MANAGEMENT SYSTEMS FIT FOR ORGANIZATIONAL PERFORMANCE

by

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ABSTRACT

The present study identifies the dimensions and variables using prior research within each of the constructs under the management systems, fit and, organizational strategy, structure, lifecycle and performance. The constructs from the research model were defined with a combination of direct, calculated and coded measures. Context analysis for each case categorized management systems design into either prescriptive or descriptive. The selected performance measures have been extensively investigated in the research fields associated with organizational management. The study uses the multiple case study design with cross-sectional data spanning from 1991 to 2005 and involving 19 aerospace companies in the United States.

A priori hypothesized relationships between the constructs were tested with Mann-Whitney procedures for differences between mean ranks associated with organizational performance measures. The results from Mann-Whitney tests suggest that there exist significant differences in organizational performance from fit factors between a management system design and the organization. Present study defined organizational performance measures for analysis in terms of Return on Assets, Return on Equity and Return on Investment.

When compared to a prescriptive management system design, a descriptive management system design was associated with higher levels of organizational
performance. Cases with a fit state were found to score significantly higher than cases with unfit state suggesting that a correct fit state is associated with higher levels of organizational performance. A fit state was associated with higher levels of performance when each of the organizational factors for strategy, structure and lifecycle were aligned to management system design.

Study results suggest equifinality as cases reached a particular fit state with differing combinations of fit factors. The study contributes to the field with interpretation of a fit model and key relationship between management systems and performance providing the base for future research efforts associated with management systems, organizational factors and the fit between them.
To Iris, Alexander and Angelica
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LIST OF ABBREVIATIONS

AIAA – Aerospace Industries Association of America
EDGAR – Electronic Data Gathering, Analysis, and Retrieval system
EFQM – European Foundation for Quality Management
G&A – General and Administrative
ISO – International Organization for Standardization
MBNQA – Malcolm Baldrige National Quality Award
MBO – Management by Objectives
MS – Management System
NASA – National Aeronautics and Space Administration
NSF – National Science Foundation
R&D – Research and Development
ROA – Return on Assets
ROE – Return on Equity
ROI – Return on Investment
S&P – Standard & Poor's
SPSS – Statistical Package for Social Scientists
TQM – Total Quality Management
U.S. – United States
CHAPTER ONE: INTRODUCTION

Organizational literature suggests that dynamic conditions will be ever present and, at an ever increasing rate of change (Bridges, 1991). Peter Drucker believes we are living through a sharp transformation where social and political structures rearrange themselves (Drucker, 1993). For organizations, the message is clear, "adapt or die" (Drucker, 1992; p. 4). But, how can organizations adapt? Five centuries ago, Machiavelli declared that: "there is nothing more difficult to carry out, nor more doubtful of success ... than to initiate a new order of things" (1950, p. 21). The path and means for a successful match between an organization and the management system seems unclear and difficult. However, adaptation and growth can be legitimately achieved since all existing complex organizations grew from small and simple organizations (Barnard, 1938; p. 104).

Researchers have immense interest in adaptation and transformation since organizations are the most essential and pervasive structures both in the social and political contexts. Organizations require competent, yet innovative, means to deal with constant internal and external environmental forces. The management system serves as the organizational interaction means to their environment. Organizations depend on management systems to fulfill their mission, to transform and ultimately, to ensure their long-term survival.
1.1 Relevance of this Research

The research intends to provide a perspective and conceptual framework on fit models between organizations and management systems for organizational performance. The research takes relevance as organizations seek means to fulfill their mission and successfully adapt to dynamic conditions and cope with changes affecting overall performance. The conceptual framework and research considers practitioners and academic interests. Practitioners seek answers from research to address currently pressing organizational performance variations. For academics, research becomes significant as the fit propositions could be extended broadly and generally to management systems and organizations. Furthermore, the research could be used as a starting point for conducting research on fit by exploring relevant propositions into empirical hypothesis.

Modern management literature focuses on one or only a few of the major levels that exist to define a management system and interactions with the organization to manage organizational performance. Pfeffer (1997) argues that the current state of organization theory produces theoretically rich research but lacks in providing actionable knowledge. The research contributes to the organization theory by hypothesizing and studying a model for fit on priority areas of action affecting organizational performance. The research outcomes identify an integrated approach to determine, develop, match and sustain the level of organizational performance from the congruence between a practical management system and the organization.
1.1.1 Relevance for Practitioners

The practical nature of the subject involves defining management system relationships for alignment, formulating a fit model, and frameworks to explain variations of organizational performance in different contexts and environments. Some organizations may not have the opportunity to restart their management system or organizational conditions with a blank slate. Nonetheless, all organizations can re-evaluate their current management system within the conceptual framework developed to understand the fit between an organization and the management system. Practitioners may proceed to apply or adapt missing elements to an already existing management system or start a new system based on the model and transformation processes presented and analyzed in the research.

1.1.2 Relevance for Academics

Differing theoretical perspectives on how management systems affect organizational performance have been the subject of investigation and are presented in the literature. As an emerging area of interest with relevance to practitioners and academics, further investigation should be conducted to understand the relationships and fit between organizations and their management systems for organizational performance.

A central concern for organizational scholars is explaining the dynamic conditions
that affect performance (March & Sutton, 1997). Despite the important theoretical and practical implications of understanding organizational changing conditions, the management system and processes involved in transformational change to achieve proper fit with the organization have not been fully explored. Given that organizations develop and change over time, the research will conceptualize management system characteristics, and explore their match to particular conditions and stages in the organization’s strategy, structure and lifecycle as a mechanism to understand and manage performance variations.

1.2 Research Question

The research intends to answer the following theoretical question:

- How does fit between management systems and organizations influence organizational performance?

1.2.1 Research Objectives

The primary research objectives of this investigation are to:

A. Study and identify the management system elements and organization characteristics forming a fit affecting organizational performance.
B. Develop a model of fit between an organization and the management system for organizational performance.

C. Investigate organizations with case studies on the research model for fit between an organization and the management systems.

D. Report investigation findings on fit for organizational performance.

1.2.2 Sub-Questions

From the main research question, other sub-questions are derived to guide the research. These sub-questions are:

- What are the elements of an organization and the management system needed to create fit for organizational performance?
- What influences the success of an organization management system?

The first research sub-question is: “What are the elements of an organization and the management system needed to create fit for organizational performance?” includes the following research subordinate questions:

- What is fit for organizational performance?
- What influences fit between an organization and the management system?
- What is organizational performance?
What is a management system?

What are the elements of a management system?

For the second research sub-question “What influences the success of an organization management system?” the research subordinate questions are:

- What is the aim of a management system?
- What functions does the management system serve for an organization?
- How does an organization utilize a management system?
- What are examples of a management system?
- How do we measure organizational performance?
- How do we predict a successful fit?

The research questions and sub-questions will guide the research and presentation of the relevant literature review in Chapter 2.

**1.3 Problem Statement**

The research will conceptualize and characterize the fit between an organization and the management system to understand the influence on organizational performance as the organization develops and changes over time.
1.4 Unit of Analysis

The research unit of analysis is the organization. An organization is composed of two or more individuals, in some cases forming cooperative groups and systems, and energized by communication to achieve a common purpose (Barnard, 1938). The General Systems Theory view modern organizations as open systems interfacing with and depending on the outside environment for survival (von Bertalanffy, 1968; Wright, 1989; Senge, 1990).

Composed of individuals and groups, organizations interface with other organizations, social systems and elements from the environment. Organizations interface each other, with networks exhibiting characteristic patterns of organization and, with other elements and open systems operating in the environment (Wright, 1989). For the investigation, the relationship between the organization as the unit of analysis to main interfaces associated with the environment, society, organizations, groups and individuals is represented in Figure 1.
1.5 Conceptual Model

The high-level conceptual model represents the problem domain with the organization as the unit of analysis. To guide the investigation, the model includes research variables from the organization and management system interacting with their environment to attain fit. The high-level conceptual model includes the effects on organizational performance from the fit between organizational strategy, structure and lifecycle factors and the management system design. The focus is on design of the
management system to provide the means for alignment. The high-level conceptual model is presented in Figure 2.

![Figure 2. High Level Conceptual Model](image)

The conceptual model represents the problem domain and includes the research unit of analysis, variables and the relationships between them. The investigation will use a consistent color scheme based on the conceptual model for representation and illustration of concepts and research model. Figure 3 illustrates the conceptual model for the investigation.
For independent variables, the research will focus on fit factors from the characteristics of the management system and the organization affecting the organizational performance. The management system characteristics result from the design of system elements; interactions between elements and their boundaries; and the transformation processes required for change and adaptation. For the organization, the characteristics treated as independent variables are the organizational strategy, structure and lifecycle.

The research dependent variable is the organizational performance resulting from fit factors. The research aims to identify how the independent and moderator
variables associated with fit explain variations in organizational performance and to identify the factors required to enhance the level of fit for performance.

All research variables within the organization and the management system interact with the environment and mutually affect each other. Using the information on independent and moderator variables, the conceptual model can be further expanded into the research model as illustrated in Figure 4.

![Figure 4. Research Model](image_url)

Critical success factors for organizational performance are the key variables that
influence organization and the management system toward obtaining desired outcomes. At the organization level, the performance factors involve the mission of the organization. At the subsystem and process level, the management system provides alignment of performance factors to specific objectives with the mission. Thereby, the evaluation of variations on performance factors resulting from fit involves the organizational context and systems necessary to generate desired outcomes.

1.6 Research Hypotheses

The research will investigate the following five hypotheses related to the management systems fit for organizational performance:

Management System Design and Performance

- Hypothesis 1: As the organization adapts to changes, a descriptive management system design provides higher levels of organizational performance (efficient and effective) over a prescriptive management system design.

Fit State and Organizational Performance

- Hypothesis 2: Correct fit state leads to an increase in organizational performance.
Fit Between Organizational Strategy and Management System Design

- Hypothesis 3: Organizational Strategy will exist in between the leading and lagging extremes. A state of fit between the Organizational Strategy and the Management System Design will be positively associated to successful performance.

Fit Between Organizational Structure and Management System Design

- Hypothesis 4: Organizational Structure will exist in between the loose and rigid extremes. A state of fit between the Organizational Structure and the Management System Design will be positively associated to successful performance.

Fit Between Organizational Lifecycle and Management System Design

- Hypothesis 5: Organizational Lifecycle will exist in between the growth and decline extremes. A state of fit between the Organizational Lifecycle and the Management System Design will be positively associated to successful performance.
1.7 Assumptions

Assumptions made for the research model are:

- The main actors affecting organizational performance are the organization and the management system.
- Organizations and management systems are complex, dynamic systems involving other subsystems.
- Organization and management systems are influenced by environmental factors.
- Organizations exist primarily to accomplish goals related to the established mission.
- Organizational activities involve people interacting among themselves to achieve common goals.
- The organization and the management system change through time.
- Organizational key performance characteristics could be described as organizations change, adapt and develop through time.
- Changes to an organization or a management system could create unanticipated responses.
- For any organization, a structural form can be designed and implemented to match a particular set of circumstances.
- For most organizations, a group of management system elements and
organizational factors can be identified to describe the fit relationship and their effect on organizational performance.

1.8 Limitations

Competing goals for successful research include presenting findings that are measured precisely, can be generalized to a population, and reflect reality (Yin, 1994). There are limitations to accomplish all these goals with full satisfaction in a single study.

The main limitation inherent in research with organizations is that experimentation must be excluded as a research strategy. When performing organizational research, the manipulation of independent variables cannot be conducted in a direct, precise and systematical manner (Yin, 1994; Frankfort-Nachmias & Nachmias, 1996). The research will address this limitation with links to empirical investigations and from robust theoretical models applicable to the study. The second limitation involves applying archival analysis as one of the research strategies to retrieve information from situations and conditions no longer present. To address this limitation data triangulation will use available information from recognized sources. The information will be compared to ensure that the correct data was recorded in the archival source.

The third limitation could be associated to the research sampling size for analysis. The research sample size will have to be sufficient to support the extension of significant conclusions to other similar organizations. Therefore, the concern might be
on how representative the research sample is of some larger population (Bordens & Abbott, 1991; Frankfort-Nachmias & Nachmias, 1996).

Another limitation involves the case study as a research method. Case studies are rich with information that could test the limits on human cognition (Simon, 1976). Furthermore, personal bias might affect the ability to assimilate and process information. The researcher must ensure that methodologies minimize conditions that may bias organizational assessment with preconceived beliefs and preferences. For this investigation, research methods and procedures will be thoroughly defined prior to data collection and analysis. The expected outcome is to increase the objective evaluation by minimizing personal influence on the observations obtained from the organization and the management system.

An alternative research method to collect present data is by conducting surveys to obtain this information. However, archival data methods seldom are subject to the differing individual interpretations of questions by the respondents when conducting surveys (Bordens & Abbott, 1991). For questions involving an evaluation, the response is a subjective assessment from individual’s cognitive factors (Frankfort-Nachmias & Nachmias, 1996). Archival data can be consistently retrieved without the cognitive factors such the knowledge, perceptions, and limitations of respondents participating in the survey. Therefore, the present study will use research methods to collect archival data.
1.9 High-Level Methodology Description

The high level methodology serves as a design plan that guides the investigator in the research process to determine what questions to study, what data are relevant, what data to collect and how to analyze the results to draw conclusions. The research process involves several iterations on sequences affected by changes to the problem scope and benefiting from refinements to the research model.

The research high-level methodology produces the following outcomes (Bordens & Abbott, 1991; Yin, 1994; Frankfort-Nachmias & Nachmias, 1996):

- Formulation of research focus
- Development and refinement of research questions
- Exploration of relevant body of knowledge
- Formulation of hypothesis
- Development of a research model
- Selection of research methodology
- Analysis of results
- Conclusions from research
- Recommendations for future research
1.10 Definitions

Descriptive – factually grounded or informative (Merriam-Webster, 2001).

Management – judicious use of means to accomplish an end (Merriam-Webster, 2001).

Fit – adapted to an end or design (Merriam-Webster, 2001).

Management Systems – the methods by which an organization plans, operates, and control activities to meet goals and objectives by utilizing the resources of money, people, equipment, materials and information (Glans, Grad, Holstein, Meyers & Schmidt, 1968).

Performance – the execution of an action (Merriam-Webster, 2001).

Prescriptive – acquired by, founded on, or determined by prescription or by long-standing custom (Merriam-Webster, 2001).

System – A regularly interacting or interdependent group of items forming a unified whole (Merriam-Webster, 2001).

Strategic – of great importance within an integrated whole or to a planned effect (Merriam-Webster, 2001).
CHAPTER TWO: LITERATURE REVIEW

This chapter includes an overview of all relevant literature from the body of knowledge studied and analyzed during the course of the research. The literature overview integrates significant concepts in organizational theory, develops an explanation of management systems, understands the organizational factors affecting fit and provides the relationships for organizational performance. The evolution of key management concepts and constructs of causal relations associated with organizational performance are presented as the investigation explores the body of knowledge for organizational theory.

Research questions will guide the presentation to understand factors affecting fit between management systems and organizations for organizational performance. Main contributions from the body of knowledge pertaining to the research model will be highlighted. Finally, a summary of literature gaps will be presented at the chapter end.

2.1 What is Fit for Organizational Performance?

To understand fit between organizations and management systems, the evolution of the concept of performance fit will be highlighted. The discussion of relevant constructs will be presented from the body of literature expanding from the
industrial era to the present time. The research variables will be introduced as the fit factors under investigation affecting organizational performance. To understand organizational action, change and adaptation, the research will present the performance concept within a system approach. Additionally, the investigation will use a process perspective to describe the means for fit between an organization and the management system.

2.1.1 Management System and Organization Fit – Brief History

Past civilizations established and mastered management systems to manage projects, advance their goals and, ultimately, organize their society (Kreitner, 1992; Cook, Hunsaker & Coffey, 1997). By applying management systems, the Egyptians built structures such as temples and pyramids, transcending the society that created them. In the same manner Chinese, Babylonian and Greek cultures established management systems to manage their form of government. Romans organized their society and important activities with an effective management system that included delegation of authority and performance management methods. Their society included a set of networks for road, water, food distribution and communication supporting the expansion of Rome into a vast empire. Their communications network provided an effective link between the emperor and the governors and, from a battlefront to the Roman senate in a matter of hours.

Today, the most fundamental elements of the Roman system can still be found in
use by organizations. Superior management systems employed by past religious and military organizations include the early Christian Church and the empire of Charlemagne (Barnard, 1938). The successful fit of a management system to the organization rendered significant performance impact to their respective societies, in most cases with historical significance.

By the 19th century, managers extended to industrial organizations the management principles, techniques and structure successfully developed for military and religious organizations. Although the Industrial era brought division and specialization of work, these organizations were commanded and operated with autocratic leadership using a top to bottom chain of command and centralized decision-making (Cook, Hunsaker & Coffey, 1997). The technological progress, industrial growth and resource gathering at a focal concern created the need to better understand the management system required to control and operate the organization. In modern times, a number of researchers have studied systems utilized to manage organizations offering concepts and management system models to contribute to the existing body of knowledge with particular frame of reference.

The classical management frame of reference extended from 1895 to around the 1940’s. Classical management can be divided into scientific management and general administrative management (Kreitner, 1992). Scientific management seeks to improve effectiveness on productivity and administrative management. The elements of a classical management system are those that provide command, coordination and control functions. Therefore, the management system corresponds to the organization
hierarchical structure operating efficiently and effectively through a series of roles and defined methods.

Early attention focused on the design of organizations with the purpose to describe the optimum structure to accomplish organizational objectives. Max Weber created the idea of the bureaucracy as a management system with an efficient structure and controls to manage organizations (Kreitner, 1992; Cook, Hunsaker & Coffey, 1997). Bureaucracy has the following characteristics: explicit hierarchy of authority, a system of rules and regulations to cover employee rights and duties, clear division of labor and specialization, uniform policies and procedures to deal with work activities, impersonality of interpersonal relationships, and selection for employment, pay and advancement based on technical competence (Cook, Hunsaker & Coffey, 1997). A management system with bureaucratic characteristics became the dominant organizational system for the industrialized era and applied around the world.

Between the 1920’s and 1950’s, researchers believed that the human aspects of business organizations had been ignored within the concepts espoused by the scientific management movement. The behavioral management approach to management is primarily concerned with human psychology, motivation and leadership and emphasizes employee behavior in the organization. The movement includes human relations and organizational behavior. By the second part of the 20th century, research attention expanded to external factors (environment), changes and interaction affecting internal factors in the organization culminating in a situational, or contingency, approach to management theory. Characterized by an open-system perspective, contingency
thinking became a practical extension of systems thinking in organizational theory.

