EIS Implementation in PETRONAS

by

Mohd Azam Yusoff

Bachelor of Science, Geology
City of London Polytechnic, 1982

Submitted to the Alfred P. Sloan School of Management
in Partial Fulfillment of the Requirements for the Degree of

Master of Business Administration in Management

at the

Massachusetts Institute of Technology
June 2000

© Mohd Azam Yusoff 2000. All rights reserved.

The author hereby grants to MIT permission to produce and to distribute publicly paper and electronic copies of this thesis document in whole or in part.

Signature of Author:__________________________________________

Alfred P. Sloan School of Management
May 6, 2000

Certified by:___________________________________________________

Michael S. Scott Morton
Jay W. Forrester Professor of Management
Thesis Supervisor

Accepted by:___________________________________________________

Toby Woll
Director, Sloan Fellows Program
EIS Implementation in PETRONAS

by

Mohd Azam Yusoff

Submitted to the Alfred P. Sloan School of Management
in Partial Fulfillment of the Requirements for the Degree of
Master of Business Administration in Management

Abstract

The thesis focuses on the Implementation of Executive Information system (EIS). The thesis
will discuss the approaches of implementing EIS, what are organizational barriers need to be
overcome, and what are the objectives for the EIS implementation. The key component of EIS
is the performance measures. The approach for development of the performance measures and
how they are used in EIS for performance management will also be discussed.

The thesis will also focuses specifically on implementation of EIS in PETRONAS and the
results of the implementation. Survey results indicates that PETRONAS is experiencing some
issues that need to be addressed. These include issues of the system performance and more
critically the doubt that some of the managers have on the usefulness of the performance
measures developed and the usefulness of the EIS in general.

Thesis Supervisor: Michael Scott S. Morton

Jay W. Forrester Professor of Management
Acknowledgements

In The Name of God. Most Gracious. Most Merciful.

Praises and thanks be to ALLAH Almighty and salutations to beloved Prophet Muhammad.

I dedicated this to my wife, Hijah Arifakh Othman, and my three children, Nor Arina, Ahmad Zarul Fitri and Ahmad Nazeri. Thank you for all the love, joy, encouragement and support for me to be able to write this thesis.

Special thanks to Professor Michael S. Scott Morton for his assistance and guidance

And finally special credits for PETRONAS for sponsoring my education in MIT
Disclaimer

The information and opinions either suggested or derived in the thesis are from author’s own personal and/or working experience and knowledge with the intention of solely writing this thesis. It does not represent or reflect in any way the official views of PETRONAS and/or its group of companies.
Table of Contents

Abstract ......................................................................................... 2
Acknowledgements ......................................................................... 3
Disclaimer ..................................................................................... 4
Table of Contents ........................................................................... 5
List of Figures ............................................................................... 7
List of Tables ................................................................................. 8

CHAPTER ONE – INTRODUCTION....................................................... 9

CHAPTER TWO – IMPLEMENTING EIS............................................. 17

INTRODUCTION ............................................................................. 17
OBJECTIVE OF EIS ....................................................................... 17
BARRIERS TO EFFECTIVENESS...................................................... 20
1. Behavior Norms and Culture ................................................... 21
2. System Capability ..................................................................... 23
3. Misalignment information contained in EIS ......................... 26
APPROACH TO SUCCESSFUL EIS IMPLEMENTATIONS .............. 27
Criteria for Successful Implementation of EIS ......................... 28
Methodology for Successful Implementation of EIS ................. 33
FRAMEWORK FOR SUCCESSFUL SYSTEM IMPLEMENTATION ...... 37

CHAPTER THREE – PERFORMANCE MANAGEMENT ................. 39

INTRODUCTION ............................................................................. 39
APPROACHES TO EXECUTIVE INFORMATION NEEDS ............... 40
By-Product Method ..................................................................... 41
Null Method .................................................................................. 41
Key Indicator Method ..................................................................... 42
Total Study Method ....................................................................... 42
Critical Success Factor Method ..................................................... 43
USING THE BALANCED SCORECARD AS PERFORMANCE MANAGEMENT SYSTEM ......................................................... 43
ACHIEVING STRATEGIC ALIGNMENT ........................................ 43
INTEGRATING LONG-RANGE STRATEGIC AND OPERATIONAL BUDGETING PROCESS ......................................................... 47
1) Set stretch targets ................................................................. 48
2) Identify and rationalize strategic initiatives ............................ 48
3) Identify Critical Cross-Business and Corporate Initiatives .... 51
4) Link to annual resource allocation and budget ..................... 51
STRATEGIC LEARNING ................................................................. 52
Shared Strategic Framework ......................................................... 53
Strategic Feedback ....................................................................... 54
Team Problem solving Process .................................................... 55
THE FOUR PERSPECTIVES OF THE BALANCED SCORECARD .... 55
Financial Measures ..................................................................... 55
Customer Measures .................................................................... 56
Internal Business Process Measures ......................................... 59
Learning and Growth Measures ............................................... 60
Cascading the Balanced Scorecard ............................................. 61
LINKING BALANCED SCORECARD TO STRATEGY ................. 62
1) Cause-and-Effect Relationship .............................................. 63
2) Outcomes and Performance Drivers .................................... 64
List of Figures

Figure 2.1. Leavitt's Balancing Act (adjusted) .............................................................................. 38
Figure 3.1. The Balanced Scorecard as a Strategic Framework for Action .................................... 45
Figure 3.2. A Different Management System- Planning and Target Setting .................................. 49
Figure 3.3. A Different Management System- Strategic Feed Back and Learning ....................... 53
Figure 3.4. Framework to Translate Strategy into Operational Actions ....................................... 63
Figure 4.1. The Evolution of PETRONAS ...................................................................................... 66
Figure 4.2. PETRONAS Organization Structure ........................................................................... 67
Figure 4.3. Summary of PETRONAS Decision Making Framework ............................................ 68
Figure 4.4. PETRONAS' VBM Requirements .............................................................................. 71
Figure 4.5. PETRONAS Strategic Planning Process .................................................................... 74
Figure 4.6. Development of External Environment Analysis Process ........................................... 76
Figure 4.7. Development of the Strategic Assessment Process ...................................................... 77
Figure 4.8. Development of the Corporate Strategic Thrust/Plans and Budget .............................. 78
Figure 4.9. A Formal Strategic Planning Process ........................................................................... 79
Figure 4.10. Conceptual Alignment Framework in PETRONAS .................................................... 81
Figure 4.11. VBM Implementation Schedule .................................................................................. 83
Figure 4.12. VBM Implementation Teams Structure ..................................................................... 85
Figure 4.13. Performance Monitoring System in PETRONAS ....................................................... 87
Figure 4.14. Five-Step Process of Developing KPIs ...................................................................... 88
Figure 4.15 Sensitivity Test to Determine the Value Impact ......................................................... 90
Figure 4.16 EIS Pilot Implementation Schedule ............................................................................ 92
Figure 4.17 EIS Architecture Overview ....................................................................................... 93
Figure 4.18 EIS Process Flow ...................................................................................................... 94
Figure 4.19 Content of EIS in PETRONAS .................................................................................. 95
Figure 4.20 PETRONAS EIS Performance Dashboard Content ..................................................... 96
Figure 4.21. Conceptual Framework of EIS Usage in PETRONAS ................................................ 97
Figure 4.22. Summary of Survey Result ....................................................................................... 99
Figure 5.1. Leavitt's Balancing Act (adjusted) .............................................................................. 101
List of Tables

Table 3.1. Tools for Organizational Learning with the Balanced Scorecard ........................................ 54
Table 3.2. Examples of Financial Measures ..................................................................................... 56
Table 3.3. Examples of Core Customer Measures ............................................................................ 57
Table 3.4. Examples of Customer Value Proposition Measures .................................................. 58
Table 3.5. Examples of Internal Business Process Measures ....................................................... 60
Table 3.6. Examples of Learning and Growth Measures ................................................................ 61
Table 4.1. Key Questions and Answers for VBM Performance Measure ...................................... 72
CHAPTER ONE - INTRODUCTION

In 1991, for the first time ever, companies spent more money on computing and communication gear than combined monies spent on industrial, mining, farm, and construction equipment.

There has been more information produced in the last 30 years than during the previous 5,000.

Let’s say you’re going to a party, so you pull out some pocket change and buy a little greeting card that play “Happy Birthday” when it’s opened. After the party, someone tosses the card into thrash, throwing away more computer power than existed in the entire world before 1950.\(^1\)

... throughout history, soldiers, sailors, Marines, and airmen have learned one extremely valuable lesson relative to the engagement with opposing force. That is, if you can analyze, acts and access faster than your opponent-you will win.\(^2\)

The extracts above show the criticality of information and how technology has changed information gathering. With the rapid growth of Information Technology, the nature of work in the organization is changing. These changes affected production work, coordinative work and management work (Scott Morton, 1991). The production work changes by the automation of the work process, information processing and gathering, and includes the automation of production, data processing and transactions billing and software that increase knowledge production like CAD/CAM.

---


The coordination within organization has change tremendously with the advancement of communications network. Distance and time has been shrunk, and organization memory such as common data base can be maintained over time, contributed to and from all parts of organization and is widely available to authorized users.

The effect of such huge amount and greater accessibility of data has transformed how managers have work. The managers are more aware of the direction that the organization should be taking by staying close to its external environment changes, and internal ideas and reaction to the environment. Timely and relevant information from these two sources can be a crucial input for direction setting process. Availability of IT has also changed the control aspects of management. Performance can be measured along some measurements that has been defined and is measured against the strategic objectives and plan more effectively. The effective manager would have to be available to use the advantages of IT in managing the information for future direction-setting and making informed decision.

Information systems have long been used to gather and store information, to produce specific reports for workers, and to produce aggregate reports for managers. However, senior managers rarely use these systems directly, and often find the aggregate information to be of little use without the ability to explore underlying details (Watson & Rainer 1991, Crockett 1992).
Key buzzwords in information system circle only a few years ago was EIS-short for executive information system. EIS was the penultimate in management information systems. EIS promised to equip corporate executives with updated business intelligence-information about the company’s own trends in revenues, profits, products, and other performance measures-so they could make better-informed decisions.

The original promise was that EIS was the tool that would give all the answers. As a lot of organization discovered, it didn’t work out that way. Most executive information systems fell way short of the mark, leaving their users disappointed with the technology. Many corporate executives today still depend on paper summaries or on information provided by administrative staff or managers as a result of that failure. And the ones who use personal computers often receive data via electronic mail that has already been heavily massaged by others in the organization.

Still others, though, regularly depend on a new breed of software that puts them in direct touch with key business measures they believe are essential for informed strategic decision making. These systems enable him or her to learn how the company perform in its markets. They can find out which product is most profitable, or determine which region’s sales are lagging, while there’s still time to do something about it.

\footnote{An EIS would facilitate collection of data enterprise wide and convert it into information. The objective of managing the information is to gain knowledge and wisdom.}
There are many reasons why EIS failed to deliver on its promise (Bartholomew 1997). Most EIS software was hard-wired and the user had to accept a predefined inquiry path and had little or no freedom to make his or her own what-if queries. The old executive information systems were perceived as being too inflexible, without allowing users to change reports to meet their specific needs.

