. The data collected has been analysed using Excel 2003, and SPSS-12 (Statistical Package for Social Science) software packages. The measurement properties of the questionnaire including factor analysis and reliability assessment have been determined. The data collected has been analysed statistically using univariate, bivariate and multivariate analyses techniques (Barret and Weinstein, 1997, 1998).

Table 3.6: Research Techniques Used

Research Techniques	Objective of the Analysis	Authors(s)/ References
Factor Analysis	The analysis used to reduce factors for the study and validate constructs.	Malhotra, 2004, Nargundkar, 2008, Hair et al., 2006.
Univariate Analysis	Analysis for descriptive statistics such as mean, median, standard deviation for each macro and micro variables.	Malhotra, 2004, Nargundkar, 2008, Hair et al., 2006.
Bi-Variate Analysis	Correlation between two macro and micro variables of research study.	Malhotra, 2004, Nargundkar, 2008, Hair et al., 2006..
Regression Analysis	Step-wise regression analysis being carried out to test hypothesis of relations to identify whether dependent EPMS effectiveness variable is explained by identified independent variables influencing EPMS effectiveness.	Malhotra, 2004, Nargundkar, 2008, Hair et al., 2006.
Case Research	To study in-depth, a relatively small number of cases of select industry rather than attempting to cover whole industry.	Yin, 1993, 2003
SAP-LAP	To have better insight through case research.	Sushil, 2000.

The case studies on EPMS effectiveness has been carried out on two organisations namely ONGC and OIL. The data was collected through discussions with senior managers in corporate planning, budgeting, performance management and benchmarking departments and through personal observations during visits to these two organizations.

The cases have been analysed using dynamic SAP-LAP (Situation-Actor-Process; Learning-Actions-Performance) framework of flexible systems management methodology. Finally, the result from survey and case studies have been synthesised and interpreted.

3.6 Concluding Remarks

Based on research evidences from literature, EPMS effectiveness conceptual framework/model has been evolved. The conceptual model is being tested with empirical study based on survey of senior and middle managers from upstream

oil companies in India through research hypotheses testing. The findings have been further enriched by case studies of selected companies. The learning from both the studies has been synthesized and the recommended EPMS effectiveness model with interpretation and implementation guidelines has been suggested.

The effectiveness of enterprise performance management system (EPMS) has been measured on six dimensions namely, strategic alignment, strategic monitoring, financial perspective, customer perspective, internal business process perspective and, learning and growth perspective. The seven macro factors influencing EPMS effectiveness are: strategy planning, strategic flexibility, strategy implementation, EPMS design, performance reporting and feedback, information system flexibility, and EPMS implementation issues. To find out links between EPMS effectiveness and factors influencing effectiveness, two methodologies have been used i.e. survey and case studies based on interviews and observations. The questionnaire was mailed and personally distributed to senior and middle level executives of 15 upstream oil companies including both government and private owned. A total of 139 executives from 10 companies have responded to the mailed questionnaire. The questionnaire (Appendix-II) consisted of total 107 questions, 70 questions on independent variable influencing effectiveness and 37 questions on dependent variable measuring EPMS effectiveness. The design of questionnaire, pilot testing, validation, data collection, and univariate analysis results are presented in next chapter.

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