According to Burns and Stalker (1961), a fundamental property of organizations is the adaptation to varying rates of environmental change. Accordingly, the management system must be designed to respond to environmental variations by adapting the information flow, authority and control systems throughout the organization. “The members of a concern are recruited to be used, by agreement, as resources to achieve its ends. The activities which are directed in this way, and the management system in operation form the working organization of the concern.” (Burns & Stalker, 1961; p. 97). In contrast to the primary emphasis on efficiency for mechanistic management systems, the organic approach stresses flexibility and innovation and delegates control through the organization to deal with unexpected situations.

In the 1980’s, an open-system perspective with relatively decentralized, customer-driven orientation defined the excellence approach for organization management (Peters & Waterman, 1982). Changes in the environmental context highlighted technology as an organizational priority for adaptation. The technological and information revolution spawned by computers and accessible telecommunications brought a shift in environmental forces from the industrial era to the information or knowledge age (Drucker, 1995). In conjunction with departure from industrial environmental contexts, the need for organizations to understand mechanisms for learning (Senge, 1990) and resources management (Barney, 2002) gained relevance as adaptation priorities.
The modern management movement combines a wide variety of management theories and concepts to deal with action, change and adaptation. Management theories generate hypotheses that guide scientific investigations regarding data to pursue and allow for the systematic ordering of facts for accumulation of knowledge (Hempel, 1966). Theorists revise explanations for what is observed from empirical facts constructing new theories. Therefore, the modern management movement evolves through the systematic testing of hypotheses suggested by management theories (Mintzberg, 1994).

For organizational performance, the research on organizational performance fit includes management theories that could be classified into five major domains: system, structure, strategy, capabilities and culture. The domain for system includes viewing the organization as an open system and the theories related to environmental factors. The domains for structure and strategy have received wide coverage as separate and joint domains influencing organizational performance. The capabilities and culture domains provide transformational factors required for change and adaptation. Table 1 presents a summary of management theory domains including representative proponents of associated organizational concepts and propositions relevant to the research.
Table 1. Summary of Management Theory Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Representative Proponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capabilities</td>
<td>Porter (1980), Prahalad &amp; Hamel (1990), Barney (1991)</td>
</tr>
<tr>
<td>Culture</td>
<td>Schein (1992), Kotter &amp; Heskett (1992), Hofstede (1997)</td>
</tr>
</tbody>
</table>

Classification of major domains provides a framework of contributions from management theory and serves as a connection between the organization and management systems. The management theory domains classify aspects of the organization that could be useful for research and analysis of the internal and external forces affecting the organization (Lawrence & Lorsch, 1967; Thompson, 1967; Kast & Rosenzweig, 1979; Sink & Poirier, 1999). In essence, these forces could provide a general description of the environment affecting organizational performance. Ultimately, the research dependent variable is organizational performance as a function of fit factors. Variations in organizational performance resulting from the fit between an organization and the management system must include the effects from environmental forces (Aguilar, 1967; Pfeffer & Salancik, 1978; Aldrich, 1979; Miller, 1992).
2.1.2 Fit Factors for Organizational Performance

In a broad sense, fit creates the conditions and linked concepts of cause and effect from the factors involved. Fit is defined as adapted to an end or design (Merriam-Webster, 2001). The concept of fit to explain organizational performance can be found in the research literature (Burns & Stalker, 1961; Chandler, 1962; Lawrence & Lorsch, 1967; Miles & Snow, 1984; Miller, 1992; Donaldson; 1999). For organizational performance, Chandler (1962) proposes a fit between the strategy and structure domains. Burns and Stalker (1961) and Lawrence and Lorsch (1967) advanced the concept of contingency fit between the organizational structure and environmental forces. Miles and Snow (1994) view fit as the combination of strategies with structures and processes to achieve competitive advantage. Miller (1992) believes that fit for organizational performance involves alignment of internal and external environmental factors affecting the organization. Donaldson (1999) argues that fit creates a contingent portfolio of causes and effects from the organizational characteristics driving performance.

With respect to the investigation, the research model extends the performance fit concepts presented by Miles and Snow (1994), Miller (1992) and Donaldson (1999). Miles and Snow (1994) applied the concept of fit to tailor strategy with the combination of structures and processes. In Miles and Snow’s context, fit is both a process and state to align the organization with the environment. Miles and Snow (1994) classify the fit connections as dynamic, leading to either organizational success achieved from a
tight fit or failure from misfit. Built around a strategy-structure-environment framework Miles and Snow (1994) believe that conditions for a tight fit can be associated to organizational excellence. Additionally, Miles and Snow (1994) introduce the concept of minimal fit, a level sufficient to provide alignment for survival.

Organizations could use the strategy-structure-environment framework to create a match or fit for performance and change. The minimal fit, misfit and failure states involve the management process, organization structure and strategy. Miles and Snow (1994) argue that an organization must establish minimal fit to survive. Misfits will not survive unless organizations find a protected environment.

With tight fit, organizations have both internal and external alignment to the environment by implementing processes reinforced by success and resulting in performance excellence. Characteristics of tight fit include an organizational structure and process that makes management decisions simple leading to widespread understanding. Therefore, actions reinforce the tight fit with processes leading to release of resources and streamlining of the organization structure.

Miles and Snow (1994) classify effective strategies to achieve tight fit either as defending, prospecting, or analyzing. The strategies could lead or lag the environmental conditions. With an early fit, the organization leads to domination of their competition. However, the early fit conditions must be quickly followed by tight fit to ensure continued success. Conversely, Miles and Snow (1994) suggest that an organization implementing a reacting strategy will not achieve a tight fit.

Additionally, Miles and Snow (1994) define a fragile fit and future fit states. A
fragile fit state results from ineffective internal change or failure to adapt to environmental change rendering the organization vulnerable to external forces. In the future fit state organizations become vertically disaggregated, with some functions farmed out to independent organizations to perform a particular process or service until the need is no longer present.

Similarly, adapting to an environment necessarily includes creating environmental conditions favoring the organizational characteristics. Miller (1992) believes that organizations must understand the relationship between internal and external environmental factors for fit. The environmental fit develops through deep understanding of the forces and dynamics that gives shape to the future and brings foresight into processes and activities affecting performance. From the organizational characteristics driving performance, Donaldson (1999) proposes identifying a contingent portfolio of causes and effects. With an organizational portfolio, the contingency variables could be fit to the situation for change and performance. The primary organizational characteristics included in the portfolio under investigation are strategy, structure and lifecycle.

The concept of fit could be applied to the investigation of relationships between management systems and organizations. In particular, the concept will apply to both the content of fit and the processes of arriving to fit. The investigation will study and understand the factors from an organization and the management system as these factors adapt, match and create the organizational performance outcomes. Three key elements form the management system under investigation. The system elements are:
strategic management subsystem, core business and decision-making processes. Additionally, the core business process encompasses processes for resources and knowledge management.

The research model for organizational performance includes fit factors from the organization and management system with a dynamic environment as the main external interface serving as moderator. Fit factors in the model include the independent variables from the management system elements and the organization. The dependent variable for organizational performance includes the effectiveness and efficiency categories. The research variables and their relationship are presented in Table 2.

Table 2. Research Variables and Their Relationship

<table>
<thead>
<tr>
<th>Research Variables for Organizational Performance</th>
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<tbody>
<tr>
<td><strong>Independent Variables:</strong></td>
</tr>
<tr>
<td>Management System Elements</td>
</tr>
<tr>
<td>Strategic Management</td>
</tr>
<tr>
<td>Core Business Processes</td>
</tr>
<tr>
<td>• Resources Management</td>
</tr>
<tr>
<td>• Knowledge Management</td>
</tr>
<tr>
<td>Decision-making Processes</td>
</tr>
<tr>
<td><strong>Independent Variables:</strong></td>
</tr>
<tr>
<td>Organization</td>
</tr>
<tr>
<td>Strategy</td>
</tr>
<tr>
<td>Structure</td>
</tr>
<tr>
<td>Lifecycle</td>
</tr>
<tr>
<td><strong>Dependent Variables:</strong></td>
</tr>
<tr>
<td>Organizational Performance</td>
</tr>
<tr>
<td>Effectiveness</td>
</tr>
<tr>
<td>Efficiency</td>
</tr>
</tbody>
</table>
2.1.3 Management and Organization

Management is an organ of an institution; and the institution, whether business or a public service, in turn an organ of society, existing to make specific contributions and to discharge specific social functions (Barnard, 1938; Simon, 1976). Management cannot be defined or understood except in terms of the associated performance dimensions and of the demands of performance exercised on management. Organization is "two or more persons" who have come together to accomplish some common purpose (Barnard, 1938; p. 73).

This research investigates the proposition that the management system and organization are mutually supportive to create a match or fit affecting organizational performance. Essential components of the organization and elements of the management system will be examined to understand and define their relationship to organization performance. The definition of the management system includes the interfaces and interaction between the management system and the organization it serves. A cohesive research model will be developed with the description of elements within the management system and their relationship to the organizational factors for strategy, structure and lifecycle.

The research model describes organizational performance from the fit relationships and interdependence between the management system and organizational factors. With a systems thinking approach, a more holistic view of the organization’s characteristics and a wide variety of mechanisms could be integrated to
build synergism between organizational systems, elements and structures (Senge, 1990; Lee, Shiba & Wood, 1999). However, the synergistic effect from integration could affect the identification of discrete contribution of fit relationships and interdependence.

According to Boulding (1956) and Wright (1989), all systems have interrelated elements, components, or subsystems and all must contribute to the organization’s purpose. Stated in a different manner, the organization’s efforts and subsystems are interrelated and their effect can be evaluated against their defined goals and purpose. Conversely, the management system operates within an environment that affects the organizational subsystems beyond their explicit control. Emery and Trist (1965) observed that from the organization’s perspective, the texture of their environment changes because previously unrelated or irrelevant environmental elements become interconnected and significant. To deal with the dynamic nature of the environment, the fit characteristics between the organization and management system must be capable of recognizing significant and interconnected changes affecting organizational performance (Cockburn, Henderson & Stern, 2000).

In competitive environments, characterized by rapidly changing conditions, traditional management practices become increasingly ineffective (Brown and Eisenhardt, 1998). The organization could match managerial practices with management systems elements as a response to environmental changes (Miller, 1992). In such conditions, management systems must possess inherent evolutionary characteristics such as increasing complexity, differentiation, integration, structuring, and autonomy (Child, 1972; Miller, 1986). The primary role of organizational
management and the management system used to cope with changing environmental conditions are included in Table 3.

Table 3. Organization Roles in Changing Environments

<table>
<thead>
<tr>
<th>Entity</th>
<th>Primary Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational</td>
<td>• Manages the interactions that enable a learning organization</td>
</tr>
<tr>
<td>Management</td>
<td>• Establishes a desirable future</td>
</tr>
<tr>
<td></td>
<td>• Achieves organizational goals</td>
</tr>
<tr>
<td></td>
<td>• Aligns the purpose of individuals with the overall society and the organization interfaces</td>
</tr>
<tr>
<td>Management Systems</td>
<td>• Effective at creating the paths</td>
</tr>
<tr>
<td></td>
<td>• To advance organizational priorities</td>
</tr>
<tr>
<td></td>
<td>• To maintain a competitive position in their field</td>
</tr>
<tr>
<td></td>
<td>• Possess inherent evolutionary characteristics</td>
</tr>
</tbody>
</table>

Management systems contribute the information on the environment and organizational activity leading to action and for the accomplishment of strategic goals (Lynch, 2000). Concurrently, management ensures that the management system stays current in order to communicate progress, results, lessons learned and priorities to the organization (Warrick, 1984; Wells & Doherty, 1994).
2.1.4 Process Perspective

The research model utilizes processes to describe the path for transformations and action from organizational activities and outcomes associated to performance fit. Garvin (1995) believes that the use of processes emphasize the links among activities providing a powerful way to understand organizations and management. Koontz (1961) advocated the use of processes as the management approach to understand how to plan, organize, lead and control. Flows from information and decision processes link the organization structure (Galbraith, 1995). The processes become building blocks for organizations that could encompass the variances not explained by traditional management approaches (Garvin, 1998). The management system includes a combination of continuous processes for decisional and informational activities to achieve desired outcomes through and with individuals who are operating in organized groups (Koontz, 1961).

A process might be an efficient tool to describe the fit between the organizational elements and transformation activities within the management system (Garvin, 1995). A focus on process emphasizes how things change including the framework of what changes in the system (Schein, 1992; Garvin, 1995). Processes collect dynamic concepts and capture linkages among organizational activities to provide a cohesive perspective of what is taking place (Garvin, 1998). Discussed in many different terms, a process perspective provides intrinsic information on the organization and management systems elements as they relate to organization performance (Ketchen, Thomas &

For organizational activities, a process perspective could describe strategy and structure with either formal and analytical or informal and social means (Cannon, 1972; Miller, Droge & Toulouse, 1988). Eden (1992) presented the argument that the development of strategy would be more effective if viewed as predominantly social rather than analytical activities within organizations. For both cases, the process approach provides a discussion tool to explain the differences between the social and analytical context.

To fulfill the organizational mission, the research model includes the strategic management system as an element of the management system. To attain the desired organizational outcomes and to prepare corresponding action plans, the strategic management system involves a series of stages and processes (Chandler 1962; Ansoff, 1965; Schoemaker, 1995). The formulation of strategies instigates processes of action. An important feature of strategic action plans is to provide formal changes in the organization's structure. Influence over strategy and structure involve key decision-making processes. The decisions and actions generate transformations of the management system intrinsic order (Cannon, 1972; Rajaopalan, Rasheed & Datta, 1993). A process perspective serves to define organizational forms based on
combination of management processes with strategy and structure for competitive performance (Cannon, 1972; Miles & Snow, 1986) and to meet the demands and, to cope with the increasing rates of change (Ashkenas, 1995). Process-oriented management has served as an organizational communication tool to recognize underlying pattern of events within individual situations (Lee, Shiba & Wood, 1999).

2.1.5 Performance Processes

Processes change the focus of both analysis and action within the organization. Processes involve how things are done, affecting organizational performance (Garvin, 1998). At the macro level, the management system consists of systems and processes closely intertwined to the organization and affecting organizational performance. Management system processes become a vital component for organizational action. Miller, Droge and Toulouse (1988) found that the relationship between strategic process and content affect their mediation between context and organizational structure. Organizations rationalize decision-making with processes to provide information. Processes establish a communication network to explain organizational decisions and to maintain an operational state. Walsh (1995) found that both process and content and their interactions were significantly related to performance and that context is an important moderator of these relationships. Garvin (1998) suggests that proper functioning of processes should precede the design of organizational structures.

Exposed to the dynamic environment and internal changes, each management
process must be continuously tuned to the organization. The organization must design their management processes from the customer's viewpoint to implement strategy effectively (Davenport & Nohria, 1994). A customer orientation provides organizations with the flexibility and efficiency toward transformation in ways appropriate to the emergent environment. The management system must focus only on those processes identified as important to the organization to ensure that continuous improvement efforts sustain performance (Keen, 1997).

Formal evaluation of organizational performance requires assessment processes. Kaplan and Norton (1996a) define four primary evaluation processes to connect long-term objectives with short-term actions and assess organizational performance. The four evaluation perspectives are: financial, customer, internal business process, and learning and growth. Evaluation of these perspectives could involve uncompleted chains of action extending beyond the time of measurement. However, the assessment processes must include a combination of feedback and feed-forward indicators. Results oriented indicators provide feedback information after the actions are completed. Conversely, process indicators monitor the feed-forward measurements for whether throughput processes can contribute to the achievement of the targets.

The processes dealing with organizational performance integrate information, resources and actions to connect and achieve objectives. As the environment changes, the process sequences capture activities and actions affecting organizational performance and describe how individuals, groups, and organizations adapt, develop,
and grow (Garvin, 1998). Appropriate fit between an organization and the management system enables actions to match the conditions and requirements of the current environment.

2.1.6 Environmental Forces and Changes

Organizations cannot aim to insulate themselves from their environments (Thompson, 1967). An organization’s survival and growth is ultimately conditioned by their capacity to learn and adapt to a changing environment (Duncan, 1979; Senge, 1990; 1994). Environmental conditions could create profound waves of social and economic changes and activities (Adams, 1918; Bridges, 1991; Quinn, 1996). Following the transition between the agricultural and industrial eras, Henry Adams (1918) noted that environmental changes create challenges where “an average mind… could no longer understand the problem in 1900”. Dramatic environmental changes often become the trigger of organizational transformations (Bacharach, Bamberger & Sonnenstuhl, 1996).

In terms of environmental factors external to the organization, the world has completed three waves of dramatic environmental changes in an agricultural-industrial-information schema (Toffler, 1990). With the present external environmental situation, Jensen (1996) categorizes waves of change into five techno-economic societies: hunter-gatherer, agricultural, industrial, information and the dream society. Jensen (1996) believes that the dream society masters the production and distribution of
information making their use both programmed and routine. Drucker (1988) agrees that the organizations have become information-based affecting strategic priorities and decision processes. Consequently, present organizations are dealing with a knowledge environment with an increased emphasis on learning processes.

The external environmental context through the waves of change from the agricultural, industrial, information and knowledge eras (Toffler, 1990; Jensen, 1996) and factors interacting with the organization (Kast & Rosenzweig, 1979) are illustrated in Figure 5.

![Environmental Characteristics and Context for Organizations](image)

Figure 5. Environmental Characteristics and Context for Organizations

Organizational responses to the factors associated with the knowledge environment context require different adaptation mechanisms from those applied under
prior environmental conditions (Duncan, 1979; Jensen, 1996). Without learning and adaptation, organizational performance might decrease. To gain efficiency, the organization relies on fixed routines for decisions and response to environmental challenges. The use of routines can be illustrated with established standard operating procedures, prescribed communication channels, and predictable career paths (Cyert & March, 1963). Without learning and perception of present conditions, the organization focus on established routines performing actions based on fixed interpretations. Performance deteriorates when routines do not fit the situation and organization members cannot agree on how to interpret the information or what actions to take (Lawrence & Lorsch, 1967). Consequently, the organization fails to meet the demands of their environment.

To match the constant variations in a knowledge era environment, the organization must become a learning organization (Senge, 1990). The learning organization emphasizes learning, knowledge and meaning operating at the cutting edge in learning systems interfacing those individuals and, organizations that can use the information (de Geus, 1988; Senge, 1990). Learning activities include sensing the external and internal environment affecting the organization. Outcomes depend on the organizational ability to absorb what is going on in the environment. The sensing process collects information for select areas of priority. The individual in the organization develops perceptions, generates meaning through interpretation and acts on that information.