Lack of dependability and consistency of the underlying information is another important reason why EIS never really catch on. Despite today’s shift toward enterprise-wide systems, many companies still use a variety of different computer systems. Consolidating the disparate data contained in each remains a problem. The technology promised more than it could deliver, because businesses generally didn’t have cross-functional business processes with consistent information.

Another problem with EIS was slow response times. Data were stored in standard relational databases, which are too slow for users to do complicated queries, and too slow to response. This frustrated the users who need fast and accurate information for their decision making.

Finally, many executive information systems were not user-friendly. It lacks the kind of intuitive ease of understanding that casual users such as executives would want. This confounded the problem as many of the top executives then were just uncomfortable with new technologies. They feel threatened and would not use the system to full potential.
The term EIS got such a bad reputation that most software vendors stopped using it. Instead, they renamed their products under the broader headings of decision-support systems or business intelligence software.

This has recently changed. EIS today has become an increasingly important tool for top executives. This increase in support is evidence, as EIS is developed in growing numbers of organizations (Watson et al., 1991). One big difference is the recent proliferation of enterprise-resource-planning systems from such software makers as Baan Co., SAP, Oracle Corp., and PeopleSoft Inc. These new systems provide a common, integrated set of business-transaction data that can be depended on as a backbone for any executive information system.

The level of sophistication of the software also has changed in recent years. Some newer systems are more proactive, periodically feeding top managers the information they need without their having to ask for it each time. Software makers are also paying serious heed to the ease-of-use issue. These systems together with a number of decision-support software could somewhat alleviate a lot of the old problems.

The current generation of EIS provides direct on-line access to relevant information in a useful and navigable format. Relevant information is timely, accurate, and actionable information about aspects of a business that are of particular interest to the senior manager. The useful and navigable format of the system means that it is specifically designed to be
used by individuals with limited time, limited keyboarding skills, and little direct experience with computers. An EIS is easy to navigate so that managers can identify broad strategic issues, and then explore the information to find the root causes of those issues.

Olve, Roy, and Wiley (1999)\(^4\) discussed how the software for EIS has evolved. The first generation systems were very presentation oriented and typically present data in a manner that facilitates comparison over time, and between business units. These systems are using tools such as HTML, Excel and Visual Basic to create simple displays, sometimes resembling a car dashboard.

The Second generation systems provide additional functionality in the areas of automatic data collection from existing systems, and the capability to "drill-down" so that users can access data underlying the summary measures. These systems are typically referred to as "OLAP" (On-Line Analytical Processing) systems because they allow users to perform analysis on the data themselves.

The current generation systems permit even more detailed analytical capabilities, offering the capacity to derive cause-and-effect relationships among the measures, and the capability to simulate strategic decision alternatives. For example, managers can ask the software to simulate what would happen if employee satisfaction scores increased by one percent. iThink, and Powerism are two examples of software with this capability.

This thesis shall analyze the implementation of EIS in PETRONAS and compare to the approach proposed by management theorist In addition, the objectives for the EIS implementation and the issues that PETRONAS is facing shall also be analyzed. Data collections for the issues is based on surveys sent to some key stakeholders at PETRONAS.

CHAPTER 2 will review the approach of implementing an EIS based literature review. This chapter will discuss, the key to successful implementation of EIS and potential barriers that organization could face. It will discuss on general the content and organizational requirements for successful implementation of EIS. This chapter is intended to give an overview what requirements organizations need to consider for successful implementation of EIS

CHAPTER 3 will discuss the performance management, which is the primary purpose of an EIS. Various methods of measuring performance will be reviewed. The main focus shall be discussion on Kaplan’s Balance Score Card approach to measures the organizational performance.

CHAPTER 4 will review the implementation of EIS in PETRONAS. It shall cover brief introduction to PETRONAS, objectives of EIS, approach of implementation, and issues that PETRONAS faced.
CHAPTER 5 is the conclusion. This chapter ends on the insights and summary of the findings of EIS implementation in PETRONAS.
CHAPTER TWO – IMPLEMENTING EIS

Introduction

The definition of EIS has traditionally been as a “computerized system that provides executive with easy assess to internal and external information that is relevant to their success factors.” Today EIS is more than that. It can be manual but the purpose or usage has enveloped a wider scope. EIS emphasis now is to facilitate the highest levels of strategic decision making and help diagnose problem (Crockett 1992).

It is commonly agreed in the literature that for an organization to successfully implement EIS, three factors are vital. The organization has to understand the objective of the EIS, the barriers of the effectiveness that it likely to face and the critical success factors of the approach.

Objective of EIS

The scope of usage of an EIS has widened from its original intention of information gathering and dissemination. Today there are three main objectives for EIS implementation.5

The first objective is to support managerial learning about an organization, its work processes, and its interaction with the external environment. The EIS system will make the managers better informed and able to ask better questions and make better decisions.

---

5 Kelly, Floyd “Implementing an EIS (Executive Information System)” at www.ceoreview.com
Study conducted by Vandenbosch and Huff (1992) from the University of Western Ontario found that Canadian firms using an EIS achieved better business results if their EIS promoted managerial learning. Firms with an EIS designed to maintain managers’ "mental models" were less effective than firms with an EIS designed to build or enhance managers’ knowledge. Vandenbosch and Huff defined “mental models” as looking at things in new ways as opposed to relying on conventional views and procedures. Model building is especially important for organization to achieve competitive performance improvements, and for understanding of emerging, new trends.

The second objective for an EIS is to allow timely access to information. Timely and relevant information is a competitive advantage that organizations need to be able to compete. Timeliness is important because issues facing a manager are ever changing. Traditional method of manually compiling information is resource and time consuming. Information is also gathered in wide variety of format. Often, by the time a useful report can be compiled, the strategic issues facing the manager have changed, and the report is never fully utilized.

Timely access of information also influences learning. When a manager obtains the answer to a question, that answer typically sparks other related questions in the manager's mind. If those questions can be posed immediately, and the next answer retrieved, the learning cycle continues unbroken. Whereas the learning cycle will not continue using traditional methods because by the time the answer is produced, the context of the question may be lost.
The third objective of EIS is to transform the organization to focus the on issues. An EIS has a powerful ability to direct management attention to specific areas of the organization or specific business problems. The focus is then to determine the root causes of issues highlighted by the EIS. This objective is commonly misperceived. Some managers see this as an opportunity to discipline subordinates. Some subordinates fear the directive nature of the system and spend a great deal of time trying to outwit or discredit it. This misconception is one of main inhibitors in successful implementation of EIS.

The powerful focus of an EIS is due to the maxim "what gets measured gets done." Managers will be attentive to concrete information about their performance when it is available to their superiors. This focus is very valuable to an organization if the information reported is actually important and represents a balanced view of the organization's objectives.

The importance of measurement cannot be understated. Misalign reporting systems can result in undue management attention to less important indicators or exclusion of other important indicators. For example, a production reporting system might lead managers to emphasize volume of work done rather than quality of work. Worse yet, productivity might have little to do with the organization’s overriding customer service objectives.

Rockart and DeLong (1988) demonstrated the importance of the alignment of the EIS and the business objectives. Out of 30 sites that they examined, 18 systems judged by their users tended to directly address a business need or problem. The seven that were judged moderately
successful has a vague connection to business objectives and the five that were not successful were not linked to business need.

**Barriers to Effectiveness**

An EIS is a high profile and high-risk project because it is intended for use by the most powerful people in an organization (Rockart and DeLong, 1988). Senior managers can easily misuse the information in the system with strongly detrimental effects on the organization. Senior managers can refuse to use a system if it does not respond to their immediate personal needs or is too difficult to learn and use. The other troubling aspect of EIS is that the benefits are difficult to quantify.

Dozens of high profile, high cost EIS projects have failed. A survey conducted by consultants CMG and SAS Institute found that 41% of 240 mortgage lenders (insurers, building societies and banks) surveyed have failed at the first attempt. The reason given were the complexity of the software, unclear requirement and the EIS is more of presentation tool rather than data gathering tool.

Literature reviewed on failure of EIS indicates a deeper problem than what was described above. The potential inhibitors to the success of EIS (Kelly; Rockart and DeLong 1988) are described below.
1. Behavior Norms and Culture

Issues of organizational behavior and culture are perhaps the most deadly barriers to effective Executive Information Systems. Because an EIS is typically positioned at the top of an organization, it can create powerful learning experiences and lead to drastic changes in organizational direction. However, there is also great potential for misuse of the information. Grant, Higgins and Irving (1988) found that performance monitoring can promote bureaucratic and unproductive behavior, can unduly focus organizational attention to the point where other important aspects are ignored, and can have a strongly negative impact on morale.

Kelly advocates that for EIS to be effective, an organization must exhibit the following culture:

a) Learning Culture

Managers must be aware of the dangers of statistical data, and be skilled at interpreting and using data in an effective way. Even more important is the manager’s ability to communicate with others about statistical data in a non-defensive, trustworthy, and constructive manner and avoid blaming. To make effective use of an EIS, managers must have the self-confidence to accept negative results and focus on the resolution of problems rather than on denial and blame.

---

6 Kelly, Floyd “Implementing EIS (Executive Information System),” www.ceoreview.com/papers/cis/htm
In a learning organization that seeks first to understand why a problem occurred, and not who is to blame, EIS can be a powerful tool. Any unusual result is seen as an opportunity to learn more about the business and its processes. Managers who find an unusual result explore it further, breaking it down to understand its components and comparing it with other numbers to establish cause and effect relationships. The numerical results can be used to focus learning and improve business processes across the organization. An EIS facilitates this approach by allowing instant exploration of a number, its components and its relationship to other numbers.

b) Macro-management not micro-management

EIS with its navigational and drill down capability can provides senior managers with the ability to micro-manage details at the lowest levels in the organization and caused uncertainty and resentment among the lower level managers (Rockart and DeLong 1988). A senior manager who is surprised at the individual results of a front-line worker might call that person directly to understand why the result is unusual. This could be very threatening for the managers between the senior manager and the front-line worker.

EIS is less disruptive and will gain easier acceptance in organizations that have a team-working culture; matrix managed projects and where status and hierarchical chain of command is more relax. Micro-management in such organization is done only when appropriate. Employees in these organizations have learned that most interactions between their superiors and their staff are not threatening to their position. Workers are more
comfortable interacting with senior managers when the need arises, and know what their supervisor expects from them in such an interaction.

c) Information is for sharing not for power

How information is viewed in an organization is another important factor that would impact the acceptance of EIS. Information is power in many organizations, and this reduces information sharing in the organization. For example, employees may hide information about their own organizational performance, but jump at any chance to see information about performance of their peers. In this type of organization there will be a lot of resistance to an EIS because a properly designed EIS promotes information sharing throughout the organization. Peers have access to information about each other’s domain; junior managers have information about how their performance contributes to overall organizational performance.

An organization that is comfortable with information sharing will have developed a set of rules for dealing with this broad access to information. These rules are less of procedures but more of defining “good manners” for information sharing. These behavioral norms are key to the success of an EIS.

2. System Capability

One of the common reasons given for the failure of EIS is the complexity of EIS itself. This is normally confounded by an IT led approach.⁷ There is always a trade-off between system

excellence and cost of development. Problem arose when system developed is an excellence masterpiece or a system teething with technical problem. Rockart and DeLong (1988) conclude that technology (hardware and software issues) is one of the key factors for successful EIS implementation.

Vandenbosch & Huff (1988) study shows that technical excellence of the system has an inverse relationship with effectiveness. Systems that are technical masterpiece tend to be inflexible. A number of explanations as to why technical masterpieces tend to be less flexible are possible. Developers who create a masterpiece EIS may become attached to the system and consciously or unconsciously dissuade managers from asking for changes. There are also unintended consequences of building technical masterpiece. The initial cost is so high that organization is not willing to spend more for maintenance and improvement, especially so when there is uncertainty that the benefits outweigh the initial cost of a masterpiece. Another effect of trying to create a system masterpiece is the length of time required may mean that it is outdated before it is implemented.

Flexibility is important because an EIS has such a powerful ability to direct attention to specific issues in an organization. With the ever changing issues that organization has to face, an EIS must continually be updated to address the strategic issues of the day. A technical excellence masterpiece is more difficult and costly to change.
While usability and response time are important factors in determining whether executives will use a system, cost and flexibility are paramount. The management of an organization is more willing to accept an inexpensive system that provides 20% of the needed information within a month or two than with an expensive system that provides 80% of the needed information after a year of development. The inexpensive system is easier to change and adapt to the evolving needs of the business. Changing a large system would involve throwing away parts of a substantial investment. Changing the inexpensive system means losing a few weeks of work. As a result, fast, cheap, incremental approaches to developing an EIS increase the chance of success.

Paradoxically, technical problems are also frequently reported as a significant barrier to EIS success. There are two technical problems that are mostly cited. One is the problem of integrating data from a wide range of data sources both inside and outside the organization. The ability to integrate data from many different systems is important because it allows managerial learning that is unavailable in other ways. An EIS will be particularly effective if it can overcome this challenge, allowing executives to learn about business processes that cross-organizational boundary and to compare business results in disparate functions.

Since EIS is intended for top management used, another technical problem that can kill EIS projects is usability. The difficulty of learning and using the system can lead to the intended people simply stop using it. They have very little time to invest in learning the system, low tolerance for errors, and initially may have very little incentive to use it. Even if the
information in the system is useful, when the interface is difficult, the result will be the manager assigning an analyst to manipulate the system and print out the required reports. This is counter-productive because managerial learning is enhanced by the immediacy of the question and answer learning cycle provided by an EIS. An analyst will not be in a position to put that acquired learning to its most effective use.

There are ways to enhance usability. The key is to get clear communication between the users and the developers. This can be done by prototyping and setting up clear communications strategy during implementation (Rockart and DeLong 1988, Kelly). Prototyping give the users the opportunity to interact with systems that closely resemble the functionality of the final system. They can thus offer more constructive criticism than just reading an abstract specification document. Systems developers are willing to listen more openly to criticisms of a system since a prototype is expected to be disposable.

3. Misalignment information contained in EIS

The final barrier to EIS effectiveness is not getting the right information and measurement in the EIS. There are two ways information will effect the effectiveness of EIS. One is when the information does not meet executive requirements and resulting with the executives stopping from using the EIS. Secondly, the information contained in the EIS meets executive requirement but is wrongly focus on variables that fail to guide the organization towards its objectives. This is has a more dire consequence. EIS has powerful ability to direct
organizational attention and can be destructive if the system directs attention to the wrong variables.

The major requirement of information is that the measures are aligned to the organization objectives. Proper definition of organizational objectives and measures is critical to reducing organizational resistance to an EIS and is the root to effective use of EIS. The benefits of an EIS will be fully realized only when it helps to focus management attention on issues of true importance to the organization. The measures have to be specific, measurable, achievable and consistent. Several authors including Crockett (1992), Kaplan and Norton (1992) and Meyer (1994) have proposed several steps for development of the measures. The details of the steps shall be discussed in Chapter Three.

**Approach to Successful EIS Implementations**

In this section we shall discuss how to structure an implementation of EIS. Through their research in the field of EIS, Rockart and DeLong (1988) observed eight factors in organizations, which appeared to be the most important for effective EIS implementation. Kelly\(^9\) also discussed at length some of the criteria needed for successful implementation of an EIS. These authors idea will be discussed below.

---

\(^{9}\) Kelly, Floyd “ Implementing EIS (Executive Information System),” www.ceoreview.com/papers/eis/htm
Criteria for Successful Implementation of EIS

1) Executive Sponsor

The first criterion for success is to have an Executive Champion to sponsor the project. The EIS champion does not need be a person who fully understand the technical issues, but must be a person who works closely with all of the senior management team and understands their needs, work styles and their current methods of obtaining organizational information. The champion’s commitment must include a willingness to set aside time for reviewing prototypes and implementation plans, influencing and coaching other members of the senior management team, and suggesting modifications and enhancements to the system.

The best person to be the champion is the Chief Executive Officer of the organization. The CEO not only can drive and get the commitment during the implementation phase but also by using the EIS in the right way, reinforce the continued buy-in and usage of EIS.

Rockart and DeLong (1988) also observed that in most of the successful EIS implementation that they studied, often the executive sponsor delegated the management of details of the implementation to an Operating Sponsor to leverage the time of executive sponsor. Usually a trusted executive subordinate (often the CFO or controller, or an executive assistant), an operating sponsor is a person who is well acquainted with executive sponsor work style and way of thinking. Ideally this person communicates easily with both the executive users and the EIS designer. He or she serves as a go-between, helping to match business needs and technical capabilities.
Operating sponsors are not essential if the executive sponsor invest extensive time and effort in developing an EIS. But the realities of executive work and time required and complexity of developing an EIS make it virtually impossible for the senior executive, especially a CEO, to manage system development alone.

An operating sponsor task is to manage the details of implementation from the user's side. There are a few primary roles that an operating sponsor needs to play. One is to ensure adequate resources are allocated to build the system. This includes funding for the development phase, as well as access to personal with technical and business knowledge needed to design the system.

Another role of an operating sponsor is determining the specific content of the initial applications. In addition, the operating sponsor has to pries data loose from the organization to support the system. Rockart and DeLong (1988) believe fighting for access data can be a major function of the operating sponsor. It is a time consuming and involves immense amount of work to navigate through the labyrinth of organizational politics for the data. Often, Line and staff managers are reluctant to provide new or existing data for as yet unknown system.

The operating sponsor role does not disappear but in fact is more critical once EIS is in place. As the system spreads throughout the organization, he or she has to continue administer the
EIS. Some of the EIS administration includes negotiating access to new data sources, deciding who get terminals, and developing new applications.

2) Appropriate Technology

Technology is an issue that an organization that want to implement EIS has to deal carefully. Computer technology continues to change incredibly fast and nowhere is technology evolving more rapidly than in the emerging field of EIS (Rockart and DeLong 1988). Rockart and DeLong (1988) observed that in implementing EIS, the company has to consider both the hardware and the software issues.

The hardware issue centered on the choice of workstation and minicomputer or mainframe host. Rockart and DeLong (1988) observed these choices are frequently straight forward, influenced heavily by the dominant vendor and capacity already available in the company. They also observed that of the companies studied, the dominant hardware is the IBM mainframe. However, at least half of the 30 companies that they studied built EIS on specialized hosts, independent big transaction-processing mainframes and traditional data processing environment (Cyber, DEC VAX and SAP as examples).

Rockart and DeLong (1988) believe that choosing the software is the most important decision in assembling the building blocks for an EIS. The issues faced by many EIS projects manager are 1) buy versus built dilemma, 2) speed and flexibility as prototyping tool and 3) styles of users and users requirements.
It is better to implement the EIS by developing and delivering a simple prototype as quickly as possible (Rockart and DeLong 1988, Kelly). This will address the software issues discussed above. The new EIS will be judged on the basis of how easy it is to use and how relevant the information in the system is to the current strategic issues in the organization. By having a simple prototype, delivered quickly, the executives can see the benefits of EIS. If the information delivered is worth the hassle of learning the system, executives who like what they see will request a flurry of requirements. These requests are the best way to plan an EIS that truly supports the organization, and are more valuable than months of planning by a consultant or analyst.

3) Appropriate IT staff

Involvement of the organization’s Information Technology (IT) Department is essential for successful implementation of EIS (Rockart and DeLong 1988). Normally the motivation for an EIS project arises in the business units not from the IT department of the organization. It is a serious mistake for the business units to take the project on without consulting or involving IT department. Executive Information Systems rely entirely on the information contained in the systems created and maintained by this department. IT professionals know best what information is available in an organization's systems and how to get it. They must be involved in the team. Involvement in such a project can also be beneficial to IT department by giving them a more strategic perspective on how their work influences the organization.
Rockart and DeLong (1988) believe that the adequate human resources, right skill mix, and level of sophistication necessary to work with executives, given the mix of sponsorship, IT experience and application complexity are the elements for a successful EIS team. They have observed that throughout their research that management frequently underestimated the number of IT staff needed to design, install and maintain the EIS. The successful systems that they studied also have team members who are knowledgeable in IT and have adequate business knowledge and have strong personal ties with the executive users.

4) Communication

The final criterion for successful EIS implementations is effective communication. EIS have the potential to drastically change the current organizational ways of working (Kelly). These include measuring and monitoring performance, how these are communicated, and may even change how people are rewarded. These changes are normally unnerving to the organization and will typically be met with resistance. Some of this resistance is simply due to lack of knowledge. However, what is more important, is the resistance cause by the feelings of fear, insecurity and cynicism experienced by individuals throughout the organization (Rockart and DeLong, 1988).

Rockart and DeLong believe that communication and training program is vital in allaying the fear and increases the understanding. A strong and vocal executive champion can influenced the change of attitudes by consistently reinforcing the purpose of the system and directs the attention of the executive group away from unproductive and punitive behaviors. In their
research, some of the companies like Boeing and United Retailing has been more successful in managing resistance using this approach compare to companies that uses the power inherent in the executive position in the organization.

**Methodology for Successful Implementation of EIS**

Several authors (Rockart and DeLong, Crockett, Kelly etc.) agree that the two important elements of successful implementation of an effective EIS are a clear consensus on the objectives and measures to be monitored in the system, and a plan for obtaining the data on which those measures are based.

As discussed in the previous section, a simple prototype rather than a detailed planning process has been found to be more successful. For that reason, the proposed planning methodologies are as simple and scope-limited as possible. The methodology to achieve the two requirements is discussed below. This is based on the proposal made by various authors including Kelly, Crockett (1992) and Rockart and DeLong (1988).

The first step is to establish an EIS Project Team. The team has to include both staff from business unit and IT department The process of establishing organizational objectives and measures is intimately linked with the task of locating relevant data in existing computer systems to support those measures (Rockart and DeLong, 1988). Objectives must be specific and measurable, and data availability is critical to measuring progress against objectives. Since there is little use in defining measures for which data is not available, the cross-
functional EIS project team can provide early warning in case of unavailability of data to support objectives or if senior manager's expectations for the system are impractical.

The second step is to establish the measures and EIS requirements. The measures have to be aligned with the organization's high-level objectives and direction. What is essential during this phase is to link the high level objectives and direction to the EIS requirement of performance measures and targets. This is done by direct interaction with the senior managers who will use the systems (Rockart and DeLong, 1988, Crockett 1992).