The organization management literature consistently and empirically supports the
proposition that the demands imposed by the environment affect organizational performance (Thompson, 1967; Lawrence & Lorsch, 1967; Galbraith, 1973; Miller, 1992). Organizations attempt to learn and understand the complex interactions that created environmental events. The ability to learn and the organizational response to environmental demands could be factors affecting performance (Senge, 1990). To adapt for environmental changes, researchers characterize learning organizations as those capable of transferring and implementing knowledge for improved performance.

To form a fit for performance, the independent variables for organizational factors and management system design includes the interface to the external environment. The literature discussion on the relationship between external environment and performance tend toward the effect the environment forces exert on the organization. The relationship between the external environment and the organization could mutually influence each other (Emery & Trist, 1965; Duncan; 1973; Pfeffer, 1982). To increase the likelihood of conditions for achieving goals and providing for mutual effect, organizations prefer to avoid unstable environments (Thompson, 1967). The research model includes a group of nine characteristics as external environmental factors. These factors are: cultural, technological, educational, political, legal, natural resources, demographic, sociological and economic (Kast & Rosenzweig, 1979).

The cultural factor includes historical background, ideologies, values and norms of society, views on relationships to authority, leadership patterns, interpersonal relationships, rationalism, science, and technology that define the nature of social institutions. The technological factor includes the level of scientific and technological
advancement in society, the physical base (plant, equipment, and facilities), and the knowledge base of technology. The technological factor also includes the degree to which the scientific and technological community is able to develop new knowledge and apply it. The educational factor refers to the general literacy level of the population, the degree of sophistication and specialization in the educational system, and the proportion of people with a high level of professional and/or specialized training.

The general political climate of society defines the political factor with the degree of concentration of political power and the nature of political organization (degrees of centralization, diversity of functions). The legal factor involves constitutional considerations, nature of legal system, specific laws concerning formation, taxation, control of organizations, and jurisdiction of various governmental units. Within the natural resources factor are the nature, quantity, and availability of natural resources, including climatic and other conditions.

The demographic external factor involves the nature of human resources available to society, their number, distribution, age, sex, and concentration of populations. The sociological factor includes class structure and mobility, the definition of social roles, nature of social organizations, and development of social institutions. The economic factor pertains to the general economic framework. The factor includes the type of economic organization, private versus public ownership, centralization and decentralization of economic planning, the banking system, and fiscal policies, and the level of the investment in physical resources and consumption characteristics.

General external environmental characteristic (Kast & Rosenzweig, 1979)
affecting the organization and the management system for performance fit are presented in Table 4.

Table 4. External Environmental Characteristics and Areas of Interest

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Areas of Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural</td>
<td>Historical background</td>
</tr>
<tr>
<td>Technological</td>
<td>Level of scientific and technological advancement in society.</td>
</tr>
<tr>
<td>Educational</td>
<td>General literacy level of the population.</td>
</tr>
<tr>
<td>Political</td>
<td>General political climate of society</td>
</tr>
<tr>
<td>Legal</td>
<td>Constitutional considerations, nature of legal system, jurisdiction of various governmental units.</td>
</tr>
<tr>
<td>Natural Resources</td>
<td>The nature, quantity, and availability of natural resources, including climatic conditions.</td>
</tr>
<tr>
<td>Demographic</td>
<td>The nature of human resources available to society; their number, distribution, age and sex.</td>
</tr>
<tr>
<td>Sociological</td>
<td>Definition of social roles and responsibilities.</td>
</tr>
<tr>
<td>Economic</td>
<td>General economic framework, centralization and decentralization of economic planning.</td>
</tr>
</tbody>
</table>

Source: Kast & Rosenzweig, 1979

Andrews (1971) introduced the organizational environment analysis concepts
into the corporate strategy processes to identify and determine an appropriate course of action. Concurrently with Kast and Rosenzweig (1979) work, Steiner (1979) introduced a set of factors to form a checklist to identify and analyze an organization’s external environment involving political, economic, social, technological forces. Johnson and Scholes (1997) support the environmental scanning concept as a source of relevant information for strategic and business planning processes.

Environmental factors could change in cycles with variations becoming contingent conditions with respect to organizational characteristics (Donaldson, 1999). Kuczynski (1986) stresses business cycle as an external environmental factor affecting organizations. The business cycle affects the organizational performance level by creating conditions for variation over time. With an expanding business cycle, the organization could have favorable conditions to increase performance level. Changes in business cycle lead to variation in performance and organizational internal characteristics, such as structure (Cockburn, Henderson & Stern, 2000). Organizations must detect environmental variations affecting performance and determine actions required to adjust and adapt.

To balance and integrate actions to results, Sink and Poirier (1999) present a framework composed of nine internal environmental factors. These factors are: measurement, planning, infrastructure, technology, communication, culture, learning, motivation, and politics. Sink and Poirier (1999) further divide the nine factors into two groups: action to results and conditions for success. The action to results includes factors for planning toward performance improvement, measurement to support
decision-making and technology with respect to how actions are implemented in the organization. Conditions for success include the remaining six factors. The combination of external environmental factors and internal environment fronts provides a framework to identify and analyze organizational strengths, weaknesses, opportunities, and threats (Kast & Rosenzweig, 1979; Miller, 1992; Sink & Poirier, 1999; Kaplan & Norton, 2001).

A framework for the integration of both internal and external environmental factors is included in the research model. The alignment of internal and external environmental factors can be described using a process flow that includes the strategies for direction, goals and objectives for targets, actions and, outcomes as organizational response (Mintzberg, 1979; Keen, 1991; Pfeffer, 1997; Barney, 2002). The process flow incorporates the concept of performance factor interdependence and the development of complex patterns from simple feedback systems (Pascale, 1990, McMaster, 1996). The organization establishes the conception of feedback structures in response to environmental factors and retrieves outcome feedback associated with performance factors (Lawrence & Lorsch, 1967; Duncan, 1973; Perrow, 1986).

Environmental response arises from the interactions among the elements in the research model, not from the complexity of the elements themselves. With the composite framework, the organization could design the structure, strategy and processes needed to respond to the environmental conditions and establish effective dynamic relationships that could affect performance (Pfeffer, 1997). The organizational external and internal environmental factors and the basic flow for the integration
Organizational actions and outcomes can influence environmental factors creating starting conditions for future periods of time (Emery & Trist, 1965). The relationship between internal and external environmental factors is neither direct nor unidirectional (Duncan, 1973; Kast & Rosenzweig, 1979; Miller, 1992). The environmental factors identified in the research model moderate the relationship of performance factors associated with fit. Through a dynamic pattern of interaction, the environmental factors become both cause and effect for organizational performance.
2.2 What Influences Fit Between an Organization and the Management System?

A number of possible factors could influence the performance fit between an organization and the management system. For the investigation, the research model includes the environmental and organizational structure, strategies and lifecycle as factors for study. In the model, the environmental factors and their changes moderate performance, as described in the previous section. The research question will describe the relationship between organizational factors and fit for performance including organization development and lifecycle. The influence of management system design factors will be described in subsequent sections. Additionally, the concepts of information flow and organizational culture will be presented as they influence performance fit.

2.2.1 Organizational Structure

Chandler (1962) proposes that the organizational structure is composed of lines of authority and communication (Barnard, 1938) where the information and data flows through those lines. Prior to Burn and Stalker’s (1961) research, the perspective on lines of authority and communication permeated as the main area of interest in the organizational performance literature (Adams, 1918; Barnard, 1938; Drucker, 1954; Woodward, 1965). Organization structure became an indispensable means to achieve organizational performance while applying the wrong structure could impair it (Drucker,
As the key performance factor, researchers believed that “organization structure must not direct efforts toward the wrong performance” (Drucker, 1954, p. 202).

During the industrial era, highly-structured hierarchies became the predominant organizational design (Burns & Stalker, 1961; Galbraith, 1973). Well-structured hierarchies tend to become highly efficient organizations capable of seeking maximum desired output. Burns and Stalker (1961) characterized these highly structured organizations as mechanistic. At the opposite end of the continuum, the organic organizations tend toward structural flexibility with wider spans of control, open channels of communication, and decentralized decision making.

As the open system perspective gained acceptance, organization designs extended the organizational structure beyond the internal composition (Emery & Trist, 1965). From that perspective, Child (1972) defines organization structure in terms of the formal allocation of roles and mechanisms to control and integrate work activities including those that cross formal organizational boundaries. Miles and Snow (1994) expose the relationship between the core operating logic and the organization structural form viewed from an internal arrangement and aligned with an external orientation. Within the operating logic, the organizational structural design must extend in multiple directions to align and coordinate efforts and to manage conflicts.

Galbraith (1973) conducted empirical research on designing and structuring of organizations concluding that there is no one best way for designing organizations. Furthermore, he states that a single way of organization design is not equally effective in all circumstances acknowledging the diversity in organization designs and respective
management systems. Empirical evidence suggests the mechanistic and organic extremes form a continuum (Woodward, 1965; Galbraith, 1973; Aldrich, 1979). In practice, an organization could be either mechanistic with some organic characteristics or tend to be organic with some mechanistic orientation. As the environmental context changes to the knowledge era, organizational structural designs with an organic orientation might be more effective in establishing a performance fit for uncertain environments (Duncan, 1973; Mintzberg, 1979; Peter & Waterman, 1982; Miles & Snow, 1994).

Duncan (1979) reiterates there is no one best structure and argues that contingency theories on organizational structure fail to define the decision path to implement the structural design. Duncan believes that the design and implementation path must start with the identification of the organization’s environment. As information on the environmental conditions increases, the structure design could provide the mechanisms to handle the environmental forces acting on the organization (Duncan, 1979). The design path must continue with the identification of counterforce factors within the organization.

In establishing a balance between the internal structure and the external environment, Galbraith (1995) defines the placement of power and authority within four areas of interest. The organization’s structural areas are: specialization of jobs; shape as span of control; distribution of power; and departmentalization. Changes in the environmental forces composition impact the organizational infrastructure. As the environmental factors unfold into a composition emanating from the knowledge era,
Galbraith (1995) presents four emerging organizational designs for structural arrangements: the functional integrator model, the distributed organization, the front/back model, and the virtual corporation. For the research model, the emerging designs are included in the agile structural arrangement.

Researchers have identified and studied structural factors that influence an organization’s management system. The complexity of the management system is determined by the structure and the systems operating within the organization (Mintzberg, 1979). Additionally, environmental uncertainty affects the information flow required for organization’s decision-making processes (Duncan, 1973). Galbraith’s (1995) empirical research on organization shows how organization structure design affects and supports policies, behaviors, and performance. The design process involves thorough understanding of the organization strategy to properly match the structure. The chosen structure of the organization affects the power and authority allocation within the management system.

Nohria and Eccles (1992) described strengths and weaknesses of factors defining organizational structure designs. For some organizational structures, the possibility and presence of structural weaknesses affecting action and response to changes might be attenuated with the flexibility of a hybrid structure. The new organization structure according to Drucker (1995) is a network society based on knowledge and decentralization. When specialized knowledge is integrated into a task, the result is productive knowledge; the more decentralized the structure, the quicker the result occurs.
2.2.2 Organizational Structures and Strategies

Prior to the 1980s, researchers studied and defined organizational forms based on strategic approaches in response to the changing environment. March and Simon (1958) presented an expanded view of how responses to changing influences impact organization structure. Simon (1976) argues that organizations exist to process information. To explain and understand how information was processed and decisions were made in complex organization structures, March and Simon (1958) proposed the behavioral theory of the firm. The behavioral theory models human behavior and establish relationships on behavior effect on organizational strategic processes (Cyert & March, 1963).

Chandler (1962) believes that organizational structure will follow the defined strategies. Cannon (1972, p. 30) implies mutual dependency because “strategy can rarely succeed without an appropriate structure.” Miles and Snow (1994, p. 18) argues that structure is part of an “organizational package that has-and-maintains a logical fit” with strategy and process decisions. Therefore, the literature suggests there is a significant relationship between organizational strategy and structure (Child, 1972; Cannon, 1972; Mintzberg, 1979; Lynch, 2000). The research disregards separation of organizational structure and strategy in a discussion of management system frameworks because of their interdependencies.

By the end of the 1980s, new technologies, increased globalization of competition and opening of new markets increased their relevance as environmental
demands on organizations (Hammer & Champy, 1993). As the environmental priorities change, the organizational strategies and structure must adapt to the environmental context. Mintzberg and Waters (1985) described the relationships and interdependencies of styles of strategy formation, strategic activities, types of information, and sources of information for organizations where executives use deliberate and emergent strategies.

Researchers have claimed that the strategic posture delineates the organizational structure required to deal with change (Galbraith, 1995; Hammer & Champy, 1993). The organizational strategy and structure are also linked to changes in performance (Cannon, 1972; Mintzberg, 1983). Furthermore, Donaldson (1987) provides empirical research to support that low organizational performance is the trigger for adaptive organizational change in structure. Structural changes affect the transformation processes within the management system. When dealing with organizational change, empirical research revealed that the structure affected organizational routines and individual decision-makers behavior when evaluating important choices and consequences (Campbell, Dunette, Lawler & Weick, 1970).

The earlier forms of management systems, with their classic organizational structures and processes, were found irrelevant or incomplete to respond to changes in environmental demands (Hamel & Prahalad, 1993; Handy, 1990). To match changes in organization structure and strategies, management systems typologies have several combinations. Proposed management systems typologies ranged from systems maintaining the status quo to an opposite end with systems incorporating radical and
revolutionary approaches (Campbell, Dunette, Lawler & Weick, 1970; Hammer & Champy, 1993; Hamel & Prahalad, 1994; Rieley & Clarkson, 2001). With application of a classical management systems approach, the organization relies on process control to obtain desired outcomes and to correct performance to previously established levels. At the other extreme, an organization can incorporate radical and revolutionary management approaches to prompt continuous change and adaptation. The predominant operational mode for the management system model must be between these two operational and adaptation extremes.

Mintzberg (1979) presented an organizational strategy-structure typology using three components. The first component characterizes an organization's structure with a set of design factors. The second component characterizes an organization's context from a set of contingency factors. The last component defines five ideal types of organizations described in terms of the design and contingency factors: simple structure, machine bureaucracy, professional bureaucracy, divisionalized form, and adhocracy. Mintzberg (1979) proposed that effective structuring requires an internal consistency among the design factors. Organizational effectiveness increases with fit of an organization's design to any one of the five ideal designs. Consequently, higher effectiveness in organizations possessing internally consistent configurations of design characteristics, with the most internally consistent design configurations defined by the five ideal types model of fit.

As organizations cope with adaptation, Mintzberg (1979) states that machine bureaucracy is the highest structured of the organizational forms. A management
system for a bureaucratic organization matched the needs of the industrial era by concentrating on technical superiority and reducing the impact of intangible elements on the decision-making process. Environmental evolution from the industrial to the information and the knowledge eras create a context that reduces the value for a bureaucratic organization structure (Mintzberg, 1979; Mintzberg & Waters, 1985; Senge, 1994). To match the contingency factors from the environmental evolution, combinations of organizational strategy and structure have been proposed with processes for decision and action (Lawler & Weick, 1970; Child, 1977; Miles & Snow, 1978; Mintzberg, 1979). As the organization embraces learning, knowledge management processes take relevance in defining strategy and structure combinations (Senge, 1990). In that context, the combination of structural-strategic factors fitting organic organizations emphasizes coordination by mutual adjustment and typically operates in turbulent environments (Mintzberg, 1979).

Organizations have the ability to preserve permanent core principles as they change structures and practices while stimulating evolution toward their vision (Collins & Porras, 1996). Their core ideology proposes to understand what needs to be preserved, to identify the purpose necessary to fulfill their strategic vision, and to define how the organization change to reach their goals. Similarly, the organizational structural characteristics respond to the demands from adaptation with internal consistency among the design factors (Mintzberg, 1979) and the required activities to attain objectives (Drucker, 1954).

Researchers have identified emerging organizational forms describing dominant
patterns affecting structures, strategies and the management system. McMaster (1996) provides a theory of organization based on complexity and self-organizing nature. The new organizational form is adaptive and able to respond to new demands imposed by the environment. An emerging structural form to increase flexibility is the network organization responding rapidly to demands for innovation with new products and services (Miles, Snow, Mathews, Miles & Coleman, 1997). The adaptive response from the organizational management system must be coherent with the development of clusters of self-organizing components and flexible structures. Concurrently, strategies must support innovation and collaboration within the organizational structure.

The structure-strategy relationship to organizational performance has been explored in the literature (Ashkenas, 1995; Doty, Glick & Huber, 1993). The relationship between structures and strategies for multidivisional corporations located at several countries were studied including the organizational forms needed to manage the extended organization (Ashkenas, 1995). To meet the demands of the environment, Ashkenas (1995) proposes concepts on adjustments that expand beyond traditional boundaries for organizational structure and processes.

Doty, Glick and Huber (1993) tested the Miles and Snow’s (1978) theory consisting of fit between strategy, structure, and process factors. The investigation was conducted with a continuum-of-types interpretation of the typology. In Miles & Snow’s (1978) theory, the defender and the prospector types reside at opposite ends of a continuum while the analyzer type is positioned between these two extremes. The three ideal types form a single continuum represented by formulating each of the fit
models with three ideal types in which the profile for the analyzer was specified as the arithmetic means of the values for the prospector and the defender. The continuum interpretation explained about 24% of performance variance for overall organizational effectiveness. However, the continuum typology model establishes the performance fit concept from a strategic perspective instead of the integrated focus presented from a management system perspective.

The literature contributes an explanation of the causal relationship between strategy and structure, interdependence, and their effect on organizational performance for efficiency and effectiveness. In particular, the organizational structure appears to support the intended strategy as the organization deals with environmental priorities.

### 2.2.3 Organization Development and Lifecycle

The organizational literature suggests that the use of emergent and deliberate strategies vary with the size of the firm and the technical complexity of the environment (Chandler, 1962; Pugh, Hickson, Hinings & Turner, 1968). Growth tends to increase organizational size and structure in an insidious process that cannot be prevented (Drucker, 1954). Organizations with environments of high technical complexity tend to select more modes of emergent strategy formation while those from less technical environments tend to select more deliberate ones.

The relationships and interdependence of the management system and the organization operate with cycles of events dealing with particular developmental
conditions and environment. Although the relation between environment, strategy and organization structure could be cyclic and interactive, the exact strength and nature of the relation will depend upon many factors. Researchers have argued that organizations evolve in a consistent and predictable manner through various stages of development (Churchill & Lewis, 1983; Tushman & Romanelli, 1985; Adizes, 1999). Each developmental stage is characterized by organization factors associated to size, complexity, and their relation to the internal and external environments (Perrow, 1986).

Churchill and Lewis (1983) studied small organizations proposing a lifecycle path composed of five distinct stages. Adizes (1989, 1999) proposes ten lifecycle development stages with patterns to identify and adapt organizational systems of structure from the inception, growing through multiple stages, until the organization finally dissolves. Adizes (1999) believes that with the appropriate management system, an organization could reach a stage of maturity where it could indefinitely deal with changes and adaptation. Organizational changes and adaptation stages might not always follow a defined path. Tushman and Romanelli (1985) suggest that although organizations evolve through stages, the pattern of reorientation and convergence might not follow a sequential path.

As the organization evolves, the organizational structure emerges as a result of developmental factors associated with each stage (Greiner, 1972). Structure follows strategy (Chandler, 1962) affecting the subsystems and processes within the management system. In the beginning and while the organization remains small, the environmental monitoring of trends and developments might solely reside at the
executive level of the organization structure. As the organization grows and develops, monitoring must involve multiple levels in the organization structure (Greiner, 1972).

Organizational development phases must consider internal and external factors. Internal organizational factors such as age, size, and stage of evolution combine with external factors such as growth rate of the industry (Greiner, 1972). Within the organization, growth and development stages create pressures to adjust and change (Greiner, 1972; Adizes, 1999). With respect to organizational lifecycle, the nature of strategies could be influenced with growth and cycle stages. Larger firms may be in their mature stage where their strategies could be deliberate and structured versus smaller firms dealing with a growth stage and using more emergent strategies (Adizes, 1999).

To allow for organization re-creation into new structural forms, Prigogine (1984) highlights the importance of ensuring disequilibria to dissipate changes into the management system structure. Nonetheless, the lifecycle of organizations might not develop or last forever. Research on organizational lifecycle suggests that on average the organization’s life is less than half that of a human being (Rieley & Rieley, 1999). In some cases, organizations cease to exist at points early in their lifecycle and prior to reaching their prime stage (Adizes, 1999).

In the lifecycle theory of organizations, Adizes (1999) proposes a comprehensive set of ten stages to describe growing and aging organizations. He describes a growing organization in terms of the following stages: courtship, infancy, go-go, adolescence, and prime. He describes the aging organization by means of the following stages: the
stable organization, aristocracy, early bureaucracy, bureaucracy and death. The lifecycle theory of organizations suggests that all organizations will have to identify and deal with specific lifecycle stage issues, which, if left untreated, can inhibit the growth, development, vitality, and life of the organization.

Organization lifecycle theory researchers identify a stage where the organization achieves levels of high success when meeting performance goals for effectiveness and efficiency (Greiner, 1972; Scott & Bruce, 1980; Churchill & Lewis, 1983; Adizes, 1999). Adizes (1999) calls the peak performance stage the prime lifecycle stage. At the prime stage, the organization can deal with environmental forces by conceiving internally developed fronts in a structured and systematic way. Furthermore, prime organizations typically know what their business is, what it should be, and develop the capability to experience growth to fulfill effectiveness and efficiency measures.

When comparing different phases for each organizational lifecycle model, the different stages could be categorized using four distinct groups: introduction, growth, maturity, and decline. Table 5 presents contributions from the organizational lifecycle propositions for all four stages used.
The organization lifecycle theory contributes to the research model in identifying the development conditions affecting the present and future capacity for organizational adaptation to changes. The identification of lifecycle stage brings understanding on the conditions and appropriate level of fit between the organization and the management system.

2.2.4 Information Flow

Drucker (1985) defines information as the axial organizational dimension providing the main structural support. Through the organization, the management
system serves as a network of distributed subsystems where analysis could be undertaken and control exercised closer to the source of activities and disturbances (Ackoff, 1974; Simon, 1976; Huber, 1982; Pfeffer, 1982; Garvin, 1993).

The accelerated pace of change stimulates increased complex information processing, affecting how firms organize, do business, and compete (Mintzberg, 1979; Keen, 1991). Performance fit requires decisions with respect to delays when retrieving information and level of detail required to plan and to execute strategic steps. The organizational network integrates information processing and decision-making processes and provides the capability to handle environmental demands at their appropriate organizational level.

2.2.5 Culture

According to Schein (1992), the culture formation begins with decisions and behavior of organizational leadership who embed their assumptions in the organization through several mechanisms related to the systems, structures, and processes. Organizational culture involves basic pattern of shared assumptions, values, and beliefs considered valid ways of thinking and behaving in the organization (Hofstede, 1997). When forming an organization, the leadership selects members that have similar personality traits, values, and assumptions. Values and assumptions important for the organization receives reinforcement through the structures, infrastructure, processes, and procedures established to guide behavior (Scholz, 1987).
As the organization matures, Schein (1996) describes how organizations could evolve into three subcultures: the local culture based on internal interactions; the technology culture responsible for intellectual capital; and the executive culture with external concerns. Lack of communication and interaction between these subcultures could impair organizational learning and bring a management system into conditions that could impair organizational performance.

Kotter and Heskett (1992) explain a different cultural perspective relating organization growth while maintaining a desired level of performance. As the organization grows, the organizational cultures become unresponsive to internal and external environmental pressures. The structuring of their management system tends toward bureaucratic characteristics maintaining the conditions that created the successful level of performance. As organizational culture adapts toward a bureaucratic management system, Kotter and Heskett (1992) declare that the values of initiative and innovation could diminish with the effect of reduced effective organization response to competitive pressures.

The management system must be designed to recognize different user perspectives and accommodate their cultural orientation to ensure that the organization work and learn together into high-performance, high-productivity work systems (Scholz, 1987; Appelbaum & Batt, 1994). Culture can improve the ability of organizations to adapt and implement new strategies (Schein, 1992). Therefore, it is important to align the management to the organizational culture to achieve desired performance.

The research model includes the influence from culture as a moderator variable.
affecting the fit between an organization and the management system for organizational performance.
2.3 What is Organizational Performance?

Organizational performance encompasses the organization and management system mechanism and methods to obtain information and to drive for action. Organizational performance could be determined from measures formed in a comprehensive and critical foundation to direct and monitor activities and to obtain desired outcomes. The understanding of performance control theory and non-linear relationships is crucial in establishing the critical foundation to manage performance.

2.3.1 Performance Control Theory

An open system is controlled by the feedback of corrective information related to the deviation between the actual output and the desired state (Wiener, 1948). For a balanced system, no deviation exists. During balanced conditions, no changes take place rendering the system into a static state. The principle of self-regulation explains the distinction between the information flow emanating from a system’s inputs and the driving energy required for activation and operation. When deviations manifest, corrective action is required to return the system to the standard of performance in a single loop character. Feedforward is an alternate single loop action that monitors the state of input variables known to affect the output. When a disturbance occurs, the feed-forward system offsets it with corresponding control actions prepared from
estimates. Operating continuously as the system transforms inputs into outcomes, a
feed-forward loop projects the desired state from the present to the future.

Argyris (1976) identified single loop action as a drawback of feedback control and
proposed double loop learning where the standards of performance are subject to the
control process. Senge (1990) elaborated the interdependence among system
components and feedback processes stressing the importance of organization
cognition. Mathematical relationships can be used to model feedback control systems
in closed dynamic systems. Open dynamic systems add complexity to the
mathematical treatment of control systems describing internal operations and feedback
correction.

With cumulative past experience and imminent situations, the management
system could allocate patterns and schemes to counteract incessant situations that
could disturb the attained performance level. Progressive mechanization, described by
von Bertalanffy (1968) as self-organization, uses processes and standard operating
procedures to respond to feedback about system performance. Although an efficient
approach, progressive mechanization creates problems when demands of the
environment deviates from known routines or when organization cannot agree on how
to interpret information or what actions to take to proceed (Lawrence & Lorsch, 1967).

Performance control contributes to the management system model by
emphasizing the importance of learning processes to anticipate and adjust for
discrepancies before they occur. The need to consider and include knowledge
processes in a management system has become increasingly important for
organizational survival in an uncertain environment.

To create a fit between an organization and a management system, the organizational performance criteria must include a developmental component (Miles & Snow, 1994; Kaplan & Norton, 2001). The developmental component must be strategic in nature to provide programmed adaptation utilizing clear decision-making processes and information exchanges to direct renewal and sustain desired performance.

2.3.2 Non-linear Relationships

Organizational performance involves non-linear relationships with dynamic conditions. To achieve proper fit with an organization, management systems exhibit complex relationships between the elements and their interactions within and, external to the system. Models can be used to describe these fit relationships but assumptions of predictable cause and effect relationships might render impractical conclusions for the management system (March & Sutton, 1997). Similarly, an array of independent interactions will fail to capture the complex nature of the fit concept (Van de Ven & Poole, 1995; Quinn, 1996; Donaldson, 1999).

In dynamic environments, change becomes nonlinear and less predictable (Brown & Eisenhardt, 1998). The relationship of independent agents interacting with each other in multiple ways could be characterized with non-linear models. These models can be used to explain how small differences in one variable may produce significant effects on the outcome for the whole system. To recognize the long-term
general character of the management system, non-linear relationships will be explored rather than describe the infinite predictions and dynamic conditions present at any given state.

A factor contributing to the open system instability is the reaction to external disturbances and influences. Organizational reactions from environmental conditions might produce effects without implicit change mechanism and extending beyond their initial presence. A theory of organizational transformation based on complexity involves understanding of complex intelligent systems and self-organizing during transitions (McMaster 1996). Complex systems have the ability to rearrange and reform their dynamic patterns of operation in mutual adaptation to changing capacities and needs of their elements in addition to changing opportunities and demands from the environment (Prigogine, 1984).

With repeated operation, the system arrangement would cluster and cumulate at certain points creating uneven areas seriously affecting system performance. At a given threshold, the system could experience a chaotic transition to states with non-predictable behavior (Prigogine, 1984). Prior to attaining the chaos transition there is a narrow region referred as the edge of chaos. Conditions at the edge of chaos provide a creative change zone for the organization (Perrow, 1986; Quinn, 1996). The region is modestly structured to allow participants to hold and exchange information yet remains flexible for mutual adaptation and reorientation to critical environmental changes (Prigogine, 1984; Gersick, 1991). Finally, the system dynamics operate with an internally generated, order producing process of self-organization (Prigogine, 1984;
For complex systems, frequent and small changes in operating performance occurs within long time spans of convergence (Tushman & Romanelli, 1985). Reorientations periods at the edge of chaos are few with major disruptions where organizational strategy, power, structure and controls are fundamentally transformed towards a new co-alignment (Tushman & Romanelli, 1985: p. 171). During convergent spans, the emergent organization system maintains full structural stability. Convergent periods involve self-organization that may or may not be associated with effective organizational performance. Within the constraints of feed-forward control, reorientations select the most efficient path generating more efficient interactions and transfers new information within the system.

For proper fit, the evolving organization and management system should operate on a region between order and chaos where the organization successfully incorporates changing conditions using communication, selection, and adaptation processes within the system (Prigogine, 1984; Tushman & Romanelli, 1985; Pfeffer, 1997). Transient response and adaptation to the environment should be reflected in the interdependent transformational processes within the management system. The literature suggest that successful change management for a management system involves the ability to understand organizations as total entities with a focus on applying organizational knowledge to the system transformational processes (Senge, 1990; Drucker, 1995; Quinn, 1996; Pfeffer, 1997).

By the early 1960s, contingency theorists Burns and Stalker (1961) argued that
organizations must provide for adaptation to a different set of environmental conditions. They proposed that management systems designed along scientific management principles and reporting structures embodying bureaucracy were inadequate to adapt to faster paced change and dynamic environments. Lawrence and Lorsch (1967) conclude that for uncertain environments, greater differentiation is needed with less hierarchical forms of internal integration. In those situations, an organic or decentralized organizational structure is preferable while mechanistic structures are desired in more certain environments.

For organic organizations, a high degree of communication and information processing must be provided to the management system to meet the environmental requirements. Tushman and Nadler (1978) suggest that information processing may be used to integrate the organization design and develop a number of propositions along complex, non-linear relationships. Galbraith (1995) explores a wide variety of organizational mechanisms that foster internal information flows matching strategy to organization structure with non-linear relationships between elements within, and external to the organization.

The adoption of changes to the management system involves specific actions taken requiring resources and effort from the organization. Through the change process, relevant information flows through formal and informal channels ensuring that the organization will cope with the demands from the environment. As the change process completes, the management system adapts and incorporates the change as part of the processes within the system. As a consequence of the non-linear nature of
changes, adopting innovations for fit might not lead to variations in performance (Senge, 1990; Mintzberg, 1994; Lawler, Mohrman & Benson, 2001).

2.3.3 Organizational Performance

Explaining variations in organizational performance is one of the most enduring themes in organization theory (March & Sutton, 1997). Evaluations of organizational practices invariably use the concept of organizational performance (Peters & Waterman; 1982; Drucker, 1992; Staw & Epstein, 2000; Rigby, 2001; Lawler, Mohrman & Benson, 2001). Researchers have developed a variety of constructs and linkages to describe and to investigate the sources and independent variables affecting organizational performance (March & Sutton, 1997). In some cases, researchers have defined key factors believed to affect organizational performance and then conducted studies to investigate their effect (Steers, 1995; Lawler, Mohrman & Benson, 2001).

Despite the broad interest in organizational performance, little common ground seems to exist in the literature regarding conceptualization and measurement of this ultimate dependent variable (March & Sutton, 1997). When attempting to define models of organizational performance, the domain and focus tend to be scattered and specific to a particular orientation. Performance measurement using multivariate models includes a wide range of evaluation criteria with little overlap between models (Steers, 1975). Performance assessment models present adaptation and flexibility as the most frequent criteria used to measure organizational effectiveness.
Adaptation and flexibility can be associated with organizational change management. The dynamic nature of factors and conditions requires that organizations continually balance the forces for stability to counter the relentless push for change (Huber & Glick, 1993). The concept of fit between a management system and the organization links relevant factors affecting organizational performance into transformation processes (Katz & Kahn, 1978; Scholz, 1987; Miller, 1992; Miles & Snow, 1994; Donaldson, 1999). Transformation processes for proper fit provides an organization with the alignment mechanisms to adjust between stability and change while maintaining adaptation and flexibility to match environmental conditions.

The concept of performance fit involves a systematic view of factors and effects associated with the organization, management system, and the environment. A systems approach, and related processes supporting the information flow, analysis, and response to organization-wide measurement, involves understanding of key performance measures to achieve fit (Kaplan & Norton, 1996b; Drucker, 1995; Donaldson, 1999). A structured approach to organization-wide performance measurement systems addresses the organization, environment, and the measurement infrastructure as an integrated whole (Sink & Tuttle, 1989). A multivariate and integrated model focus on the relationship between key performance factors with a unifying framework to obtain the information needed to conduct evaluation (Steers, 1975).

Burke and Litwin (1992) defined performance as an outcome or result. These organization-wide outcomes include measurements for productivity, profit, service
quality, and customer or employee satisfaction. Burke and Litwin (1992) believed that in a systems perspective, it was the convergence of the effects of all organizational variables that leads to performance improvement.

Holton (1999) distinguished between performance and performance drivers. In the measurement infrastructure, performance is the actual outcome produced by the organizational efforts. The time dependent characteristics can be associated with performance drivers. Drivers are those aspects of performance that can sustain or increase system, sub-system, or process capacity to be more effective or efficient in the future. Holton (1999) considers organizational performance as directly related to performance drivers.

Performance measures impacting the organization could be described using key dimensions of effectiveness and efficiency (Sink & Tuttle, 1989; Kaplan & Norton, 1992; Hammer & Champy, 1993). However, the organizational literature frequently interchanges the concept of performance with the dimension of effectiveness measurement (March & Sutton, 1997). Effectiveness refers to how well an organization achieves the defined goals and produces expected outcomes (Parsons, 1956; Drucker, 1967). Efficiency is the ratio between collective outputs and inputs as the transformation processes consume a minimum of resources (Porter, 1980; Champy, 1995; Barney, 2002).

Dimensions of effectiveness and efficiency relates to the type of control systems, mechanisms, and interactions between the organization, the management system, and their internal and external environment. A management system fit to the organization
influence internal efficiency and external effectiveness. Additionally, the effectiveness of an organization and the management system may be presented as the impact or magnitude of their integrated outcomes. Empirical research tends to concentrate on effectiveness measures when organizations focus on narrow measures and tend to relegate efficiency measures for investigations with specific environmental conditions (Steers, 1975; March & Sutton, 1997).

Organizations develop suitable management systems to perpetuate their order and survival. Much of the research interest is to characterize how organizations develop, live and adapt their management systems to operate, adapt and survive (Lawrence & Lorsch, 1967; Greiner, 1972; Duncan, 1973; Katz & Kahn, 1978; Mintzberg, 1979; Simons, 1995). The driver of action starts with the identification of a gap on system performance (March & Simon, 1958). The minimum level of performance pertains to the actions and outcomes assuring organizational survival (Miles & Snow, 1994). Ackoff (1974) and Steiner (1979) proposed analytical and rational change process models using analysis of gaps between organizational objectives and capabilities. The processes of planning and control provide the necessary actions to meet those gaps.

In March and Simon’s (1958) theory, the driver of action is a performance gap, between actual and desired results, that stimulates a search for new information to interpret the gap and inform corrective action. Within this context, performance fluctuations are the drivers of organizational change. Fluctuations in performance might not be significant to disturb or affect the organization. With disturbing and detectable
conditions, the organizational actions and changes have their beginnings with individuals. The thoughts and behaviors of individuals drive organizational change (Katz & Kahn, 1978). Therefore, the individual provides the detection and implementation mechanism to reduce gaps in organizational performance.

The literature provides specific relationships for organizational performance including configurations connected by a common theme or profile (Mintzberg, 1983; Miller, 1996). A recurring theme found is the assessment of organizational effectiveness in terms of organizational goals (Drucker, 1954; Odiorne, 1965; Pfeffer, 1982; Cameron, 1986; Bridges, 1991; Donaldson, 1999). The theme assumes that organizations have clearly defined, time bound, and precisely measurable goals. The research and practice difficulties stems in the reliable identification of comparable and practical relevant goals within organizational settings and the measurement of incompatible goals at the aggregate level (Cameron, 1986; Mintzberg, 1994). Additionally, the performance configurations on effectiveness seldom discriminate for efficiency factors and measures.