Measures and EIS requirements can be established through a three-stage process outlined below:

1. EIS team solicits the input of the senior executives in the organization in order to establish a broad, top-down perspective on EIS requirements.

2. The team interviews the managers who are most likely to be directly involved in the collection, analysis, and monitoring of data in the system to assess bottom-up requirements.

3. The team summarized the results and recommendations and presented to senior executives and operational managers in a workshop where final decisions are made.
The third step is to organize a senior management workshop. This can be done after all the variability in the results of the interviews has been analyzed and synthesized to identify recurring themes and important differences of opinion.

The are two objectives for the senior management workshop. One is education and the other is for the senior management agreement on initial set of measures to be included in the EIS. The workshop will be an opportunity to educate senior management on the use of EIS, to address some of the cultural issues raised earlier and to deal directly with resistance to the system.

The education component of the workshop is most effective if integrated with the work of creating measures. The interviews done earlier will produced an initial set of measures. The senior management can deliberate on these measures for priority and technical feasibility.

The next step is to construct data collection mechanism. Data to support the information requirements of senior managers will likely be dispersed across the organization’s information systems and external sources. Once the requirements for EIS were established in the senior management workshop, the EIS project team, augmented by technical experts, can develop a list of required data elements and link them with appropriate data sources. The team will then establish requirements for data extraction from each of these systems and spin off appropriate systems development projects.
The final step is for the EIS project team to focus on EIS design. There are three components to consider:

- The first component is looking at the legacy system and inventory of computers used. This will enable the team to discover what upgrades is needed and what hardware will imposed limitation to the EIS. Included in this inventory will be an assessment of network storage and communication facilities.

- The second component is the design of the data repository in which summary data from all sources will be stored. The design of this repository is critical because it must allow managers to easily extract and explore data along numerous dimensions. Standard relational designs may not be sufficient or practical for this application.

- A third component is the design of the actual EIS interface that senior managers will interact with. Screens and commands must be exceedingly obvious and easy to use so that senior managers can quickly access the benefits of the system without wasting a lot of time learning how to use it. Ease of use can be ensured by developing a prototype system with "sample" data, and watching senior managers as they interact with the prototype. Two to three iterations of prototype redesign and testing with four senior managers would be sufficient to ensure that the system is easy to use.
Framework for Successful System Implementation

Rockart, Earl and Ross (1996) discussed the roles of leadership and line management in successful IT system implementation in organization. The framework for successful implementation is based on Harold Leavitt balancing act and modified by Rockart and Scott Morton (1984). This is shown in Figure 2.1. For successful implementation, the changes in structure, culture, processes and peoples roles have to take place.

Based on the discussion previously, this framework is also useful to consider for EIS implementation. The barriers and the factors for successful EIS implementation discussed can be organized into the five balancing acts the company has to balance for successful implementation. This framework will be used as the basis for evaluation of PETRONAS EIS implementation in later chapter.
Figure 2.1. Leavitt’s Balancing Act (adjusted)

ORG. STRUCTURE & CORP. STRUCTURE

ORGANIZATION’S STRATEGY

MANAGEMENT PROCESS

TECHNOLOGY

INDIVIDUAL & ROLES

© Rockart/Scott Morton, CIER, MIT Sloan School of Management

Source: John F. Rockart, Michael J. Earl and Jeanne W. Ross “The New IT Organization: Eight Imperatives” p. 28, Exhibit 8
CHAPTER THREE – PERFORMANCE MANAGEMENT

Introduction

This chapter shall discuss how the EIS is used in organization. As discussed in chapter two, the objectives of EIS are three folds. First is to support organizational learning, secondly to access relevant information in timely manner and thirdly to focus on critical issues that affect the organization. The way organizations are able to achieve those objectives is by using the information from EIS for their Performance Management.

The author defines Performance management as the use of performance measurement information to effect positive change in organizational culture, systems and processes. Setting performance goals, allocating and prioritizing resources achieve this. It also includes informing managers the change of current policy or program directions to meet those goals, and sharing results of performance in pursuing those goals.

The author believes that the two critical factors for performance management are 1) defining the executive information needs and 2) the use of the performance management system. In this thesis, the Balance Scorecard approach shall be used as the framework to discuss the performance management of organizations.\(^\text{10}\)

Kaplan and Norton first introduced the idea of a Balanced Scorecard in the January - February 1992 issue of the Harvard Business Review. The need for such a tool emerged out of a

growing recognition that the traditional measures, which are mainly financial measures were insufficient to manage the modern organization.

Olve, Roy, and Wiley (1999) also discussed the problems of such measures. In their view the problems of such measures are:

- It is short-term focus. This promotes activities that are counter to long term strategic objectives of the firm.
- Financial measures ignore the non-tangible investment that the firm must made to achieve success.
- Costs are not adequately explained as costs are attributed to cost center no activity. Thus, organization has difficulty to differentiate, which cost is high or which product is profitable.
- The result display by financial measures is difficult to relate to employees’ activities.
- External factors such as competition or regulatory changes are not reflected.

**Approaches to Executive Information needs**

At the EIS Institute ’88 and ’89, practitioners ranked getting the executive information needs as their number one concern. These concern includes “getting executives to specify what they want” and “keeping abreast of executives’ changing needs and desires” (Stecklow, 1989). For EIS, the critical success factor (CSF) is the most frequently mentioned approach of the methods that determine information requirements (Watson, ET al., 1993). Rockart in his paper “ A New Approach to Defining the Chief Executive’s information Needs.” In 1978
discussed on five available approaches and advocating for CSF for defining the executive information needs. He described them as follows:

By-Product Method

In this method the information gathered is based on the organizations ongoing operations and little attention is paid to the real information needs of the top management. All information is from the by-product of the transactional system of the organization (e.g. payroll, accounts payable, billing, inventory. It is made available to all interested executives and reaches the top management in the form of summary and aggregated.

Null Method

The second approach is the Null Method. There is no formal or systematic effort of information gathering but rather information is gathered rapidly in informal fashion and delivered orally to the top management by trusted advisor. This approach is based on believes that top management activities are dynamic and ever changing and hence information cannot be pre-determined exactly. Proponents of this approach see the managerial use of information as Mintzberg does:

"...it is interesting to look at the content of the manager's information, and at what they do with it. The evidence here is that a great deal of the manager's input are soft and speculative - impressions and feeling about other people, hearsay, gossip, and so on. Further more, the very analytical inputs - reports, documents and hard data in general - seem to be of relatively little importance to many managers."\(^{11}\)

**Key Indicator Method**

The third method is called the Key Indicator Method. This method is based on three concepts. The first concept is the selection of key indicators that measure the health of the organization. The measures are mainly financial measures. The second concept of this approach is exceptional reporting. The indicator is measured against a pre-determined target and if the result varies significantly it will be flagged to the manager. The managers can peruse all the indicators which is made available to them or focus on problem as flagged by the indicators. The third concept is the used of visual display. This range from computer consoles to wall size display of computer generated or graphic material. This method is quite useful because it give the top management key items or snapshot of the information. It also draw the information from the organization database. The draw back is that most of the implementation of this method is most of the indicators are financial indicators.

**Total Study Method**

This approach is based on a sample of some of the executives information needs. The managers are interviewed to determine their environment, objectives key decision and the resultant information needs and are compared to the existing system. The method is expensive and time consuming. The amount of data and opinions gathered is a lot. Analysis of the input is more of an art than scientific. There is a lot of difficulty in determining the aggregation level of decision making, data gathering, and analysis at which to work.
Critical Success Factor Method

The fifth approach is the Critical Success Factor Method. It utilizes executive goals and their current objective and subjective information needs. This approach is based on the concept of "critical success factors" which are a few key variables, which must go right for the business to be successful. The critical success factors support the achievement of the organizational goals. As a result, critical success factors are areas of activity, which the management should give constant and careful attention to.

Using the Balanced Scorecard as Performance Management System

Kaplan and Norton (1996)\textsuperscript{12} described how innovative companies used the Balanced Scorecard as a framework to strategically manage their organization (Figure 3.1). They used the measurement to accomplish four critical management processes:

1. Clarify and translate vision and strategy
2. Communicate and link strategic objectives and measures
3. Plan, set targets, and align strategic initiatives
4. Enhance strategic feedback and Learning process

Achieving Strategic alignment

Kaplan and Norton (1996) advocate that the key to success of companies is to have the organization align to a shared vision and common objectives. The pre-requisite for the

strategic alignment is that the organization must developed its mission and vision and objectives for the Balanced Scorecard. Alignment is achieved when everyone (in the ideal world, every person from the boardroom to backroom) in the organization understand and shared the long-term vision and strategy embodied in the Balanced Scorecard.

Balanced Scorecard permits such a top-to-bottom alignment. It started with the development of the Balanced Scorecard by the executive team. This will gain the commitment and team building. To gain maximum benefits of shared understanding and commitment among all the organization; the executive team should share its vision and strategy with the whole organization. When everyone understand the long-term goals and strategy for achieving these goals, all organizational efforts and initiatives can be aligned to the needed transformation processes (see Figure 3.1).
Kaplan and Norton believe that no single program can align a large organization. Instead the large organizations use several interrelated mechanism were used. This is based on their experience with some large organizations, where the process is an extended and complex one and some organization have eventually involved 5,000 or more of their employees in the
alignment process. Kaplan and Norton have observed that three distinct mechanisms were used.

1. **Communication and Education Programs** - A consistent and continuing program put in place to ensure that all employees understand the strategy and what are required to achieve the strategic objectives. This is reinforced with the feedback of the actual performance. Brochures, newsletter and electronic bulletin boards can be used as tools for the communication. Kaplan and Norton, however cautioned that to be effective, these tools have to be woven together in a comprehensive communication effort that is directed in achieving long –term strategic alignment over the long term. The design of such program should answer several fundamental questions.

   - What are the objectives of the communication strategy?
   - Who are the target audiences?
   - What is the key messages for each audience?
   - What the appropriate medium for each audience?
   - What is the time frame for each communication strategy?
   - How will we know that the communication has been received?

2. **Goal-Setting Programs** - Once the understanding exist, business units must translate the higher –strategic level objectives into team and individual objectives. Cascading the measures articulated by the Balanced Scorecard down to personal level does this. Previously organization has problem in decomposing the measures other than the financial measures. The Balanced Scorecard make a unique contribution here where non-financial measures can be decomposed into a more disaggregate elements. The Balanced Scorecard
is based on a “performance model” that identifies the value drivers of the strategy at the
highest level. The Balanced Scorecard framework of linked cause-and-effect relationship
can be used to guide the lower level objectives and measures that are consistent with the
higher level strategic objectives (This will be discussed in details in the linking of
Balanced Scorecard to strategy).

3. **Reward System Linkage** - The alignment must ultimately be linked to the reward system
to give incentives and motivate the employees. Kaplan and Norton cautioned that this
linkage has to be approached carefully and only after the education and communication
programs are in place. Even though tying the compensation to scorecard measures are
attractive, it has some risk. Some of the risk outlined by Kaplan and Norton are:

- Are the right measures on the scorecard?
- Could there be unintended consequences in how the targets for the measures are achieved?

The disadvantages occur when the initial scorecard measures are not perfect surrogates for the
strategic objectives, and when the actions that improve the short-term measured results may
be inconsistent with achieving the long-term objectives.