Drucker (1982, 1986) emphasizes that organizations are institutions with sets of interrelated processes and learning environments and there is no “one best way” to measure or improve performance. Configuration research typically fails to account for both strategic and structural elements of organizations (Miller, 1996). Guided by practicality considerations, the research tends to identify and measure simple concepts with narrow relationships. In several studies, the primary performance measures relate to efficiency and financial factors (Kaplan & Norton, 1992). The dynamic nature of
organizational factors mandates a systematic approach with an integration of relevant measures.

Organizational performance variance can be the result of an unrealistic standard (Huber & Glick 1993; Wilkinson & Dale, 1999). Compounded by an increasingly dynamic and uncertain environment (Emery & Trist, 1965), the management system might gravitate in a state of dynamic tension toward objectives failure and the possible demise of the organization mission. Weick (1979) believes that organizations fail to adhere their actions to decisions when faced with unrealistic goals and performance measures. Furthermore, the individuals in the organization assume a simple one-way cause and effect relationship while neglecting origins, terminations and interactions. In those conditions, the management system fails to fit the organization in the dimension of effectiveness and, consequently, the organization cannot attain the expected performance level.

The characteristics of control systems must prevent introduction of unintended effects on management system performance. The organization can only survive so long as it is capable of interacting with and conducting transactions between itself and the environment. Control systems must be designed properly to be an effective contributor to management system performance. When control mechanisms are inflexible or unrealistic, the organization cannot focus on the desired goals affecting management system performance (Katz & Kahn, 1978). Instituting rigid system controls curtail innovation and adaptation and affect the measurement of organizational effectiveness (Steers, 1975). Ultimately, rigid controls might affect organizational
performance in both dimensions of effectiveness and efficiency.

Organizational performance involves a combination of different factors. The fit concept identifies reaches and maintains a viable balance on the relevant performance factors from an organization and the management system.
2.4 What is a Management System?

Management systems must be explained and understood to identify the primary characteristics and relationships affecting organizational performance (Cockburn, Henderson & Stern, 2000). To understand important relationships with the organization and the key concepts of a management system, a review of management system background and relevant theory will follow. The areas presented include systems thinking, open systems, management system as a model, process approach and performance processes. Organizations as the research unit of analysis will be related to the management system.

Depending on the situational context, the definition of a management system could take multiple meanings. The research will consider a management system as “the methods by which an organization plans, operates, and control activities to meet goals and objectives by utilizing the resources of money, people, equipment, materials and information” (Glans, Grad, Holstein, Meyers & Schmidt, 1968, p. 3). At present, organizations have widely varying types of management systems to select from for consideration and implementation. A review of relevant theory could provide understanding about the area of interest associated with simple, complex and conflicting forms of management systems.
2.4.1 Systems Thinking

According to Merriam-Webster (2001), a system is a regularly interacting or interdependent group of items forming a unified whole. Organizations develop systems to align their resources and manage change in their environment. The basic elements to determine the factors needed to drive performance are affected by the established management system and the human element interacting with the organization. Managers must communicate the vision and strategy to all who can affect the success of the organization (Drucker, 1992).

The framework and interaction to transfer this information could be modeled from the General Systems Theory (Koehler, 1938; Weiner, 1948; Shannon & Weaver, 1949; Sommerhoff, 1950; von Bertalanffy, 1950; von Bertalanffy, 1968). The general systems approach is concerned with relationships, interdependence, patterns, structure, and environment. The system involves a collection of related elements working interdependently to create a specifiable outcome. Patterns and structure to produce outcomes become evident as the system elements interact and respond to environmental factors.

Systems theory expanded into concepts applicable to the social and management sciences (Boulding, 1956; Ackoff, 1974; Ashby, 1956; Katz & Hahn, 1978). Researchers have shown interest in explaining the areas studied as part of a larger system and to understand their role and relationship in the larger system. Wright (1989) suggests that the General Systems Theory serves as a broad framework under
which organizations and management systems could be studied.

2.4.2 Open Systems

In contrast to closed systems where modeling is limited to internal system elements, open systems consider the effects, relations, and interactions between the system and external forces (Boulding, 1956; Ashby, 1956; Ackoff, 1974). By applying open systems thinking, the dynamics and problems of relationships, structure, and interdependence can be considered in the system model. The described open system is never perfect nor it can be developed with all possible elements and relationships to become a complete model. System element's interconnections and interactions with their environment tend to be dynamic, complex, and, in some cases, unknown.

For open systems in the organization context, Wright (1989) described common system characteristics as holistic, hierarchical, goal seeking, dealing with inputs and outputs, energy, transformation, entropy, equifinality, and control systems. To study the relationships and element interdependence, the system must exist as an indivisible entity using a holistic view, arranged in hierarchies based on goals, multiple outcomes and a common purpose. The system operates with cycles of events dealing with the importation of energy from the external environment into the system and providing output into their environment.

Open systems are dynamic systems operating through changes that will alter the balance between internal components and external interfaces. The components and
interfaces balance the changes with transformations of inputs into outputs. Through each change transformation, the character of the system and the relationship of the system’s components will remain the same. The system will restore fundamental characteristics to preserve steady state conditions via transformations to a similar open system.

Energy is stored to preserve the organization during each transformation by arresting the entropy process to maintain order and sustain complexity. The equifinality principle states that an open system can reach their final state regardless of the path taken and differing initial conditions. According to this principle, there is a tendency for the system to regulate itself and to reduce the equifinality level as the system reaches the final or desired state (Boulding, 1956; Wright, 1989). Consequently, a system could develop, change, and adapt with multiple, but equally effective paths to establish a desired state.

Open system concepts from theories across multiple disciplines have been proposed for management systems. Open system concepts expand the organizational elements and consider external factors affecting performance. Mintzberg (1979) introduces the organizational structural elements; Miller (1992) explains the fit factors from the environment; and Senge (1990) stresses on open system view to conduct organizational learning. Adizes (1999) argues that the organizational lifecycle produces variations in performance from interaction between the organization and the external elements.

Donaldson (1999) combined strategic management, economics and organization
theory to formulate the portfolio model for performance driven management. He argues that performance is a variable that can be positioned between organizational mismatch and change, where change is the expected outcome. Donaldson (1999) proposes eight key variables for the portfolio: business cycle, competition, debt, risk, diversification, divisional structuring, divestment, and the influence of directors. The portfolio concept advocates an open system understanding of the nature and distribution of the correlation between key variables. Furthermore, the open system conditions in the portfolio associates the elements of management systems with the concept of performance fit (Donaldson, 1999).

Management systems are open systems capable of changing their subsystems and transformation processes to provide flexibility and to ensure long-term survival of the organization (Wright, 1989; Lee, Shiba & Wood, 1999). Sustainable performance at desired levels demands that management system transformations interact with the organization and cope with external forces. Consequently, a management system could develop, change and adapt with multiple equally effective paths to establish a level of organizational performance.

2.4.3 Industrial Era Management Systems

Frederick W. Taylor (1915) founded the Scientific Management movement in the late 1800s. The Scientific Management movement contribution to management systems is the application of rational thought to organizational process and on process
redesign with techniques to achieve maximum efficiency. During stable environments, the organizational strategy to standardize processes could lead to a successful management system by increasing organizational efficiency (Mintzberg, 1979). With these conditions, organizational performance assessments emphasize efficiency measures.

Based on a hierarchy of authority (Barnard, 1938), industrial capitalism required a set of administrative structures and control systems developed to achieve efficiency and cost-effectiveness. Simultaneously, bureaucracy serves as a management system greatly reducing the level of discretion exercised by individuals within the organization through the use of prescribed rules and procedures (Weber, 1946). By applying rationality to both organizational and work processes, the organizational structure follows the combination of work simplification, work specialization, administrative control procedures, hierarchical authority, and prescribed rules and procedures. The application of control mechanisms theory contributes to the research on management system as organizations manage change and execute programmed decisions. The organization is an open system to the environment and must provide for change and adaptation of the organizational structure (Mintzberg, 1979).

Strategy and learning have been considered as areas relevant to organizational performance for the post-industrial era management systems (Drucker, 1995). The transition to the information and knowledge eras increase the complexity of management and change factors affecting organizations (Perrow, 1986; Romanelli, 1991; Galbraith, 1995; Quinn, 1996; Garvin, 1998).
2.4.4 Management Systems and Research Model

The literature related to management systems is vast and frequently crosses discipline boundaries. The literature presents a business orientation with a focus on helping organizations to adapt and change for long-term survival (Rieley & Clarkson, 2001). With changing organizations, the management system must be adaptable. Most research and literature on management systems tend to be presented and explained through theoretical concepts, generic models, and broad frameworks. For some case studies, an application of a particular model is described from the perspective of the organizations involved and their specific conditions.

One of the central tenets of systems theory is that the system as a whole is not reducible to the constituent parts (Boulding, 1956; Ackoff, 1974; Ashby, 1956; Wright, 1989). The systems model is the integrated framework of the modern management theory to describe the behavior of organizations both internally and externally (Ackoff, 1974; Ashby, 1956; Mintzberg 1979; Wright, 1989). Internally, the management system shows how and why members perform their individual and group tasks. Externally, the management system integrates organizational transactions with other organizations and institutions. Management systems provide a perspective toward organizational interrelationships rather than deterministic linear cause and effect chains.

The literature has dealt with management systems primarily as they relate to organization theories on structure, command and control systems, and decision and information networks. A set of relationships, liaisons and differences will ensue without
precluding the interdependence between the management system and the organization. Selznick (1957) described management systems as rational action systems inescapably imbedded in a matrix for both the individuals and the institutional structures.

Environmental uncertainties affect the relationship between rationality and organizational performance (Fredrickson & Mitchell, 1984). Organizations prefer conditions that permit rational behavior (Simon, 1976). For uncertain environments, the organization experiences an increase in information flow creating difficulty in identifying and understanding cause-effect relationships (Duncan, 1979). Furthermore, the decision processes within the management system fail to differentiate for critical environmental and organizational variables (Fredrickson & Mitchell, 1984). Consequently, a high level of environmental uncertainty increases the level of interaction activity and confounds critical and irrelevant information available to the organization.

The complexity of management systems tends to increase in response, and for adaptation, to the environmental conditions (Chandler, 1962, Chakravarthy, 1997; Rieley & Clarkson, 2001). However, when organizations become successful their learning and experience could lead to simpler strategic choices. Miller (1993) argues that successful adaptation to environmental complexity causes simplicity in terms of narrowly focused organizational strategies and processes. To increase simplicity, the organization tends to favor configurations where “goals, strategy, structure and culture reinforce each other” (Miller, 1993; p. 130). The dominant strategic theme leading to success tends to thrive in stable environments.
In complex and dynamic environments, simple strategies fail to respond to demands and challenges (Drucker, 1982; Prigogine, 1984; Miller, 1993). An organization coping with environmental changes, while critical to long-term success, requires continuous performance improvements (Rieley & Clarkson, 2001). The management system must provide a balance between organizational environmental context and strategic complexity. With balance, the organization realizes the desired performance potential as the management system provides the path to undergo change and adaptation.

The literature suggests that it is possible to determine and describe elements to characterize the management system and the organization and their relationship for organizational performance (Drucker, 1973; Deming, 1986; Kreitner, 1992; Miller, 1992; Rigby, 2001; Kaplan & Norton, 2001). Identifying the key factors affecting performance fit is the primary research problem. The concern would be whether we can identify key elements of a management system and the organization and relate them as fit factors influencing organizational performance. The research model, with stated assumptions, investigates the fit between an organization and the management system. The research model presented in the investigation must provide significant explanations of variations in the dependent variable, organizational performance.

The difficulties in identifying causes of performance variations are widely known in the literature (March & Sutton, 1997). Practitioners have a great deal of interest and investigators demonstrate persistence in the research subject. For example, equations developed by Albert Einstein predicted that Isaac Newton's motion laws, although close,
were incomplete. Subsequent experiments on Einstein’s theory validated these predictions. Newton’s formulas involve key factors introducing negligible error in predicting results and require simple application. In the same manner, researchers have introduced and developed different concepts to describe and explain organizational performance (Drucker, 1973; March & Sutton, 1997; Kaplan & Norton, 2001).

The research objectives seek to explain significant variations of organizational performance by exploring the fit between key factors from the management system and the organization. The proper interpretation of equifinality provides for the same level of organizational effectiveness to be reached from differing initial conditions and by a variety of paths (Katz & Kahn, 1978). The assumption of equifinality is implicit in the research model with the possibility that multiple combinations of organization design and management system could create similar levels of fit and organizational performance.

Management system models can be classified by the system design based on prescriptive or descriptive criteria. For models becoming the normative standards for organization performance, the criteria must be adopted and performed in a compulsory and prescriptive manner. Compliance to the criteria ensures that a satisfactory performance level has been achieved necessary to meet the prescribed requirements for management systems.

Descriptive criteria to drive performance can be adapted into different organizational arrangements and interpreted to create a variety of management system
models. With descriptive criteria, the organization formulates and incorporates the management system priorities to meet the needs of each individual organization. Defined standards and established criteria to drive for performance provide the means for organizations to compare and benchmark their management systems.

The open systems concept adds a complete new dimension to the organization management field. With the open system approach, the research increased in content and richness. Prior to the Total Quality Management (TQM) movement in the 1980s, the majority of models for open management system described in the literature were prescriptive in nature (Odiorne, 1965; Rao Tummala & Tang, 1996; Pun, Chin & Lau, 1999). Prescriptive management system constructs delineates how best to improve an organization’s performance. Prescriptive systems include the Management By Objectives (MBO) and ISO 9000 models. For a MBO system, the prescribed processes include the definition of objectives, deployment of action plans and feedback controls for performance evaluation. The ISO 9000 model prescribes a system that must document key processes and changes to the system, conduct periodic assessments and prepare evidence on completion of corrective actions.

Descriptive management systems evolved in the latter part of the 20th century to provide organizations with means to absorb and adapt to ever-increasing changes. Descriptive management system constructs presented in the literature include the performance excellence models (Peters & Waterman, 1982; Pfeffer, 1997; NIST, 2001; EFQM, 2001). As the theory develops, empirical research on emerging management system orientations includes strategic management and TQM.
2.4.5 Criteria to Drive for Performance

Criteria to drive performance can be incorporated into the management system models. The criteria to drive performance involve a set of principles, concepts and values to determine and guide the organization in setting the direction to drive and sustain performance. The following table provides the model principles, concepts and values for the ISO 9000:2000 Quality Management System, Malcolm Baldrige National Quality Award 2001 Performance Criteria, the European Foundation for Quality Management (EFQM) 2001 model and the management system research model.

Table 6 presents a summary of model principles, concepts and values between four comprehensive management system models. All management systems are descriptive in nature except for the prescriptive ISO 9000:2000 system.
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Customer Focused</td>
<td>Customer focused</td>
<td>Customer focused</td>
<td>Customer focused</td>
<td>Customer focused</td>
</tr>
<tr>
<td>Leadership</td>
<td>Leadership</td>
<td>Visionary leadership</td>
<td>Leadership and constancy of purpose</td>
<td>Visionary leadership</td>
</tr>
<tr>
<td>Human Element</td>
<td>Involvement of people</td>
<td>Valuing people</td>
<td>People development and involvement</td>
<td>Individual and collective participation</td>
</tr>
<tr>
<td>Management by Fact</td>
<td>Management by fact</td>
<td>Management by fact</td>
<td>Management by fact</td>
<td>Management by fact</td>
</tr>
<tr>
<td>Valuing Partners</td>
<td>Mutually beneficial supplier relationships</td>
<td>Valuing internal and external partnerships</td>
<td>Partnership development</td>
<td>Partner involvement</td>
</tr>
<tr>
<td>Systems perspective</td>
<td>System approach to management</td>
<td>Systems perspective</td>
<td>Systems perspective</td>
<td>Systems perspective</td>
</tr>
<tr>
<td>Continual improvement</td>
<td>Continual improvement</td>
<td>Continuous improvement</td>
<td>Continuous improvement</td>
<td>Continuous improvement</td>
</tr>
<tr>
<td>Process Model</td>
<td>Process approach</td>
<td>Management by processes</td>
<td>Continuous processes</td>
<td>Continuous processes</td>
</tr>
<tr>
<td>Learning</td>
<td>Organization and personal learning</td>
<td>Continuous learning</td>
<td>Continuous learning</td>
<td>Continuous learning</td>
</tr>
<tr>
<td>Results Focused</td>
<td>Focused on results and creating value</td>
<td>Results orientation</td>
<td>Results focused</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>Managing for innovation</td>
<td>Continuous innovation</td>
<td>Continuous innovation</td>
<td></td>
</tr>
<tr>
<td>Public responsibility</td>
<td>Public responsibility and citizenship</td>
<td>Public responsibility</td>
<td>Public responsibility</td>
<td></td>
</tr>
<tr>
<td>Agility</td>
<td>Organization and performance agility</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.5. What are the Elements of a Management System?

To describe relationships between organizations and management systems affecting organizational performance, the research will define management system elements fitting the organization for adaptation, development and growth, and to match the conditions and requirements of the environment. The management system model includes the transformation system and processes. Elements of a management system research model are strategic management system, core business processes, and decision-making processes. Within the core business processes, the model includes the processes associated with knowledge management and resource management.

2.5.1 Management System Model

Harold Kurstedt (1985) identified a management domain characterized by a management system that includes elements such as people, tools, technology, and information. Kurstedt defined a management system model as containing three primary components - "who manages," "what is used to manage" and "what is managed". Who manages include the human element, what is used to manage refers to management tools, and what is managed focuses on the organizational system.

Three interfaces link these components: measurement-to-data, information portrayal to information perception and decision-to-actions. The measurement-to-data
interface between what is being managed and management tools; the information portrayal to information perception interface between tools and who is managing (management tools portray information while the manager perceives the information from the management tools); and the decision-to-actions interface between who is managing, and what is being managed. In this interface, the manager yields decisions while the organizational system requires actions. The organizational system yields measures while management tools require data.

The management system model adapted from Kurstedt’s model (Sink & Tuttle, 1989) is presented in Figure 7.

![Management System Model](image)

**Figure 7. Management System Model**
Kurstedt (Sink, & Tuttle, 1989) argues that “who makes the decisions” matters. The debate between choice and determinism has been central in organization theory. Child (1972) proposes the strategic choice concept where executives exercise strategic choice to build their own detailed model of decision processes. Cognitive aspects and psychological factors in terms of personality, values, and information filtering are related back to executive’s tenure, age, and demographic variables to perform the strategic choice.