**Integrating Long-range Strategic and Operational Budgeting process**

Kaplan and Norton believe that using the Balanced Scorecard to align human resource to the
business unit’s strategy alone is insufficient. The business must also align its financial and
physical resources to the strategy. Long-run budget, strategic initiatives, and annual budget
must be directed to achieving the targets for the objectives and measures of the scorecard.
Kaplan and Norton found that four steps are needed to use the scorecard in an integrated long-range strategic planning and operational budgeting process (Figure 3.2). The four-step process identifies the long-term outcomes the organization wish to achieve inclusive of the explicit targets for the measures. The process then identifies the mechanism to achieve the target and concludes by establishing the short-term milestone for the financial and non-financial measures on the scorecard. The four steps identified by Kaplan and Norton are:

1) Set stretch targets

Managers should set ambitious targets for measures that all employees can accept and buy into. The cause-and-effect interrelationships on the scorecard help to identify the critical drivers that will allow the breakthrough performance on important outcome measures, particularly financial and customer one.

2) Identify and rationalize strategic initiatives

Once the targets are set, the manager should do two things. One is to access whether the current initiatives will help achieve these targets or whether new initiatives are needed. Secondly, the manager should set priorities for capital investment and action program to achieve the targets.
Kaplan and Norton proposed three ways for initiatives identification. They are:

1) The Missing Measurement Program- Kaplan and Norton experienced that after designing the Balanced Scorecard, at least 20% of the data are not available for the measures on the scorecard. This is a management problem rather than data problem. “What can’t be measured can’t be managed” and if there is no data exist to support the measure then the
management process for a key strategic objectives is likely to be inadequate or non-existence. So this is an opportunity to institute the initiative for the process to collect data for the measures. Kaplan and Norton believe that by instituting the process for the data collection, this will lead organization to not only develop strategic initiatives that gather relevant information but also facilitate better management of a critical internal process.

2) Continuous Improvement Programs Linked to Rate-of-Change Metrics- Managers must decide whether their stretch targets can be achieved by continuous improvement, such as TQM, or discontinuous improvement such as reengineering. If a continuous improvement approach is adopted, a rate of improvement metrics should be used to track whether near-term efforts are on the right track for the achievement of the long-term objective.

3) Strategic Initiatives Directed to Radical Improvement of Performance Drivers- Kaplan and Norton believe that the Balanced Scorecard provides front-end justification and focus for reengineering and transformation of process where the continuous improvement will not enable the stretch targets to achieved within the time-frame set. The objective of the reengineering or transformation need not be measured on dollars saved, but rather on non-financial objectives as well. Examples of such objectives could be reduction in order fulfillment cycles time, reduction product development cycle time, and enhancement of employees’ capabilities. Kaplan and Norton believe the power of the scorecard driven reengineering or transformation is that organization can focus on issues that create growth, not just on issues that focus on cost reduction and increase efficiency. Again, Kaplan and
Norton believe that the key ingredient for setting the priorities is the cause-and-effect relationship embedded in the Balanced Scorecard.

3) Identify Critical Cross-Business and Corporate Initiatives

An important element in planning process is to identify the linkages of the strategic business unit to other SBUs in the corporation and to functional activities done at the corporate. These linkages provide opportunity for mutually reinforcing action and sharing of the best practices. The Balanced scorecard provides a mechanism for managers to identify and exploit the synergies across business units and also provides a common framework for organizing the planning process of corporate support department.

4) Link to annual resource allocation and budget

Kaplan and Norton suggested that the strategic planning must be link to operational budgeting if action is to be tied to vision. They observed that currently, organization have separate process for strategic planning and operational budgeting. There is no linkage between the long-term strategic targets and the operational budget. Traditionally operational budget established short-term targets for financial measures and establishes and authorizes the spending level for capital investments, research and development, and for marketing and promotional activities. Such detail short-term financial planning is important, but Kaplan and Norton believe that the budgeting process should encompassed short-term performance of the strategic objectives and measures of the scorecard non-financial perspectives. These milestones established for the upcoming year, the expectations for the short-term
achievements along the long-term strategic path that the organization has chosen. The short-
term budgeting process is seen as simply the first year translation of a five-year plan into
operational budgets for strategic objectives and measures in the four scorecard perspectives.

**Strategic Learning**

Kaplan and Norton consider the strategic learning process in the balanced Scorecard
framework as the most innovative and important aspect of the entire scorecard management
process. They have observed that now many organizations started to use the Balanced
Scorecard to extend their operational and management review processes as a strategic
learning process. This extends single-loop learning to double loop strategic learning (Figure
3.3).

Kaplan and Norton suggested that an effective strategic learning process has three essential
ingredients:

1) A shared strategic framework that communicates the strategy and allows each participant
to see how his or her contribution to the achievement of overall strategy.

2) A feedback process that collects performance data about strategy and allows the
hypotheses about interrelationship among strategic objectives and initiatives be tested.

3) A team-problem solving process that analyzes and learn form the performance data and
then adapts the strategy to emerging conditions and issues.
Figure 3.3. A Different Management System-Strategic Feed Back and Learning

![Diagram of a different management system showing strategic feedback and learning]

Source: Kaplan and Norton, “The Balanced Scorecard” p. 253, Figure 11-1

**Shared Strategic Framework**

The Balanced Scorecard as advocate by Kaplan and Norton is a representation of the organization’s shared vision. The scorecard’s objectives and measures clarify and communicate the vision to mobilized and focus the organization. Also, the Balanced
Scorecard establishes a common performance model, and communicates a holistic approach, linking individual efforts and accomplishment to the organization objectives. The Balanced Scorecard establishment of shared vision and shared performance model provides the first element of strategic learning.

**Strategic Feedback**

When managers devise a Balanced Scorecard, they articulate their strategy for the organization. Through regular reporting on the Balanced Scorecard measures, managers detect which departments and initiatives are on target, and which are not. Departments that do not achieve targets can engage in a learning process to discover why they are not achieving expected results and to correct the problem. Even when all targets on the Balanced Scorecard are met, managers can begin observe the interactions between the measures on the scorecard to discover unintended side effects of their strategy, or relationships between measures that they did not expect. Table 3.1 shows the tools that can be used to encourage strategic learning as discussed by Kaplan and Norton.

**Table 3.1. Tools for Organizational Learning with the Balanced Scorecard**

<table>
<thead>
<tr>
<th>Correlation Analysis</th>
<th>• Statistical techniques can be used to uncover relationships between Balanced Scorecard measures, or to validate predicted relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Game / Scenario Analysis</td>
<td>• Scenario analysis can be used to engage management teams in evaluating different courses of action, or different strategies with respect to past experience with the Balanced Scorecard</td>
</tr>
<tr>
<td></td>
<td>• Where statistical data is still being gathered, or even where data is</td>
</tr>
</tbody>
</table>

54
Anecdotal Reporting

present but does not show the entire picture, qualitative stories are an excellent way of communicating progress and engaging the organization in learning about progress on a Balanced Scorecard measure

Strategic Review Meeting

- Balanced scorecard measures should be reviewed regularly in an operational context. (Are we achieving targets?) The structure of the Balanced Scorecard should also be reviewed, perhaps on a less frequent basis to learn from experience and develop new strategies. (Are these the targets we want to achieve?)

Team Problem solving Process

The third element of the strategic learning is an effective team-solving process. Kaplan and Norton advocate that the accountability be assigned to cross-functional team rather than the traditional compartmental accountability. They believe that responsibility for achieving the measures and mobilizing the initiatives should be shared across the entire management group.

The Four Perspectives of the Balanced Scorecard

Kaplan and Norton proposed that organization should look at performance in four perspective: financial, customer, internal business process, and learning and growth. They believe the four perspectives of the scorecard are generally applicable in wide range of organization.

Financial Measures

Kaplan and Norton described that there are three general objectives or themes that are typically reflected in the financial perspective of a Balanced Scorecard: Revenue Growth,
Cost Management, and Asset Utilization. The measures for each of these objectives can be identified by answering the question "How can this objective be achieved?"

**Table 3.2. Examples of Financial Measures**

| Revenue Growth | • Sales and market share  
|                | • Number of new products, or new applications of existing products and services  
|                | • Number of new customers and markets  
|                | • Number of new market channels, differentiating on service, delivery mode and price  
|                | • Number of new pricing strategies  
| Cost Management | • Revenue per employee  
|                | • Unit cost reduction  
|                | • Percent use of low cost business processes. (e.g. increase use of EDI to replace costly manual purchasing approaches)  
|                | • Percentage of expenses measured by Activity Based costing  
| Asset Utilization | • Inventory reduction, increased turns  
|                | • Cash-to-cash cycle  
|                | • Return on capital  
|                | • Productivity / efficiency  

**Customer Measures**

Before establishing customer measures, organizations must identify the market segments they are serving or wish to serve. Organizations may select market segments that are most
profitable, or that are under-served. For each segment consider customizing the following set of widely used measures to the specific characteristics of your business: market share, customer retention, customer acquisition, customer satisfaction, and customer profitability.

Table 3.3. Examples of Core Customer Measures

<table>
<thead>
<tr>
<th>Market Share</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Percent of market segment captured by your organization</td>
<td>• Percent of each customer's total requirement served by your company (e.g. for customers purchasing clothing at your apparel store, what portion of their total annual clothing budget do they spend with you?)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Retention</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Number of defections (customers who take their business elsewhere)</td>
<td>• Increase in sales to current customers</td>
</tr>
<tr>
<td>• Frequency of orders / visits / contacts with current customers</td>
<td>• Average cost to acquire a new customer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Acquisition</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Number of new customers, or total sales to new customers</td>
<td>• Ratio of sales to inquiries</td>
</tr>
<tr>
<td>• Average order size, or average revenue per customer interaction</td>
<td>• Number of individuals indicating that they are extremely satisfied with their experience with your organization on a satisfaction survey</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Satisfaction</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Number of complaints</td>
<td>• Number of unsolicited thank you letters</td>
</tr>
<tr>
<td>• Number of individuals indicating that they are extremely satisfied with their experience with your organization on a satisfaction survey</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Profitability</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total profit per customer</td>
<td>• Total cost per customer or per transaction</td>
</tr>
</tbody>
</table>

Perhaps more than any other perspective, the customer dimension of your Balanced Scorecard affords opportunities to learn about and transform your business. In the table above, we have summarized typical quantitative measures to assess performance with customers. However,
the customer perspective also provides rich opportunities to obtain qualitative data. For example, comments and complaints by customers on satisfaction surveys may be more important than the satisfaction level they express. Analysis of this information may lead to identification of new market segments, or new product / service opportunities, or many other transformations in your business.

Indeed the customer perspective of the Balanced Scorecard provides opportunities to go beyond core measures to those that are even more strategic, reflecting the value proposition offered to each market segment. By value proposition, we mean the unique combination of product attributes, image and relationship characteristics that define your interaction with customers. Here are some examples of strategic measures that may be used in conjunction with the core measures above.

### Table 3.4. Examples of Customer Value Proposition Measures

<table>
<thead>
<tr>
<th>Product / Service Attributes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functionality</strong></td>
<td></td>
</tr>
<tr>
<td>• Overall satisfaction with product / service</td>
<td></td>
</tr>
<tr>
<td>• Number of features exceeding those provided by competitors</td>
<td></td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td></td>
</tr>
<tr>
<td>• Service failure index</td>
<td></td>
</tr>
<tr>
<td>• Return rate</td>
<td></td>
</tr>
<tr>
<td>• Number of revisions</td>
<td></td>
</tr>
<tr>
<td>• Warranty claims</td>
<td></td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td></td>
</tr>
<tr>
<td>• Customer perception of value for money</td>
<td></td>
</tr>
<tr>
<td>• Gross Margin</td>
<td></td>
</tr>
<tr>
<td>• Customer life-cycle cost</td>
<td></td>
</tr>
<tr>
<td>Timeliness</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>• Customer profitability</td>
<td></td>
</tr>
<tr>
<td>• Percent on-time delivery</td>
<td></td>
</tr>
<tr>
<td>• Total time for customer interaction (e.g. time for hotel check-in process)</td>
<td></td>
</tr>
<tr>
<td>• Average waiting time (e.g. line-up for bank teller)</td>
<td></td>
</tr>
<tr>
<td>• Satisfaction with delivery time</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Premium paid for brand name</td>
</tr>
<tr>
<td>• Market share</td>
</tr>
<tr>
<td>• Percent of customers in target market segment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Percent of key items out of stock</td>
</tr>
<tr>
<td>• Number of back-orders</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Internal evaluations</td>
</tr>
<tr>
<td>• Customer surveys, etc.</td>
</tr>
<tr>
<td>• Total number of visits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Convenience</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Request fulfillment time</td>
</tr>
<tr>
<td>• Number of customer interactions required</td>
</tr>
<tr>
<td>• Customer interaction time required (e.g. express car rental)</td>
</tr>
</tbody>
</table>

**Internal Business Process Measures**

There are many internal processes in the typical organization that deserve attention and measurement. But measuring and managing these processes can only drive incremental improvements, and do not contribute to the strategic management of the organization. It may be appropriate to include measures about the accounts receivable process in a Balanced Scorecard for the accounts receivable department. A Balanced Scorecard for the strategic business unit, on the other hand, needs to reflect the entire value chain. We need measures of
organizational performance all the way from the identification of a customer need to the satisfaction of that customer need.

Table 3.5. Examples of Internal Business Process Measures

| Identify or Make the Market | • Profitability by market segment  
|                           | • Percent of revenue from new products  
|                           | • Percent of revenue from new customers  
| Design                    | • Time to market  
|                           | • Break-even time  
| Build                     | • Number of defects  
|                           | • Process time  
|                           | • Process cost  
| Deliver                   | • Percent on-time delivery  
|                           | • Stock-outs  
|                           | • Percent defects  
| Service (post-sales)      | • Average satisfaction rating  
|                           | • Number of customers re-ordering within a three-month period  
|                           | • Number of customers who do not order again within a year  
|                           | • Number of deliveries during which a related product or service is cross-sold

Learning and Growth Measures

The learning and growth perspective of the Balanced Scorecard focuses on the organizational infrastructure that is required in order to achieve objectives in the other areas. There are three common categories for learning and growth measures: employee capabilities, information technology, and motivation, empowerment and alignment. Here are a few examples of measures for the learning and growth perspective.
Table 3.6. Examples of Learning and Growth Measures

<table>
<thead>
<tr>
<th>Employee Capabilities</th>
<th>Information Technology</th>
<th>Motivation and Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Employee satisfaction (involvement, recognition, access to information, support from staff functions, etc.)</td>
<td>• Information coverage ratio - number of processes having adequate information on quality, cycle time, and cost</td>
<td>• Suggestions received</td>
</tr>
<tr>
<td>• Staff turnover</td>
<td>• Percent of customer information available during front-line interactions</td>
<td>• Suggestions implemented</td>
</tr>
<tr>
<td>• Productivity (revenue per employee, return on compensation, profit per employee, etc.)</td>
<td>• Return on data - new revenue per database etc.</td>
<td>• Rewards provided</td>
</tr>
<tr>
<td>• Number of employees qualified for key jobs relative to anticipated requirement</td>
<td></td>
<td>• Length of time required to improve a key measure such as on-time deliveries by 50% (half-life metric)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Percent of employees with objectives aligned with key Balanced Scorecard measures</td>
</tr>
</tbody>
</table>

*Cascading the Balanced Scorecard*

Kaplan and Norton proposed that the Balanced Scorecard is best deployed at the "strategic business unit" level. While it can be used to create incremental improvements within a department or functional area, and to create coherence in a large diversified enterprise, it adds the most value in an organization which is a profit center, and has its own strategy and market
segments. At this level, the power to articulate, communicate and learn from the strategy expressed in the Balanced Scorecard is most effective.

Once a Balanced Scorecard has been defined at the strategic business unit level, it can then be cascaded down through the organization, allowing departments, work groups and even individuals to devise Balanced Scorecards that show their contribution to the strategy of the organization. For each strategic business level measure (and related target), business units can define additional measures and targets indicating how they will work together to achieve the corporate target. In addition, action plans and resource allocation decisions can be made with reference to how they contribute to corporate Balanced Scorecard objectives. Finally, the Balanced Scorecard can be used to strengthen organizational alignment by linking reward systems to the Balanced Scorecard objectives.

**Linking Balanced Scorecard to Strategy.**

As illustrated in the Figure 3.4, the Balanced Scorecard can provides a framework for translating the vision and strategy into operational actions. Each of the perspective of the scorecard is trying to answer the key question for the organization to achieve their strategy.

Kaplan and Norton propose three principals to enable the organization’s Balanced Scorecard to be linked to its strategy. They are 1) cause-and-effect relationship 2) performance drivers and 3) linkage to financials.
1) **Cause-and-Effect Relationship**

Every measure selected for a Balanced Scorecard should be an element of a chain of cause-and-effect relationship that communicates the meaning of the business unit’s strategy to the
organization. A properly constructed scorecard should tell the story of the business strategy through such a sequence of cause-and-effect relationship. It should make the relationship (hypotheses) among objectives (and measures) in the various perspectives explicit so that they can be managed and validated. It should identify and explicit the sequence of the hypotheses about he cause-and-effect relationship between the outcome measures and the performance drivers of those outcomes.

2) Outcomes and Performance Drivers

The real contribution of a Balanced Scorecard program is that the creation of the scorecard by senior managers reveals the strategic assumptions they are making - the theory of the business. It does this by revealing the expected linkages or cause - effect relationships between the objectives in each of the four perspectives. Typically, the strategy will indicate that actions in the Learning and Growth area are expected to enable internal business process innovations which will in turn allow the achievement of specific customer objectives and finally to financial results.

Kaplan and Norton proposed that a good balanced Scorecard should have a mixed of outcome measures and performance drivers. Outcome measures without performance drivers did not communicate how and whether the outcome achieved is an early indication of successful strategy. Conversely, performance drivers without outcome measures will not reveal whether the operational improvement is translated into financial performance.
CHAPTER FOUR - EIS IN PETRONAS

Introduction to PETRONAS

PETRONAS is the National Petroleum Corporation of Malaysia. It was formed under the Companies Act in 1974. Unlike other National Oil Companies (NOC), PETRONAS is also vested control of all petroleum resources in Malaysia through the Petroleum Development Act, passed by the Parliament in the same year of PETRONAS incorporation. Herein lies the uniqueness of PETRONAS. PETRONAS, although 100 percent owned by the Government of Malaysia, is a commercial entity under the Companies Act. PETRONAS keeps its profits and pays out dividend, tax and royalty to the government unlike other NOCs that do not own the natural resources. This unique arrangement has given PETRONAS to have more autonomy.

PETRONAS has a direct reporting line to the Prime Minister who is advised by the National Petroleum Advisory Council. PETRONAS is governed the Boards of Directors whose members are representative from Ministry of Finance and other related government bodies and PETRONAS representatives. PETRONAS is managed and run by the President who is also the Chief Executive Officer and is responsible for the performance of PETRONAS. The Board meets every month to track and monitor performance of the company and to approve work program and budget.

PETRONAS original role was to act as the Production Sharing Manager overseeing the exploration and production undertaken by the Multi National Oil Companies in Malaysia.
Since its inception, PETRONAS has now evolved from Production Sharing Manager into a global player (Figure 4.1).

![Figure 4.1. The Evolution of PETRONAS](image)

PETRONAS has grown into a fully integrated oil and gas entity engaged in a broad spectrum of petroleum and related value-adding business activities in both the upstream and downstream sectors. Today, with over 100 subsidiaries and associated companies, the PETRONAS Group operates in more than 20 countries around the world and is ranked among the Fortune Global 500 companies.

PETRONAS set-up as an organization comprises of the holding company and operating subsidiaries (OPUs). PETRONAS is organized around 6 core businesses and supported by 5 key divisions (Figure 4.2), headed by either Senior Vice Presidents or Vice Presidents, and they are known as Business Head. Together with the President and the CEOs of major OPUs, they form the Management Committee that assist in decision making process.
Figure 4.2. PETRONAS Organization Structure

Prime Minister

Board of Director

President & CEO

Legal & Corporate Affairs

Corporate HSE

Internal Audit

Regional Office

Corporate Security

President’s Office

International Business Venture

E & P Business

Gas Business

Refining Business

Marketing Business

Petrochemical Business

Maritime & Log. Business

Corporate Planning Division

Human Resource Division

Finance Division

Technology Division

Education Division
Figure 4.3. Summary of PETRONAS Decision Making Framework

- **Corporate**
  - Overall policies, objectives, strategies, plans and budget
  - Overall management and performance of PETRONAS

- **BUs**
  - Business strategies, plans and budget
  - Overall management of the business

- **OPUs**
  - Functional strategies, plans and budget
  - Functional activities, management and performance of OPUs
Figure 4.3 illustrates the decision-making framework in PETRONAS. There are clear distinct roles between corporate and OPU. The framework takes into account the different roles that PETRONAS has to manage and the fact that all of PETRONAS OPUs are separate legal entities. Even though feedback loop is not depicted in the figure, the PETRONAS Management Committee which is chaired by the President and made up of all the Business Heads and some of bigger OPUs’ CEO acts feedback mechanism.

Overall, PETRONAS is being managed strategically at PETRONAS HC level and operationally at individual OPUs level. In this framework, the accountability for the performance of each OPU resides with the respective CEO. The Business Heads roles are to provide the stewardship and the strategic direction of the business by formulating, recommending and implementing the objectives and the strategies for the business. Business Heads using the Business Committee platform are also responsible for exploiting and realizing synergies and integration that exist within and across the business.

**VBM and EIS in PETRONAS**

The idea for EIS was mooted during the Institutionalization of Value Based Management (VBM) in PETRONAS in 1996. VBM project is one of the outcome the strategic study conducted in 1995 to help the company on its globalization. The management Consultant Company A.T. Kearney was engaged to help PETRONAS to implement VBM in PETRONAS.
On of the success factors for institutionalizing of VBM is the IT to facilitate the used of performance measurement system. The used of IT was concluded to be a key factor due lesson learnt from the failures of the Management Information System (MIS) that was used in PETRONAS before. Apart from the performance measures, the MIS is very cumbersome and time consuming to produced because of lack of IT support in term of hardware and software. The reports are produced manually in paper form and with so many measurement it was quite thick. These factors ultimately contribute to the demised of MIS.