Empirical studies on executives reveal that intervening processes of managerial cognition and the executive’s background affect the determination of decisions from specific choices (Cyert & March, 1963; Child, 1972; Finkelstein & Hambrick, 1996). For strategic decision-making, Finkelstein and Hambrick (1996) believe that the organizational environment frames the degree and level of discretion open to management for determination of decisions. Executive decisions could be influenced with the deterministic conditioning effect of the environment. At extremes, the conditioning effect on executive decisions could range from low for incremental environments to high for environments where technology change and rate of change demands constant adaptation of strategies and processes. Therefore, Finkelstein and Hambrick (1996) investigation suggests that Kurstedt’s “who manages” matters as an intervening process with conditioning effects from the environment and decision-maker background (Sink & Tuttle, 1989).

Rensis Likert (1967) developed from empirical research four different management system models using survey methods as a means of diagnosing
organizational characteristics for performance. The management systems models are: exploitive, benevolent, consultative, and participative. Each model framework includes processes for goal setting, leadership, communication, interaction-influence, motivational force, decision-making and control.

Likert’s models departed from the traditional perspective that a management system must be based on prescribed criteria originating from ideal models. Likert (1967) explains that organizational leadership, as the primary internal factor, combines with external environmental factors to affect each particular management system model in terms of their total performance. Consequently, the organization design with a participative-democratic management system is the preferred model to achieve the highest levels of organizational performance (Likert, 1967; Miller & Friesen, 1984). Organizations aligning with the participative management systems tend to have organic characteristics (Burns & Stalker, 1961; Likert, 1967).

Organizations attempt to confront change with appropriate management systems, and finding the proper system renders a daunting and complex process (Schwenk, 1989; Pascale, 1990). From that perspective, change management could be construed as a misnomer since change is constant and uncontrollable. In spite of these conditions, an organization can, and must, strive to understand what is changing and prepare to stay ahead of events. Research work in the change management field identified implementation characteristics influencing the organization and the people involved with change processes (Coch & French, 1948; Ronken & Lawrence, 1952; Kotter & Schlesinger, 1991; Lawrence, 1991). Understanding the effects from the
change process will be crucial in attaining the desired performance. For performance fit, the management system must provide alignment with the organizational elements through the change process. Additionally, Harzing and Hofstede (1996) recognize the importance of understanding the organizational culture when developing planned change in organizations and stressed the need to prepare for continuous adaptation.

The research conceptual framework was based on a classification of management system characteristics into distinguishing features of control and adaptation. The five distinguishing features of control and adaptation in organizations are: type, control, change management, system nature and, definition. Depending on the management system interactions with the environment, the system type could be classified as either open or closed to the environment. The control system could be either absent or could be present in the form of feedback, feed-forward and/or learning loops. To deal with changes, the system could provide no response, correction, prediction and/or adaptation to disturbances. The nature of the system is related to the system type and could be either static or dynamic. A static management system continuously meets the demands from the internal environment while dynamic systems deal with the environment. The management system design could be defined either with prescriptive conditions or descriptive criteria. Table 7 shows the characteristics of four general models of organizational management systems generated for the investigation and based on all five distinguishing features.
Table 7. Management System Characteristics

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Control</th>
<th>Change</th>
<th>Nature</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restrictive</td>
<td>Closed</td>
<td>None</td>
<td>None</td>
<td>Static</td>
<td>Prescriptive</td>
</tr>
<tr>
<td>Reactive</td>
<td>Open</td>
<td>Feedback</td>
<td>Correction</td>
<td>Dynamic</td>
<td>Prescriptive</td>
</tr>
<tr>
<td>Proactive</td>
<td>Open</td>
<td>Feedback</td>
<td>Correction</td>
<td>Dynamic</td>
<td>Descriptive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feedforward</td>
<td>Prediction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evolutionary</td>
<td>Open</td>
<td>Feedback</td>
<td>Correction</td>
<td>Dynamic</td>
<td>Descriptive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feedforward</td>
<td>Prediction</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning</td>
<td>Adaptable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.5.2 Management System Research Model

To establish fit with the organization, the management system integrates subsystem and processes to enable change and adaptation for organizational performance. The elements of the management system model include subsystems and transformation processes interacting with micro-macro linkages and closely associated with each other. Each process and subsystem provides a path, control, and contributions toward the management system transition into the final organizational change state. The system transformation processes involves the strategic management subsystem and processes for core business, knowledge management, resources management and, decision-making.

The management system is a dynamic and evolutionary system where the
elements change over time, patterns and functions adjust and adapt to the structural and spatial relationships resulting from stimulus, conditions, and disturbances introduced to the system.

Within the management system, elements interfacing the environment become subject to pressures and inputs from outside their boundaries. In the same manner, the management system contributes outputs and effects related to the processes, interfaces and functions contained in the dynamic arrangements. The management system requires complex control anticipation of or in response to outside forces to provide the ability to cope with unforeseen or even unforeseeable environmental changes.

Feeding the open management system is a range of input categories such as information, strategies, priorities, and resources. Particular examples of resource inputs include people, capital, materials and supplies. Inputs are transformed by the organizational system converting them into outputs. The organizational system provides outputs to the environment that could be classified into products, services, information and waste. The organization will find it desirable to minimize waste to improve the output to input ratio in order increase efficiency. Some effects associated with waste output include resources that become non-usable, requirements not met, and data overload. As a consequence of the non-linear characteristics of the management system, the integration of efforts within organizational system with the outputs to the environment should not be confused with organizational performance results (Cockburn, Henderson & Stern, 2000). Performance results transcend the
particular management system we intend to study.

Management system elements interact with a number of information pathways to outline and constraint response for structural transformations and correct deficiencies from expected outcomes. Feedback refers to the paths in the management system lagging in nature to provide information to the organization for adjustment and revision. Feed-forward paths reinforce and validate the expected outcome in a manner that requires reasonable prediction of adaptive system responses in addition to continuously changing environmental conditions and challenges. The characteristics of parallel transformation processes in the management system include mechanisms of networking and coupling with elements required for learning, translation and transition. These pathways and response controls interrelate, supply, and receive information from the management system elements and their interfaces. The mutual interaction between the management system and the organization develop emergent behavior for creativity and innovation evolving both, the system and the organization, into new levels of complexity and new conditions of possibilities (Perrow, 1986).

Capable of interacting with the environment in order to assure their viability, a management system is interdependent with environmental forces. Both the system and the associated environment are mutually influenced through their exchanges or transactions. The level of influence to and from the environment assumes different perspectives and relevance with proximity to the environment’s potential dynamics. Exchanges and transactions with environmental forces are complex, dynamic and unpredictable (Perrow, 1986). In that context, the fundamental function of the
management system is to transform environmental uncertainties to a form of certainty within the interfaced organization.

2.5.3 Transformation System and Processes of a Management System

To achieve performance fit, transformation processes from the management system align the organization and management system. The management system includes the following system and processes:

- Strategic Management System
- Key Processes
  - Core Business
  - Knowledge Management
  - Resources Management
  - Decision-making

The transformation system and key processes follow a systems approach with the plan-do-study-act improvement cycle (Juran, 1988; Deming, 1993). Organizations respond to the demands of their environments while struggling constantly to improve and sustain gains in efficiency, effectiveness, and mission fulfillment.

Approaches for strategic planning, process reengineering and TQM could improve organizational performance (Rigby, 2001; Lawler, Mohrman & Benson, 2001).
However, when applied independently, the gains from performance excellence in the organization might not match the effort expended. Seldom have these independent gains provided permanent competitive advantage. The management system provides the means to understand how a high level of excellence is achieved and, most importantly, how organizations can integrate gains to sustain it.

2.5.3.1 Strategic Management System

Chandler (1962) defines strategy as the determination of the long-run goals and objectives of an enterprise, the adoption of courses of action, and the allocation of resources necessary for carrying out these goals. The strategic management system focuses on strategic decisions pursuing the organization’s mission by aligning the organization’s internal capabilities with the external demands of the environment. The purpose of the strategic management system is to share mental models, communicate the value of desired target, establish sense of urgency, and provide operational definition as the environment changes. The system includes processes to define the operating area and develop a vision and mission; to translate the mission into specific strategic objectives; to formulate strategies to achieve the objectives; to implement and execute the strategy; and to evaluate performance to initiate corrective adjustments and generate lessons learned for the next cycle (NASA, 2000).

To understand the strategic management system, the research must consider the organizational perspective from where strategies develop. Mintzberg and Lampel
(1999) categorized ten strategy schools of thought within the strategic management field, dividing them into three prescriptive and seven descriptive approaches. Also, the categorization refers to the processes utilized to formulate and apply strategies. Within the prescriptive strategic management schools, Mintzberg and Lampel include the design, planning, and positioning schools and processes. The remaining seven strategic management schools and processes form the descriptive group. These schools are: entrepreneurial, cognitive, learning, power, cultural, environmental, and configuration. Strategies emanating from processes related to a selected school of thought might not create appropriate strategies for the organization (Mintzberg & Lampel, 1999).

Processes to communicate relevant information and establish controls could guide the organization to direct the strategic management system into the proper perspective. The strategic management system relies on information from the processes within the management system to provide strategic control, to ensure a balance between strategy and operations, and between the long term and the short term (Goold & Quinn, 1990). Control ensures that the chosen strategy is being implemented properly and that it is producing the desired results. The strategic management system provides flexibility in the implementation of strategy with strategic controls that can accommodate uncertainty. The feedback controls provide the constraints to operate in a prescriptive mode and the feed-forward elements the inspiration to expand in the descriptive mode (Mintzberg & Lampel, 1999). The prescriptive mode determines what the strategy and outcome should be expecting for
formal and close adherence to requested actions. For an organization, the prescriptive mode provides risk reduction for strategy implementation. In the descriptive mode, the organization is rationality bounded with survival and protection mechanisms with the capacity to expand the strategy to the practical limits. Conversely, the strategic management in the descriptive mode enhances organizational freedom to explore and develop opportunities.

Goals associated to strategies become the driving force for decision-making. To establish a favorable position in their organizational field, the strategic management system imparts priorities for deploying resources at various levels, and in all parts of the organization, and provides the basis for selection of core processes to be developed and operated. Organization's goals experience constant influential forces from events, structures and systems acting on objectives and causing shift in priorities (Selznick, 1957). Transitional processes within the strategic management system impart and obtain information, provide mechanisms to deal with issues, designate resources and control core processes. Measurement and evaluation tracks implementation actions and assessment on how the organizational performance changes as a result of strategic actions. The strategic management system requires this assessment information to incorporate adjustments into the next improvement cycle (NASA, 2000).

Organizational strategies develop into activities affected by the environment. For example, changes to the present environment include new information technologies and global competition creating different challenges for managing of organizational activities (Huber, 1990). Strategic management may be considered a continuous set of
processes that adjust and align the organization with changing conditions at the interfacing environment.

The literature suggests that successful strategic management is a key component of the management system for effective management and, therefore, organizational performance (Senge, 1990; Chakravarthy & Doz, 1992; Hart & Banbury, 1993). Organizations with a successful strategic management system could structure an effective management system that allows for mutual adjustments to deal with priorities (Peters & Waterman, 1982) with the capacity to satisfy all stakeholders (Chakravarthy, 1986), to provide adaptation to both present and uncertain environments (Child, 1972), to explore opportunities for growth (Chandler & Hanks, 1993), and to succeed in spite of organizational complexity (Dess & Robinson, 1984).

### 2.5.3.2 Core Business Processes

A process is a set of interrelated work activities characterized by specific inputs and value adding tasks that produce specific outputs (Hammer & Champy, 1993; Schermerhorn, 1999; p. 230). The core business processes involve the organization’s mission and the core activities carried out by the organization to achieve the primary task (Chandler, 1962). Supported by the management system framework, each core activity depends and relies on the human element for every transaction and value added effort (Campbell, Dunette, Lawler & Weick, 1970; Meyer, 1994). The organization structure should not be of primary concern unless the core process
outcomes are affected by it (Champy, 1995). In pursuing evolution of the organizational resources and capabilities into core processes for competitive advantage, the transformational processes within the management system provide the configuration for interconnection and sequence.

The overarching objective of the core processes operating in the management system is to continuously achieve a fit between core capabilities, complementary resources, and learning opportunities. To facilitate such a fit, the strategic priority should be to establish effective communication links to sources of knowledge on potentially relevant resources and the technologies that are coevolving with them. Furthermore, core process improvements depend on improving present skills and learning, exploiting, adapting, and mastering new technology. Complex environments precede changes to organizational core processes (Perrow, 1986; Chakravarthy, 1997). To contribute to organizational performance, the changed core process exhibit dynamic efficiency orientation as the preferred mode of operation (Ghemawat & Ricart i Costa, 1993). For dynamic efficiency, the organization must satisfy requirements with a minimum use of resources while adapting to the environment.

Management system systems designed along scientific management principles and reporting structures are too rigid to adapt to faster paced change (Burns & Stalker, 1961). Core processes within the management system must be flexible to adapt to the environment (Kast & Rosenzweig, 1979), be dynamically efficient (Ghemawat & Ricart i Costa, 1993), and incorporate organization learning (Senge, 1990).
2.5.3.3 Knowledge Management Processes

Knowledge management is a process that helps organizations find, select, organize, disseminate, and transfer important information and expertise necessary for activities such as problem solving, dynamic learning, strategic planning, and decision making (Stata, 1990; Argyris, 1993; Kotnour, 1999). In the management system context, to establish the proper fit with the organization, the knowledge management processes strengthen the core business processes with key information and learning sequences.

Organizations are now made up primarily of knowledge workers whose products are knowledge and innovation (Huber & Glick, 1993). The management system relies on localized intelligent systems from the knowledge management processes where analysis could be undertaken and control exercised closer to the source of the disturbance (Emery, 1969). These interactions would bundle information processing and decision-making tasks into the most effective path of action and to handle the demands of their broadened task environment at the local level (Huber, 1982). Knowledge management processes become action enablers infusing elaborate situational understanding to fulfill operational requirements from customers and stakeholders. At the organizational level, local interfaces form a network while creating communication paths to ensure that information flows to where it is needed and across boundaries (Shannon & Weaver, 1949).

Sophisticated gradients, such as information and meaning, also emerge from the
transformational processes, all interacting interdependently, setting the possibility for evolution, to respond to the acceleration of change, increasing complexity, and increasing levels of efficiency (Rieley & Clarkson, 2001). Consequently, knowledge work requires a much better educated and skilled workforce than previously existed (Drucker, 1995). Learning requires full appreciation of complex interactions that create an outcome from events and understanding for correct attribution of effects from both systems and randomness. Feedback within the management system enables learning of these interactions and effects and knowledge process adaptation to environmental change. Therefore, knowledge management processes enhance organization learning.

Long-term organizational success requires effective knowledge management processes associated with learning, the ability to rapidly create, recognize, integrate and implement new techniques and understanding (Argyris & Schon, 1978; Senge, 1990). Deming (1993) urges leaders to transform organizations with a system of profound knowledge. Dynamic characteristics of the management system require continuous learning and adaptation at all organization levels. Past experience cannot be used to predict that an individual or an organization will be able to succeed in future business challenges.

A form of efficient self-organization is progressive mechanization (von Bertalanffy, 1968). Progressive mechanization relies on fixed processes, standard operating procedures, and prescribed communication channels to establish predictable, efficient routines to respond to feedback on system performance (Cyert & March, 1963). In contrast to progressive mechanization, knowledge management processes are
characterized by variety and exception rather than routine, tending to resist structured approaches (Davenport, Jarvenpaa & Beers, 1996). Execution of knowledge processes involves capturing, transforming, and distributing highly structured knowledge resulting from transactions, interventions, and changes to the management system.

Communication channels encompass the organizational network with flexible processes to respond to requirements and disturbances. Efficiency for knowledge processes emanates from learning experiences and transfer of information crucial to the management of knowledge. Knowledge management processes incorporate lessons learned with actions to take or avoid similar situations during planning and execution phases of the plan-do-study-act improvement cycle (Kotnour, 2000).

The management system encompasses the entire system with organization, people, and technology as focal points. The relationships between organization's competitiveness, innovation advancements, and knowledge management present a set of considerations regarding how these relationships affect strategic management and the formulation of competitive strategies. An organization's core competencies must consider managing knowledge on both the transactions to be realized and the transformation processes required to achieve these transactions.

Organizations have developed systematic knowledge management processes to manage the intellectual resources (Wiig, 1999) and as a way to develop core strategic competencies (Walsh, 1995) needed to succeed. Learning can be viewed as the means to long-term performance improvement with systematic efforts producing knowledge to enhance the organization’s ability to perform more effectively (Senge,
1990; Wiig, 1999). Organizations could use knowledge processes for analysis, planning, evaluation, decision-making, resource allocation, and to sustain core processes for overall organizational performance.

2.5.3.4 Resources Management Processes

Resources management is one of several process elements interacting interdependently with elements of the management system. When describing an organization, the flow of inputs and outputs is the starting-point. The organization takes resources (inputs) from the larger system (environment), processes resources, and returns them to the environment in a changed form (outputs) (Wright, 1989). The present challenge confronting all organizations pertains to the development of internal capabilities to mobilize organizational resources for competitive advantage (Barney, 2002).

Management theories have recognized the importance of resource management. Chandler’s (1962) definition for strategy refers to the determination and allocation of resources necessary for carrying out the long-run goals and objectives of an enterprise. Wernerfelt (1984: p. 172) defines resources as "those (tangible and intangible) assets which are tied semi-permanently to the firm." From the resource perspective, an organization is equivalent to a broad set of resources that it owns. Furthermore, Wernerfelt (1984) regards resources as important contributors for organizational performance.
The resource-based view focuses on the analysis of intra-organization resources for competitive environment (Barney, 1991). The analysis concentrates on determining the resources potential value to the organization. For competitive advantage, valuable resources are either unique or specific to the organization and could not be readily transferred or imitated by other organizations (Barney, 1991). Search and adaptation at the organizational level may result in unique capabilities and competitive advantage, but because of increased competitive pressures, advantages become short lived (Porter, 1980; Barney, 2002). Therefore, organizations must operate with a heterogeneous resource base at the organizational level and within the competitive environment with which they interface (Barney, 1991). A possible source of competitive advantage could be obtained by sustaining heterogeneity in the organizational resource base.