**VBM Institutionalization Approach in PETRONAS**

In institutionalizing VBM, PETRONAS considered both the requirements for being a value based company and the implementation approached. Figure 4.4 illustrates PETRONAS requirements of Value Based Company. They are:

- New performance measure that relates to value.
- Revision of Strategic Planning
- An organization that is value based.

**Value Based Performance Measure**

PETRONAS has historically been using Return On Total Asset (ROTA) as it measures of performance. In using ROTA and trying to link lower levels of organization performances, PETRONAS faced the problems of the traditional financial measures as described in the previous chapter.
A new measure called Economic Earnings (EE) was developed. EE was developed to be able to satisfy certain requirements and are able to be linked with the value drivers and lower level performances (See Table 4.1)

Figure 4.4. PETRONAS' VBM Requirements
Table 4.1. Key Questions and Answers for VBM Performance Measure

<table>
<thead>
<tr>
<th>Questions we can answer with VBM</th>
<th>“Tool” or measure we utilise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Has the company created value?</td>
<td>1) Value creation over and above invested capital</td>
</tr>
<tr>
<td>2) What is the financial performance today? How does it compare to peers?</td>
<td>2) Performance Measures - ROTA - CFROI - Economic Earnings</td>
</tr>
<tr>
<td>3) Is performance above required return?</td>
<td>3) Economic Earnings and WACC - Weighted Average Cost of Capital</td>
</tr>
<tr>
<td>4) What are the OPUs and PETRONAS worth today and what is the value of the strategic plan?</td>
<td>4) Plan valuation model linked to specific KPIs, or value drivers</td>
</tr>
<tr>
<td>5) What drivers create the most value?</td>
<td>5) Value driver tree</td>
</tr>
</tbody>
</table>

Economic Earning is quite similar to Economic Value Added (EVA) in the way they are calculated. The objective is to measure the performance taking into account the invested capital and the cost of capital.

**Value Based Strategic Planning**

PETRONAS planning has been both top-down and bottom-up. The planning horizon in PETRONAS is for five years and detail budgeting is done for the next plan year. The original
planning process faced the problems that Kaplan and Norton described as prevalent in most of the Companies. The long-term objectives do not have any relation to the short-term objectives of the plan and budget. Another problem is the budget requested by the Business Units gave no indication of the value that they can generate.

Figure 4.5 illustrated the new Strategic Planning Process of PETRONAS. Value based strategic planning is a continuous learning process with strategy selection based on a value test. PETRONAS has defined characteristic of value based strategic planning process as:

- Financial performance linked to strategic position
- Alternative strategies developed for review
- Financial forecasts grounded in strategic reality
- Alternative strategies evaluated based on value maximization
- Strategy implementation tracks Key Performance Indicators which have the greatest impact on value
Figure 4.5. PETRONAS Strategic Planning Process

The first process is for OPU's and BUs to assess their strategic position of each of their business segment, segmented along the value chain of the business. A review of their performances is also conducted. Concurrently, an external environmental analysis is conducted, coordinated by Corporate Planning Division. The outcome of the strategic positioning assessment is identification of issues and development of strategic thrust with
inputs from BUs and OPU. The BUs and OPU then developed their strategies, evaluate them, and select the strategies that are expected to maximize their value. These process are guided by the corporate strategic thrust. The strategies are evaluated at the corporate level to ensure consistency and they are aligned with the objective of maximizing PETRONAS total value creation. This where total synergies for PETRONAS are optimized and any inter-OPUs disputes are resolved. Once the strategies are approved at the corporate level, the BUs and the OPU will then developed their implementation plans and budget to support the implementation of the approved strategies. Normally no amendment are made to the proposed strategies as the strategies were thoroughly review at the BU level by the Business Committee to ensure that each business is in line with the corporate objectives. The inter-business strategies are also review at the Business Committee. The plan and budget are then submitted to the corporate again for final approval. The approved plans and budget are then monitored by each OPU for its implementation and performances. The details planning process in PETRONAS is illustrated in the following Figure 4.6, 4.7, and 4.8.

As can be seen from the Figures of detail planning process, there are vigorous iteration process between Corporate, BUs and OPU. The Corporate develops the strategic thrust but not without the inputs of the businesses. The corporate strategic thrusts then become the guiding principles for the company in developing the strategies. The process goes through a whole cycle until the budget is approved at the corporate level. The strategic planning process carries by PETRONAS is very much in line with the framework proposed by Hax and Majluf in Figure 4.10.
Figure 4.6. Development of External Environment Analysis Process

OPU  |  BU  | Corporate Planning  | Senior Management Strategy Forum

- Provides general overview of the environment
- Provides EEA inputs, collects and analyses data
- Develops and consolidates overall EEA
- Finalizes EEA

EEA - External Environmental Analysis
Figure 4.7. Development of the Strategic Assessment Process

OPU:
- Conducts business segmentation
- Conducts internal analysis of the segment
- Conducts external analysis of the segment
- Develops OPUs' SPA
- Conducts performance review

BU:
- Business level EEA
- Conducts business level segmentation
- Conducts business level internal analysis
- Conducts business level external analysis
- Reviews OPUs' performance review
- Business level SPA
- Submits to Corporate Planning
- Business level performance review

SPA-Strategic Position Assessment
Figure 4.8. Development of the Corporate Strategic Thrust/Plans and Budget
Figure 4.9. A Formal Strategic Planning Process

Source: Hax & Majluf (1996), p. 30, Figure 2.4
The last step in the planning process is the performance monitoring system. Against each plans there will be a specific Key Performance Indicators (KPIs) assigned with specific target to be achieved (these are the same as milestones as described by Kaplan and Norton).

With the planning process and the new performance measurement in place, the third requirement is the transformation of the PETRONAS itself. While the first two requirements are process development, the third requirement involved alignment of the organization to the process that were developed. This include setting up of the new way the for organization and the employees will be measured, and how does this link to the reward system in PETRONAS. Another important process is the mechanism of reviewing the results of the strategy. All these will an integral part of performance management system in PETRONAS. The review process put in includes review of overall PETRONAS performance every half yearly, and BUs every quarterly and individual OPUs will do their review monthly. The conceptual alignment framework is illustrated in Figure 4.10.
VBM Implementation in PETRONAS

The implementation of VBM in PETRONAS started with the formation of corporate VBM team in April 1996. The project was champion by the Senior General Manager of PETRONAS Corporate Planning and Development division and monthly review of progress by the Steering Committee. A Senior Vice President chaired the Steering Committee and committee
members are made of the top management of PETRONAS. The Corporate VBM project team were:

- Development of the requirements for a value based company inclusive of process and framework
- Approach for rolling-out the project to the rest of organization
- Methodology for measures development and value drivers
- Communication and training framework

The team engaged AT Kearney to help them develop the methodology and communication and training. The team defines the critical success factors for this project as:

1. Top Management Support-Clear communication to the shift to VBM
2. Formalized Regular Monitoring System-OPUs MC or Special Steering Committee
3. Measures adopted are practical and easy to use-simplicity and accuracy
4. Ownership / Buy-in at all levels-Beginning with top management and across
5. Value Creation mindset-Transparent and integrated focus
6. System and IT support-Facilitating usage
Figure 4.11. VBM Implementation Schedule

<table>
<thead>
<tr>
<th>KEY ACTIVITIES</th>
<th>CY</th>
<th>Qtr.2, 96</th>
<th>Qtr.3, 96</th>
<th>Qtr.4, 96</th>
<th>Qtr.1, 97</th>
<th>Qtr.2, 97</th>
<th>Qtr.3, 97</th>
<th>Qtr.4, 97</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) VBM Awareness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Primer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Key Stakeholder update</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Development Measurement Framework</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Value Drivers &amp; KPIs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reporting Framework</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• System, IT Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Application of Framework</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Performance Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Strategy Review/Annual Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Group Portfolio Mgmt. System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Roll-out Value Based processes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pilot Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Feedback - Fine Tuning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Handover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.11 illustrate the schedule and the key activities of the VBM implementation in PETRONAS. The team developed the primer early as an initial communication and set up meetings with each OPUs CEO and Management Committee. The objectives were to get the buy-in and to get the commitment from the OPUs for the formation of their own implementation teams for the development their Value Drivers and performance measures based on Key Performance Indicators (KPI). The early commitment was needed because the
corporate team believed that for better acceptance, the CEOs should drive the implementation at their respective OPU.

Each of the OPU’s team was given training on the process and methodology for implementation of VBM. Figure 4.12 illustrate the implementation team structure and their relationship with the corporate. The Champion at each OPU is the CEO and the Custodian which act as the team leader during the implementation and will be responsible for the overall process at the later stage is normally appointed by the CEO from the head of finance or planning division.

The objectives of the OPUs VBM team are threefold. First is to create awareness and buy-in at their respective OPU by communicating the reason and the change caused by the institutionalization of VBM. Secondly, to develop the performance measures based on the methodology proposed by the corporate team, and finally, to formalize the process of review and using the performance measures.
Development of Performance Measures

The Key Performance Indicators was introduced as a basis of monitoring the performance to focus the organization on the strategies that create value. KPI is define as a relative measure of the performance of that organization is used to indicate the performance of specific activities in the organization directly affecting the value of that organization. It is the outcome of the value driver of the organization (Figure 4.13)
**Characteristics of KPI**

To ensure that the KPIs are acceptable to the organization, the KPIs developed have to satisfy the following characteristics:

- **Actionable/Controllable** - the KPI has to measure the activities that the employee has control of or can influence the outcomes. Since it is impossible to influence the outcomes absolutely, the degree of control varies and the KPIs developed should reflect this uncertainty.

- **Measurable** - the KPI developed must be measurable and the information or data should be easily available in the current system.

- **Assignable** - the KPI must measure the activities that are accountable to an employee. If the activity is deemed to be important and there is no person in charge, the organization structure should be changed to ensure accountability.

- **Impacts Value** - the KPIs are tested for their impact to value creation of the OPU to ensure that the KPIs developed are meaningful in tracking the OPUs performance. To help this the Corporate VBM team developed software to enable this.
**Approach to Development of KPI in PETRONAS**

PETRONAS took a five-step process to develop the KPIs (Figure 4.14). This is to ensure that the right KPIs are developed and the focus is on the KPIs that track the strategy of PETRONAS.
Figure 4.14. Five-Step Process of Developing KPIs

Step 1
The first step is to identify all the KPI candidates, which were developed from three sources. The first is from the value driver tree, which was developed to establish the link between financial drivers and the underlying activities. The second source is from the strategic plan, which will produce the high level KPIs that need to be tracked to ensure achievement of
strategy. The third source is from the analysis of the value chain to give the candidates for functional KPIs.

**Step 2**
The second step was to link all the KPIs to the value driver tree. This would enable the linking of the KPIs that measure activities to the main financial drivers and the achievement of the strategy. Two sets of KPIs were observed. One are those that can be link directly to the financial drivers and others have indirect impacts to the value creation.