Most classical management theorists regard employees as tools to be used to achieve organizational goals. Wernerfelt (1984) disputes the concept by fostering the idea that employees are valuable resources. Both Drucker (1994), by emphasizing philosophy, and Deming (1986), by emphasizing philosophy and processes, demanded that people be treated as a resource instead of a financial cost.

Knowledge management processes impact resources management, in particular for the people involved and the core processes applied. Researchers have concluded that an organization's survival depends on the capacity to learn as much as it does on the capacity to meet current market requirements (Prahalad & Hamel, 1989; Senge, 1990; Barney, 1991). Barney (1991) explains that organizations assume competitive advantage from the implementation of unique value creating strategy. Prahalad and
Hamel (1989) concluded that the ability to learn faster than competitors and improve on existing skills is the most defensible organizational competitive advantage.

In planning and implementing strategy, Hamel and Prahalad (1989, 1990) believe that the organization must create a fit between resources and the pursued opportunities. Organizations must leverage resources to obtain desired results (Barney, 1991). In leveraging resources, the organization could consider trademarks, internal knowledge of technology, skilled personnel, trade contracts, machinery, efficient procedures and capital (Wernerfelt, 1984). Hamel and Prahalad (1990) argue that leveraging core competencies can be more important than the organization's current resources.

The implication from resources management processes is that the organization must recognize and utilize the key resources from the broad resource base available to the organization. However, sustained competitive advantage becomes a continuous state of change as other organizations develop and learn to exploit their own resources.

2.5.3.5 Decision-making Processes

A decision is a choice from among the available alternatives (Argyris, 1976). Researchers propose a wider perspective for decision-making processes. Simon (1976) believes that decision-making is the process of developing and analyzing alternatives and making a choice. The decision-making processes could be either programmed or non-programmed depending on the associated uncertainties. Programmed decisions are decisions that are repetitive and routine and that can be solved by applying rules or
following a procedure. The decision involves predictable outcomes from well-defined information and decision criteria. Non-programmed decisions are unstructured decisions that are unique and either requires innovation, information comes from incomplete channels or involves unknown criteria (Simon, 1991).

Rational decision-making model puts thinking first (Simon, 1976). The model process sequence is: defining the problem, diagnosing causes, designing possible solutions, deciding on the best solution, and implementing the choice. In spite of this, the rational model of decision-making could create problems for practicing managers when dealing with decisions beyond their bounded rationality (March & Simon, 1958). Mintzberg and Westley (2001) attribute management education as the cause for disconnection of senior management from organizational operations. Traditional management schools provide management education out of context from the actual organization managers will encounter. Mintzberg and Westley (2001) believe that managers with traditional management education rely primarily on their limited decision-making capacity when dealing with organizational adaptation and change.

Programmed decisions obstruct decision-making processes for dynamic situations. When dealing with turbulent environments, Duncan (1979) argues that the organization’s decision processes might not match the situation evolving. Lynn, Marone and Paulson (1996) declare that incremental approaches to change fail in turbulent environments because the organization cannot rely on a predictable sequence of events. For turbulent environments, organizations must focus on the internal infrastructure to resolve the increased need for information and strategic decision-
Decision-making processes are critical to the ability to change (Sinha, 1990; Romanelli, 1991). Use of a formal process model for decision-making increases the likelihood of strategic decision success (Harrison & Pelletier, 2001). But hierarchical decisions tend to produce inwardly rigid and narrowly focused communication flows. Wide information flow provides understanding of the environment, affects the ability of the organization to assimilate new knowledge and expand innovative capacity. The management system provides the decision-making processes to enable action where and when needed for organizational response to environmental conditions (Duncan, 1979).

A successful management system relies on effective decision-making processes to drive the change mechanisms affecting organizational performance. The simultaneity of adapting to feed-forward limits and detection of performance deviations suggest that the decision-making processes in the management system must support the organization in exploring opportunities and implementing timely corrective action.
2.6 What is the Aim of a Management System?

The aim of the management system is to provide the path for information and action and to give shape for organizational structure and processes (Barnard, 1938; Likert, 1967). The management system provides unity of purpose through the organization, decision-making guidance, communication of new opportunities and threatening conditions, rationale for evaluating and steering resources, and promotes the common development of a constantly evolving management system for the entire organization (Thompson, 1967; Drucker, 1995; Kaplan & Norton, 2001).

2.6.1 Contingent and Constant Evolution

Organizational research underscores the need for the organization and associated management principles to be contingent on the rate of change in an organization’s environment (Burns & Stalker, 1961) affecting structure (Mintzberg, 1979), organizational learning (Senge, 1990), and core processes (Hammer & Champy, 1993). As the environmental context shift thorough the agricultural-industrial-information-knowledge context (Toffler, 1990; Jensen, 1996), dramatic technological changes become a key environmental factor affecting organizational performance (Woodard, 1965) to the point where organizations cease to exist (Drucker, 1992). Similarly, environmental changes can constrain a particular set of resources to become
scarce or unavailable and limiting strategic choices for organizations competing within the organizational population (Barney, 1991).

To remain competitive, organizations must be responsive to changes (Prahalad & Hamel, 1990), the largest impact manifesting as a need to improve performance (Peters & Waterman, 1982). The ability to improve performance while undergoing and responding to changes is critical to long-term survival (Peters & Waterman, 1982; Rieley & Clarkson, 2001). The fundamental adaptation paradox is that attaining organizational performance excellence requires consistency. But when consistent, the organization becomes vulnerable because processes for adaptation and learning (Senge, 1990; Donaldson, 1994) might not take place. In order to be successful, organizations must create adaptability and flexibility in the management system to absorb inevitable change. A flexible and adaptable system could create the performance fit for an organization to balance the external environmental conditions with the internal forces along dimensions of efficiency and effectiveness.

Management history shows that high-performing enterprises often initiate and lead, not just react and defend (Peters & Waterman, 1982; Miles & Snow, 1986; Prahalad & Hamel, 1990; Drucker, 1995). High performing enterprises start strategic offensives to secure sustainable competitive advantage, and then use their established position to achieve superior and sustained performance over their competitors. To achieve a larger goal, the organization allocates efforts and a pattern of actions within the management system. Aggressive pursuit of a creative, opportunistic strategy could take an organization into a leadership position where the products and services become
the standard in their competitive field.

To adapt with incremental changes and deal with revolutionary periods, the literature presents three broad methodological categories: structural, process, and transformational (Tushman & Romanelli, 1985; Gersick, 1991). The link could be made between each category to evolutionary conceptual elements of nonlinear interdependence, self-organization, and qualitative evolution (Gersick, 1991; McMaster, 1996). Within the system, nonlinear interdependence represents the structural dimension. As the system changes and evolves, self-organization represents the process dimension. Qualitative evolution represents the transformational dimension as the system copes and progresses with changes. Changes to the management system must deal with an organizational structure where the process orientation provides the means to cope and assess transformation.

The management system conscious purpose still provides for improvisation when dealing with unexpected, unpredictable occurrences of paramount concern for organization transformation. Furthermore, different kinds of demands on the organization require that the management system provide with an evolutionary opportunity choice rather than the possibility of accepting unknown fate.

### 2.6.2 Strategic Orientation

Strategy has to do with thinking strategically, being informed and responding to a dynamic environment in pursuit of a mission (Porter, 1996; Pfeffer; 1997). Contingency
theories and the deterministic view portray the organization as constrained by the environmental factors (Child, 1977). When dealing with these environmental conditions to pursue the organizational mission, the literature considers the deterministic view and the concept of strategic choice (Hrebiniak & Joyce, 1985). In the deterministic view, strategy must become a match to environmental conditions. However, with strategic choice the organization can take actions to influence the environmental constraints. The research model leans toward the strategic choice perspective.

Within strategic choice, organizational adaptation and change response could be divided into deliberate, equilibrium-based or transformational perspectives (Kiel 1994; Beeson & Davies, 2000). Deliberate response implies a determined strategy and course of action based on rational definition and control. Organizational response based on equilibrium is a strategic choice seeking a balance between the organization and the environmental conditions. For the transformational strategic choice, organizations consider their environmental factors as conditions and opportunities for change and adaptation. In all cases, the strategy must be developed to match the intended outcome with differing order and control relationships. Likewise, Porter (1996) proposes that organizational activities must be made to match their strategy to create competitive advantage. The organizational actions involve intentionally setting goals for the desired future state, developing an approach to achieving those goals and providing alignment between all organizational activities.

For large-scale change, the goals or objectives become part of the organization's strategic planning process, or intended strategy (Mintzberg & Waters, 1985). Nadler &
Tushman (1997) suggested that one of the challenges when implementing large-scale complex change was the difficulty in visualizing the actual outcome or future state once the change is achieved. Many management scholars have emphasized the emergent component of change; often the final state of the organization is a product of unforeseen events that are not anticipated or overwhelming the planning function (Lindblom, 1959; Mintzberg, 1979; Eisenhardt, 1989). Unpredictable events or temporary issues must be isolated from expected events or episodic issues and categorized based on their strategic relevance.

In addition to seeking strategic alignment, Prahalad and Hamel (1990) believe that leveraging organizational core competencies must become a priority in the adaptation process to achieve competitive advantage. Leveraging core competencies involves the strategic knowledge within the organization that must be emphasized during transformational adaptation. Leveraging core competencies evolve under unknown and unpredictable conditions (Quinn, 1996). The level of environmental uncertainty could be determined from external scanning to tailor the leverage strategy to that particular level of uncertainty (Duncan, 1973; Eisenhardt, 1989; Courtney, Kirkland & Viguerie, 1997). Environmental factors and components comprising the organization’s environment are differentiated into internal and external relationships to identify the level of uncertainty.

The dynamic nature of organizational and environmental factors challenges traditional strategic orientations. Mintzberg (1990) claims that strategic planning is an oxymoron. He argues that concentration of organizational efforts relies on explicit
strategies made in a static and limited context “block(ing) out peripheral vision” (p. 84).
Mintzberg proposes a model of strategic progression using planning, adaptive, and entrepreneurial strategy formulation modes. The research model for performance fit requires a management system operating with an active and dynamic strategic management subsystem. Under this condition, the strategic management system interacts with the wider management system providing a strategic orientation. In that regard, an organizational fit for successful performance should reflect the intended strategic direction.

2.6.3 Dependence

Mission depends on environment influencing resources and processes (Lawrence & Lorsch, 1967; Duncan, 1979; Mintzberg, 1979; Barney, 2002). Mission affects determination of strategy by assessing strengths and weaknesses, opportunities, and threats. Knowledge management processes use of information about the present, while trying to anticipate the future environment in which the organization will be operating (Senge, 1990; Porter, 1996). Decision-making processes establish an action path and answer the questions raised when choices must be made about resources, core processes, strategy and knowledge (Eisenhardt, 1989; Pfeffer, 1997). The strategic implication is that all organization members are potential decision-makers requiring appropriate information as they influence the processes for effective action (March & Simon, 1958; Quinn, 1996).
Organizational studies suggest that past successes lead to a reduction in information processing by creating a desire to narrow the range of options to those that provided successful outcomes (Miller, 1993; Donaldson, 1999). Successful performance creates a strong organizational identity or culture affecting the concentration of power, information flow and decision-making (Hofstede, 1997). In a successful context, organizations disregard environmental changes by invoking known routines and striving for overall simplification. In some cases, the decision-maker vanishes behind known routines and programmed processes (Cyert & March, 1963; Garvin, 1995). The simplicity notion creates an emphasis on performance measures for efficiency leading to an accumulation of slack resources (Barney, 2002). Eventually, the organization might reduce the capacity to deal with the complexities from the environment to a level where organizational survival might be a struggle (Miller, 1993).

Management system design for performance fit must include subsystems and processes to provide coordination and integration of organizational interventions to deal with environmental forces. The strategic management system attempts to find an optimal match between the resources and capabilities available within the organization (strengths and weaknesses) and the external market conditions and environmental trends (opportunities and threats) (Kaplan & Norton, 2001; Barney, 2002). This analysis and subsequent match often translates into objectives related to organizational performance. The core processes align and match the organizational efforts to produce desired outcomes (Garvin, 1995). Information flow from decision-making processes provides for action and control of organizational core processes and activities,
comparison of predicted outcomes from strategies, and evaluation of overall performance.

### 2.6.4 Environmental Influence and Social Context

The major environmental transformation from the industrial age to the information/knowledge age marked changes affecting social aspects of the organization. During the Industrial era, Cyert and March (1963) depicted business organizations as political systems. With changes in the environmental context, economic, political and technological forces became relevant to understand organizational performance (Woodward, 1965). Concurrently, Emery (1965) argued that the social subsystem within the organization environment interact in a mutually inclusive fashion with the political, technological, and economic subsystems. Changes and transformations on the environment in which we live affect the social and organizational systems with respect to control, status and power (Quinn, 1996).

Bridges (1991) focuses on the social aspects of strategic change, noting that the human element carry out the organizational transformation. Strategy refers to the combination of goals and the means for achieving them while strategic change involves leveraging and integration of the competitive resources (Lynch, 2000; Barney, 2002). However, Mintzberg (1990) refer to the influence and effect of social concerns as minimal within the field of strategic management because the primary impact takes place at the organizational level. Successful organizational transformation results from
cooperative interpersonal and group behavior process of comparing actual conditions with planned conditions, analyzing the differences, and making necessary changes. Leadership drives implementation of transformation and change strategies, but a purely managerial mindset inevitably fails (Bridges, 1991; Kotter, 1995; Drucker, 1995).

The social context is one of several factors within the environmental forces included in the research model. Organizational theory provides different perspectives on the importance of the social context and the impact on outcomes and performance. Several researchers believe that organizational social dynamics and inter-group relationships contribute toward meeting common interests and fulfillment of overarching needs (Schein, 1992; Kotter, 1995; Hofstede, 1997). Parsons (1956) proposed that organization’s functional contributions meeting the needs of society defined the effectiveness to fulfill organizational goals.

For most organizations, the relationship between the social context and performance cannot be neglected. In particular, the strategic management processes force organizations to deal with a mission and objectives on a wider scale (Pfeffer, 1997; Barney, 2002). To achieve desired organizational outcomes, the management system must coordinate and integrate relevant social interventions. A primary aim of the management system is to overcome the limitations on the ability for individuals to process information (Simon, 1958; Cyert & Simon, 1963). The unique goal combination of relevant contexts and information processing capacity gives the organization the identity, power and strength to mobilize into the environmental challenges with a likelihood of success (Lawler, 1996a).
Burke and Litwin (1992) propose that structural focus of change has greater impact on systems and task requirements, while a change in organizational climate and leadership has a stronger impact on motivation and individual needs. The organization’s position in the environment depends on the unity, coherence, and internal consistency of strategic decisions (Prahalad & Hamel, 1989). As strategic consistency and alignment increases, the social context becomes part of the environmental composite. Organization development practices for organizational and individual outcomes require interventions along two broad dimensions: the target level and the nature of change. The target level refers to change focus as it affects individuals, groups, or organizations. The nature of change can be defined along a continuum of task-oriented and people-oriented activities.

The literature suggests that environmental forces affect the fit between the organization and the management system for organizational performance. The social context manifests as an internal organizational characteristic within groups and individuals and as an external environmental factor from society. Organizational outcomes are fulfilled with planned, coordinated, and collective efforts resulting from human interventions within the social context. Furthermore, the quest for performance optimization involves combination, conversion, and integration of internally generated efforts resulting from social interventions. Changes in the environmental and organizational social context influence the transformation processes to attain a successful fit.
2.7 What Functions Does the Management System Serve for an Organization?

To understand the functions the management system serves for an organization, four interrelated areas will be highlighted. The areas are information/communication, organization structure, environmental scanning, coordination and integration. Additionally, the investigation will concentrate on a process perspective to describe the primary functions from the management system required for performance fit with an organization.

2.7.1 Information/Communication

In an organization where the communication path is unreliable, the transfer of intended information suffers (Shannon & Weaver, 1949). For those cases, the effects on the receiving end could range into three possible cases: incomplete transmission, selective message alterations, and messages totally changed. For all three cases, the message will have to endure interpretation from the participants involved in the transmission process. The management system provides an interactive link of congruent information to the organization impervious to the erratic interpretation path. Thus, the organization engages in effective information relays to make decisions and take actions that result in desired effects and outcomes (Child, 1972; Drucker, 1976). As the communication path exchanges information, a new cycle of learning and
adaptive behavior will be introduced into the management system (Walsh, 1995).

Within a given organizational design, organizations can alter reporting relationships to adjust and adapt to dynamic conditions (Galbraith, 1995). A large number of interfaces, widely distributed, within and external to the organization respond to variations among the elements in the environment (Weick, 1979; Chakravarthy, 1997). In that context, the management system could be view as a complex adaptive system to gather information about the organizational surroundings. Communication paths widen with less formalization and centralization of information supporting effective decision-making (Brown & Eisenhardt, 1998). A successful fit creates the relationships to maintain relevant information exchange within the management system for the benefit of organizational performance.

2.7.2 Organization Structure

The nature of organizational core business processes auspices the development of appropriate management system structures. Organization design criteria involve the definition of division and integration mechanisms based on objectives and purpose. The organization structural configuration responds to the developed design characteristics. Burns and Stalker (1961) suggested that successful organizations tend to be either, at extremes, mechanistic or organic. For mechanistic situations, the management system operates with predictable processes and efficiency is the performance imperative. The organization must adhere to rules and to the chain of
command with highly centralized and specialized functional structure.

Conversely, organizations might face the need to constantly respond to changes with less predictable processes where the management system allows creativity and exploration (Prigogine, 1984). These organizations tend to be organic and the management system functions with a flexible chain of command where decision-making is more decentralized and departments less specialized (Burns & Stalker, 1961). The mechanistic command and control structure might be appropriate for an organization where the management system allows flow of communication and information primarily in one direction (Burns & Stalker, 1961; Campbell, Dunette, Lawler & Weick, 1970). For organizations composed of knowledge workers, the power structure will emanate and continue to flow from the top (Van de Ven & Poole, 1995). However, the information path and decision-making processes must flow in multiple directions within the organization (Senge, 1990; Nadler & Tushman, 1997).

The development of appropriate management system structures might involve a combination of particular orientations resulting in several forms. For example, different technologies impose distinct kinds of demands on individuals and organizations, requiring an appropriate organizational structure (Woodward, 1965). For environments with high rates of change, management system structures and organizational forms must be designed for flexibility and knowledge creation (Brown & Eisenhardt, 1998). The developed system structure relates to organizational division and hybrid departmentalization around functions, products, services, customers or geographical areas (Galbraith, 1995). Authority conflicts and performance assessments could
generate continuous adjustments to the organization structure and correspondingly, the management system circumscribed by it (Barnard, 1938).