**Step 3**
The third step was to eliminate the KPIs that has low impact to the organization. This was done using the software developed by the Corporate VBM team and interviews with the relevant employees. Some of the KPIs has a quantifiable impact while others are not. For the non-quantifiable KPIs the interview is very critical. Figure 4.14 illustrate the template for valuing the KPIs value impact.

**Step 4**
This step is to ensure that the employees who are accountable to the KPIs will be comfortable with the KPIs. The employee and the superior were interview to determine the manageability of each KPI. The chosen KPI will be the one that has high value impact and high manageability.
Step 5

The final step was to assign the accountability to the employees. Each employee has to agree on the sets of KPI that they will monitor and are accountable for and signed their agreement.
Development of EIS in PETRONAS

Concurrent to the development of KPI in PETRONAS, The Corporate team also starts implementing the EIS. This is based on the understanding that an EIS will help facilitate the usage of KPIs for PETRONAS performance reporting system to better manage strategy implementation.

In the initial phase (late 1996), the Corporate VBM team start involving the IT division in appraising the current IT system of PETRONAS to support EIS implementation. A few systems were appraised. The decision was to use the SAP EIS and InSight as the front-end software. The main reason is to ensure that minimal linkage by using SAP software or SAP licensed software (InSight) since the bulk of information for VBM resides in R/3 and R/2 systems. The planned completion for EIS prototype and pilot were to be by June and September 1997 respectively (Figure 4.16).

The EIS system architecture overview and process flow is illustrated in Figure 4.17 and Figure 4.18 respectively. The EIS prototype was implemented in Petronas Gas Bhd, which is one of the bigger OPU in PETRONAS and was up and running by September 1997. By September 1999, the EIS was implemented and being used in 21 OPUs in PETRONAS.
### Figure 4.16 EIS Pilot Implementation Schedule

<table>
<thead>
<tr>
<th>Organise Project</th>
<th>1997</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Feb</td>
</tr>
<tr>
<td>Prepare Infrastructure</td>
<td></td>
</tr>
<tr>
<td>Configure Software</td>
<td></td>
</tr>
<tr>
<td>Develop Prototype</td>
<td></td>
</tr>
<tr>
<td>Conduct Testing</td>
<td></td>
</tr>
<tr>
<td>Conduct Training</td>
<td></td>
</tr>
<tr>
<td>Production Support</td>
<td></td>
</tr>
<tr>
<td>Project Admin</td>
<td></td>
</tr>
</tbody>
</table>
Figure 4.17 EIS Architecture Overview

SAP-EIS

Report Level Aspects
Data Imports Rules

SAP R/3
SAP R/2
NON SAP

InSight Application

• Graphic & Modeling capability
• Dashboard for:
  - Shareholder Value
  - Market Focus
  - Operational Excellence
  - Organizational Learning
• E-Mail
• Trend Analysis
• P&L and Balance Sheet

• Lotus 123 spreadsheet
The original intention of the EIS was to facilitate tracking and monitoring of the KPIs. As the project progress, additional requirements were added on. The final content has the financial information and few dashboards in it (Figure 4.19). The EIS implemented has the capability to do trending and what if analysis and the drill-down capability. The main content is the performance dashboard that used the balanced scorecard approach (Figure 4.20). The KPIs
developed were re-looked to ensure that the four perspectives as espoused by Kaplan and Norton were covered.

Figure 4.19 Content of EIS in PETRONAS
Usage of EIS in PETRONAS

Figure 4.21 illustrate the conceptual framework of EIS usage in PETRONAS. The EIS will form the platform of integrating all the databases in PETRONAS. It main usage is in performance management by monitoring the performance based on the KPIs. It give the information to the managers for them to do the corrective action based on actual versus plan achievement and from the analysis of the external forces and overall market performance.
This will give them an indication of whether the strategic objectives are achievable. The strategic objectives may be changed based on the information or the plan may be revised to achieve the original objectives. The timely and relevant information available from the EIS also encourages them to learn as advocated by Kaplan and Norton.

Figure 4.21. Conceptual Framework of EIS Usage in PETRONAS
Status and Issues of EIS in PETRONAS

By December 1999, the implementation of EIS was almost completed. The EIS is available to up to four hierarchical levels in each of the 21 OPUs. The Corporate team sent out survey to 19 OPUs, which have EIS installed and running. The survey was sent to the CEOs to gauge their understanding and usage of the EIS in their respective OPUs. Out of 19 sent, 11 responded and the result is shown in Figure 4.22. The low response rate (42% did not responded) is probably an indication that there may be resistance to the EIS. Since the CEOs are the executive sponsor for their respective OPU, one would expect a much higher response rate. Apart from the low response rate, there were three other main concerns raised from the survey. They are system performance, Usefulness and out of date information.

System Performance

76% of the CEOs that responded find that the system is not user friendly. They find that the system is not easy to navigate and confusing. They also complained about slow retrieval and response time of their query. 36% also responded that the data in EIS are not presented graphically in an easy-to-read format that requires minimal analysis to identify trends and levels of performance for proactive/corrective action.

The slow response time of the system is subjective, and probably can be improved with time. The critical factor is what are the user requirements. The EIS is not just for reporting but as discussed earlier, the objective of the EIS are for organizational learning and proactively
taking corrective action with the availability of timely and relevant information through the EIS.

Figure 4.22. Summary of Survey Result

The system, which is based on SAP, would be expected to have some limitation. SAP as a transaction system is good in a stable environment and all the requirements are predetermined. But as stated by Rockart and DeLong (1988) based on work by authors such as Mintzberg, Anthony, Kotter, Jaques and Isenberg, the executive roles is not pre-determined
and cast in stone. Even though there are some overriding roles that the executive plays in managing an organization, these roles change with the ever-changing environment.

**Usefulness**

Out of the total respondents, 72% of CEOs do not find the system useful in tracking performance of their OPUs and take timely action to achieve target results. This is a serious issue as the main objective of EIS is to help the CEO in managing the performance of their respective OPU. One reason given was that they are unclear on the relationship between the performance measures developed (KPI) and how it drive the value of their organizations. There were also some reservation on wether the KPIs are the right one and their concern on their inability to influence outcome of the KPIs. The more serious concern is that they do not believe in usefulness of EIS because at this stage they are also using the paper format that they are more comfortable with.

**Out of Date Information.**

64% of CEOs responded that the information in the EIS is not updated regularly. This problem arises due to the bulk of information for the KPIs do not reside in the SAP system. On average only about 30% of the needed information are from the SAP and are automatically update. This issue was foresee in the implementation planning stage. The step taken was that to ensure the line people who are accountable for the KPIs to manually update them into the system. But what happen instead was this role was left to the planning department, which have to liase with the KPIs’ owners and then updated it into the system. This was time consuming and perceived as additional work for the planning department.
As discussed earlier in Chapter 2 and Chapter 3, there are some key determinants for successful EIS implementation. They are the roles of leadership, culture of the organization, technology chosen, linking the EIS to business strategy and managing the resource and data issues. These factors will effect the amount of resistance the EIS will face.
The keys to having a successful EIS are to have the EIS link to the business strategy and active and continuous role of the leadership in driving and communicating the advantages of an EIS. The EIS should be used as a learning tool that will give a timely and relevant information to the managers. Management process has to be in-place to support this. This should include the reward system that encourage the use of EIS as an organizational learning tool. EIS should never be used for fault finding or micro-managing the organization.

The resistance has to be managed carefully. Resistance is expected as EIS can make subordinates felt threaten with the fear of loss of control, too much visibility of their operation to top management, fear of change itself (Rockart and DeLong, 1988).

**Evaluation of EIS in PETRONAS**

The evaluation of the implementation of EIS in PETRONAS shall be based on the following criteria:

1) Technology.

The SAP system and the InSight software used by PETRONAS was driven by the capacity already available in PETRONAS and the need to minimize linkage problem. This is a common decision made by most of companies studied by Rockart and DeLong (1988). The survey results show some dissatisfaction with the system performance. The slow response and difficulty of navigation through the system is a technical problem that can be improved with
time. There is a potential limitation on the improvement. As discussed earlier, SAP is good only for stable, pre-determined user requirements. Since the use of EIS is to manage the company based on a dynamic environment, the system may have to be improved. Chen (1995) proposed an enterprise wide repository-based model driven EIS to capture integrated organization and information system to solve some of the issues on system performance that were similar to the ones raised in PETRONAS.

Consistent with the proposal by various authors discussed earlier in Chapter 2, the implementation of EIS in PETRONAS started with a pilot and involved the IT department very early in the implementation phase. This is probably the main reason why the system implementation was successful in term of meeting the dateline and within the approved budget.

2) Organization Strategy

PETRONAS put a lot of emphasis on the importance linking the EIS to the strategy. The EIS project mooted out of the VBM is to ensure the focus is on successful achievement of strategy by focusing on the right measures and using the EIS to focus on critical factors.

3) Management Process

PETRONAS introduced new management processes to support the VBM and EIS. These include the strategic planning framework, performance review and reporting process, and revision of performance appraisal for compensation. This is inline with the thinking of
Rockart, Earl and Ross (1996) that the management process need to be in-placed for successful IT system implementation.

4) Leadership Roles
Implementation of EIS in PETRONAS started at the corporate and was sponsored by the Senior General Manager of the Corporate Development and Planning division of PETRONAS. His role is similar to what Rockart and DeLong (1988) envisaged as an operating sponsor. The role of executive sponsor is played by a steering committee, where the members are made up of all the Business Heads of PETRONAS.

For the individual OPUs, the respective CEO was the executive sponsor, and the head of the finance or planning division become the operating sponsor. The survey results indicated that there may be serious problem in the acceptance of the EIS by some of the CEOs who are supposed to championed EIS in their organization. This is evidenced in the somewhat low survey response and the doubt that some CEOs have in the usefulness of the EIS for managing the organization performance. Another possible reason is that CEOs are fully committed but instead, the measures developed may be the source of the problem where the measures do not fully reflect the real measurement that the CEOs feel useful to manage their organization. This is one of the issue that Kaplan and Norton (1996) believe to be critical in the acceptance of the measures for performance management.
In conclusion, the Implementation of EIS in PETRONAS has been partially successful. PETRONAS implementation approach has been consistent with the approach that was espoused by various authors like Rockart and DeLong, Crockett and Kelly. The use of EIS in PETRONAS is also consistent with the proposal by Kaplan and Norton. Some of the problem raised by the survey on the system performance can be resolved with time.

What PETRONAS should be concerned is the usage issue. Clearly the survey results shown that the CEO of the OPU doubts the usefulness of EIS. The two major factors put forward were the unclear linkage of the performance measures (KPIs) to the strategic alignment and how they can use the KPIs for better performance. This process has to be reiterated with the CEOs to ensure that right measures are developed and used in performance management. At this stage ensuring that all the CEOs are fully committed and see the benefits of EIS is important for managing future EIS evolution and spread in PETRONAS.
References


Bartholomew, Doug "When Will EIS Deliver?" Industry Week, 246(5) P. 37-40, 1997 March


Harris, Michael C. "Value Leadership: Winning Competitive advantage in the Information Age." ASQ Quality Press, 1998


Kelly, Floyd “Implementing EIS (Executive Information System),”
www.ceoreviewcom/papers/eis/htm


Watson, Hugh J. and Frolick, Mark N. “Determining Information Requirements for an EIS,” MIS Quarterly, September 93, P. 255-269