For all organizational configurations, the management system provides the framework to support the fit factors for performance. The organizational structure relates to the mapping of planning, control, and coordination roles of organization’s actors. The management system structure describes the relationships, tasks and processes to integrate actions and outcomes affecting the internal and external environments. With a matching fit, the management system functions as a primary mechanism to support organizational structure.

2.7.3 Environmental Scanning

As the organizational environmental factors change, the management system must provide means to scan for information about changes to minimize the lack of fit between the environment and the system (Tushman & Romanelli, 1985; Gersick, 1991). Environmental scanning is a systematic method of obtaining, compiling and using information about environmental forces that might be relevant to the organizational opportunities or might represent areas of concern.

To process, define and plan the organization’s strategies involves scanning information about events, trends, and relationships in an organization’s external environment (Aguilar, 1967). Weick (1979) suggests that compiling and analyzing information requires rejection of irrelevant or incorrect information about the external
environment. Conversely, relevant environmental information might be incomplete or inaccurate and could involve risks (Brown & Eisenhardt, 1998). A reliable assumption for organizational design is constant change with an uncertainty implication during environmental scanning. Organizational design models based on uncertainty avoidance of environmental forces may be obsolete (Cyert & March, 1963; Duncan, 1973).

Environmental information could lead to strategic reorientations to adjust for current conditions (Eisenhardt, 1989) that could take an organization outside its familiar domain (Starbuck, 1983). Environmental scanning is also considered the principal driver that puts into motion the organizational adaptation processes (Pfeffer & Salancik, 1978; Daft & Weick, 1984; Tushman & Romanelli, 1985). Adaptation processes increase interactions and consideration of multiple alternatives for decision-making. An organization processing the increased environmental information must also resolve goal conflict. Environmental scanning decreases the lack of fit conditions resulting in organizational failure or a performance state requiring complete transformation (Pfeffer, 1982; Tushman & Romanelli, 1985). Within the organization, environmental information must be codified, interpreted, and abstracted. To increase performance fit, the management system processes route environmental information and provide the structural flexibility for effective exchanges.

In the later part of the 20th century, organizations faced increasingly more complex situations, embedded in interconnected social, economic, and political systems operating in dynamically changing environments (Quinn, 1996). In addressing these external systems, the organization must recognize there are limitations. For example,
detection levels might be insensitive to effects from factor variations or, at the other extreme, could overload the organization with data. Environmental scanning and monitoring must track the perspectives and orientations relevant to the organization and the possible effects on overall performance. It is important to continue to stress that the research unit of analysis is the organization. With the management system, the organization forms a combination of interactive mechanisms to deal with the composite environmental forces affecting organizational performance.

2.7.4 Coordination and Integration

The management system provides linkages for unity of action among interdependent activities (Thompson, 1967). To achieve common objectives, results for activities, and outcomes from each relevant process join together. With the deployment of essential control and information mechanisms, the management system achieves coordination and integration of interdependent processes through the interfacing organization (Lawrence & Lorsch, 1967). Over the long term, the management system provides consistency in resource allocation and reduction of competitive risk with integration of innovation and learning into relevant activities for the short term (Prahalad & Hamel, 1989; 1990).

Organizational components and the management system operate with changing requirements of performance and improvement (Mintzberg, 1979). The transformation processes in the management system must deal with change factors and provide
mechanisms for the organization to adapt and survive (Pfeffer, 1997). At the same
time, transformation processes and change mechanisms must improve and adapt.
During deep changes, the management system functions of coordination and
integration might be challenged with the increase in expended data and transaction
density (Brown & Eisenhardt, 1998; Rieley & Clarkson, 2001).

A systematic approach to manage the organization includes the processes for
alignment to achieve performance fit. The transformation of organizational performance
from an initial state of performance misalignment to a final state of fit requires
coordination and integration. The integration of transformation processes within the
management system matches conditions and priorities from organizational factors. The
transformation relationship between the organization and the management system to
achieve fit is illustrated in Figure 8.
Integration of relevant factors affecting organizational performance involves dynamic processes and environmental conditions. Adjustment to dynamic conditions must be systematic to drive for performance fit. Nadler and Tushman (1997) argue that the organizational design and congruence between the components of the management system has decisive impact as a key performance factor. To reach the goal of competitive advantage, they contend that it is important to integrate organizational structure, workplace culture, and employee motivation. Integration of these elements supplements Scholz (1987) proposition that organizational strategy must consider the cultural context. The transformation of the management system results from a planned
change designed to significantly enhance overall organizational performance.

The basic elements of a formula based organizational change strategy and transformation of the management system includes changes affecting the organization as a social system. Researchers proposed methods to transform the social system as an organizational change strategy (Lewin, 1951; Katz & Kahn, 1978; Eden, 1992). Typically, an organization seeks a state of equilibrium by maintaining a balance between driving forces and restraining forces (Miller & Friesen, 1984). The need for change occurs when one of these two forces becomes stronger than the other. Responding to the need to restructure, Lewin (1951) proposed an intermediate state, unfreeze, for changing the organization’s interpersonal relation influencing behavior. Once the change has occurred, organization enters into a semi-stationary equilibrium state reflecting the desired change. The organization operates with continuous adaptation of the social system to respond to forces and demands with interventions that strengthens the driving forces or weakens the restraining forces. At the semi-stationary state, the management system will continue to transform and recreate into a continuously evolving form until the next restructuring cycle.

Organizational studies have considered the conflict and tendencies toward both order and disorder as an overarching effect on organization performance (Mintzberg, 1978; March, 1981; Miller & Friesen, 1984; Tushman & Romanelli, 1985; Gersick, 1991; Sastry, 1997). A setting of dynamic conflict between stress and inertia at all levels of organizational analysis simultaneously creates pressures for change and for maintaining current patterns of action. The restructuring episodes match Lewin’s (1951)
To achieve coordination and integration, the management system must meet the organizational conditions as the effects from change and adaptation manifest and alter the level of fit for organizational performance. Quinn (1996) describes two major types of change that can occur for systems at the individual, organizational, and global levels. The organization as the research unit of analysis lies in between both extremes. Within the management system, a rational analysis and planning process produces incremental change, usually limited in scope and reversible. Deep change requires new ways of thinking, involves major disruptions and tends to be irreversible. With deep change we increase the risk of failure and decrease control on possible outcomes.

The literature suggests that for most organizations, the application of a management system provides a more efficient and effective means of control and coordination of leverages to achieve the strategic agenda with integration of capabilities, effort, and the natural dynamics of organizational change (Peters, 1982; Merchant, 1985; Simons, 1995; Lynch, 2000; Barney, 2002). Similarly, empirical evidence suggests the systematic management processes enhance organizational performance (Hendricks & Sinhal, 1997).
2.8 How Does an Organization Utilize a Management System?

As a result of the technological advances and global marketplaces, organizations operate with dynamic and complex environments (Chakravarthy, 1997). A management system provides a broad perspective toward interrelationships to understand performance variations in a continuum and the capacity to effectively deal with change. Organizations focus on organizational core competencies in order to strengthen them and integrate the organization's capabilities into the management system processes.

An organization utilizes a number of management approaches, tools, and techniques to seek performance improvement. Approaches, tools and techniques include: total quality management, benchmarking, time-based competition, balanced scorecard, partnering, reengineering and change management (Porter, 1996). In some cases, management approaches, tools, and techniques have taken the place of a management system resulting in dramatic operational improvements. However, many organizations have been unable to translate operational gains and periods of high performance into a systematic improvement process to sustain a competitive position (Steers, 1975; Porter, 1996; Staw & Epstein, 2000; Lawler, Mohrman & Benson, 2001).

The management system provides the methods and linkages by which an organization plans, operates, and control activities to meet goals and objectives. To drive for action, we must understand the performance control theory and non-linear relationships as concepts influencing management system performance. The
management system serves as the organizational means to drive improvement on all fronts, to move closer to a viable competitive position, and to introduce timely changes in order to sustain a competitive position (Rieley & Clarkson, 2001).

2.8.1 Organization and Complex Processes

The emphasis on complex transformational processes rather than prediction and control leads to new challenges for designing a management system requiring trans-disciplinary understanding (Perrow, 1986). Complex interdependence can be better explained with natural systems such as the weather and the brain (Prigogine, 1984). A simple nonlinear interdependent relationship can drive a system towards complexity where a local response can be a part of an ordered system. Conversely, global order can be hidden in randomness (Prigogine, 1984; Tushman & Romanelli, 1985).

The main contribution from the complexity perspective is for the organization to seek understanding of influences each of the management system elements and subsystems has on the other. As the organization adapts to changes, learning becomes crucial to provide a level of organizational performance (Senge, 1990). At the edge of chaos, creative and innovative information flow within the organization and into the transformation processes. Creative chaos takes place when the organization faces a crisis or believes there is a sense of urgency and difficult challenges to be met. During transformation, the management system must also provide relevant information from strategies, learning, decisions, and performance measures to support the
organization. For an organization, there is no other way to integrate the performance priorities into the management system, but to rely on complex mechanisms. The organization attempting to maximize the efficiency and effectiveness of an individual component will most likely fail at meeting the desired goals, and completing changes for adaptation (Mintzberg, 1994; Drucker, 1995; Lawler, Mohrman & Benson, 2001).

2.8.2 Individuals and Strategic Management

Mintzberg (1979) suggests that internal workings in the organization and styles of management play an important role in strategic management. Personal needs of an organization’s members create pressures against centralization and formality at the strategic level by shaping and deviating the strategic implementation process (Mintzberg, 1979; Kotter & Heskett, 1992). Strategic management encompasses the activities and functions of executives and those who deal with the environment (Drucker, 1992). Attempts to influence the overall direction of organizations must include all interactions and interface levels where relevant information and effective decision-making are closest to the action.

In the same manner, strategic thinking can occur at all levels of the organization (Mintzberg & Lampel, 1999). Strategic thinking involves understanding the individual role, whatever their functions or responsibilities may be, to make strategically sound decisions for the organization’s well being. Mintzberg (1994) argues that to include relevant contributions into strategies, the organization must remove pressure from
organizational structures and the culture surrounding the individual. The information flows include parallel processes with top-down, bottom-up and across exchanges deviating from the traditional mechanistic hierarchy using a single top-down flow. Strategic thinking at the individual level reinforces decision-making and actions toward desired outcome (Scholz, 1987; Porter, 1996; Lynch, 2000). The organization benefits from the diverse perspective (Ashby, 1956) and enhancement effect of non-linear interactions (Prigogine, 1984) by including all those who can affect strategies and outcomes into the strategic management subsystem.

2.8.3 Management of Change

By the end of the 20th century, the technological drive and global concerns have turned change management into a valuable skill (Quinn, 1996) and a source of competitive advantage (Prahalad & Hamel, 1989; 1990). Orlikowski and Hoffman (1997) believe that organizational change associated with the adoption of new technology appears as a constant and difficult to prognosticate for the organization to prepare for it. They define three types of organizational change, based on their uncertainty and risks as anticipated, emergent and opportunity-based. The anticipated changes take place as planned while the emergent and opportunity-based occurs during adaptation and operation phases.

Change is healthy and acceptable for all interventions that culminate in actions coherent to the management system outcomes (Beer, Eisenstat & Spector, 1990).
Donaldson (1999) advocates a contingency theory with a portfolio of variables that interact with each other to affect the performance of the organization. Donaldson (1999) proposes that business cycle, competition, debt, and divisional risk are variables to drive organizational change, while diversification, organizational structuring, and external management are variables inhibiting change. From his perspective, adaptive change is triggered from crises of poor organizational performance. Donaldson (1999) argues that high performance when sustained through time leads to the organization into change aversion. With aversion, organizational to environment misfits become insufficient to trigger adaptive change.

The management system provides a balance between reacting to a performance crisis and the disruption from continuous adaptation. Sastry (1997) proposes an organizational change model for monitoring organization-environment consistency to set the pace of organizational changes and to introduce change freeze points with internal pacing following a reorientation. The management system must operate with mechanisms to deal with changes more or less continuously and providing organizational adaptation as discontinuous restructuring and evolutions.

According to Warrick (1984), six basic factors will help organizations to prepare for change. These factors are: establishing the need for change; developing a results-oriented strategy for change; using a plan to guide the change process; involving key stakeholders in planning and managing the change; building reliable feedback mechanisms and monitoring the change; and assuring that management systems and structures support the change. Organizations move from the steady state prior to
change into a future state with action processes to align for coherence and stability (Bacharach, Bamberger & Sonnenstuhl, 1996). Understanding change factors, preparing for change, and establishing alignment processes provide the means to transition amid state of fit between an organization and the management system.

The increasing nature of change creates instabilities where the organization response and incremental adaptation to change might not appear comparable to environmental factors such as economic and social conditions (Gersick, 1991). Therefore, incremental adaptation resulting from rational analysis and planning process must be the preferred mode to incorporate changes to the management system in response to environmental disturbance (Quinn, 1996). However, change increments should affirm organization conditions to maintain a recognizable progress path and to prevent despise, dissent or confused standstill as unintended responses (Kanter, 1983). Incremental change requires continuous adjustments, improvements, and alterations to evolve the system (Gersick, 1991; Quinn, 1996). Transformational change refers to dramatic conditions requiring fundamental revisions to management systems, processes and structures (Galbraith, 1995).

The literature suggests that managing change as an incremental condition implies improving on known routines and providing adaptation for new situations. At an increased level, radical change suggests revolutionary methods and deals with transformation of the organization and the management system. Independent variables from the research model introduce the change conditions affecting the level of fit for organizational performance.
2.9 What are Examples of a Management System?

Researchers believe that some organizations consistently outperform others by developing means that place them in competitive advantage (Cockburn, Henderson & Stern, 2000; Barney, 2002). Successful organizations must have a flexible management system to respond rapidly to market and environment changes as a consequence of the temporary nature associated with their competitive advantage (Porter, 1996). The origins of competitive advantage include the ability to identify and respond to environmental signals prior to becoming a competitive leverage. The organization must provide both environmental scanning and monitoring to ensure detecting these signals (Aguilar, 1967; Fahey, King & Narayanan, 1981).

Examples will be provided on prescriptive and descriptive management systems, their frameworks, key characteristics and limitations for implement in organizations.

2.9.1 Management System Framework

A systems approach to management for organizational performance has been defined with various types of management system frameworks. In the later part of the 20th century, research interest expanded into contingency models with a quality orientation and frameworks for performance excellence (Child, 1977; Lee, Shiba & Wood, 1999). The investigation will explore relevant management system frameworks
including the performance excellence models.

2.9.1.1 Management System Framework Types

Yusof and Aspinwall (2000) categorize the management systems into three broad types as applied by organizations implementing a Total Quality Management program. They define management systems as either those from consultants and experts, academic-based or awards-based frameworks. Consultants and experts create system frameworks derived from personal opinion and experience in providing consultancy to organizations. In the same manner, academic-based system frameworks are developed by academics from research and experience in the field. For organizations seeking recognition in their implementation of a management system, the awards-based frameworks provide a common criteria model (Hendricks & Singhal, 1997; NIST, 2001).

Frameworks derived from personal opinion and experience include models developed by Peters and Waterman (1982), Deming (1986), Juran (1988), and Lawler (1996). In some cases, the models developed from personal opinion and experience evolve into criteria for award-based frameworks such as the Deming Prize and the Malcolm Baldrige National Quality Award.

Frameworks from consultants, experts and academics tend to generate a fair amount of discussion and debate in the literature with empirical investigations primarily conducted by their proponents (Pascale, 1990; Harari, 1993; Champy, 1995; Yusof &
Aspinwall, 2000). Discussion and investigation of award-based frameworks tend to concentrate in the regions where participants could earn the recognition.

### 2.9.2 Performance Excellence Models

One of the excellence models receiving wide exposure in the researched literature is the model from Peters and Waterman (1982). As consultants they conducted empirical studies of organizations in the United States and defined their framework for organizational excellence with these factors:

1. Organization must have a bias for action
2. Customer orientation
3. Autonomy and entrepreneurship
4. Productivity through people
5. Hands-on, value-driven approach
6. Staying with the business known
7. Simple form, lean staff
8. Simultaneous loose-tight control properties
9. Flat, cross-functional organization structure

A Peters and Waterman (1982) model established a reference point for comparison and investigation of performance excellence frameworks. Peters and Waterman’s investigation revealed that 43 organizations could achieve and sustain performance excellence for at least 20 years. Probing further, a number of academic
studies scrutinized and extended the empirical data from Peters and Waterman’s model. In one study, Pascale (1990) observed performance deterioration within five years of Peters and Waterman’s investigation for two thirds of the 43 organizations.

Deming (1986) believes that the management system framework must have a quality orientation. Deming (1986) views the organization as a system and defines organizational performance in terms of current and future needs of the customer. The quality management system prescribes 14 points or obligations of top management toward achieving organizational performance. Deming (1986) emphasizes continuous improvement to constantly and forever improve the management system. Although the 14 points are prescriptive in nature, the implementation approach of organizational roles and responsibilities are left to the organization for their definition. The importance of Deming’s quality management system contributions to performance management model could be found in the literature (Rao Tummala & Tang, 1996; Lawler, Mohrman & Benson, 2001; Rigby, 2001). Management system models with Total Quality Management orientation are examples of models influenced by Deming’s contributions.

Lawler (1996) offers six principles for long-term competitive advantage based on organizational excellence. The principles should be integrated to change the organization into a high performance work organization. His principles are:

1. Organization can be the ultimate competitive advantage
2. Involvement is the most effective source of control
3. Lateral processes are the key to organizational effectiveness
4. Organization should be designed around products and customers
5. All employees must add significant value
6. Effective leadership leads to organizational effectiveness

Performance excellence models from Peters and Waterman (1982) and Lawler (1996) introduce a systems approach to management with a customer orientation for organizational performance. Similarly to management system frameworks incorporating Deming's (1986) 14 principles, performance excellence models present a variety of mechanisms to impart well-being and satisfaction within internal and external organizational activities.

Organizational performance excellence models involve descriptive criteria serving as the management system framework. Performance excellence models require completion of activities with virtue and achievement. Organizations that achieve and sustain performance excellence must be proactive in meeting their mission, staying customer focused, and matching their environment. A strong sense of direction permeates the organization to achieve effectiveness and efficiency, and the dynamic interdependent relationship. The management system elements drive all relevant interdependences at high levels of competence to obtain effectiveness, fulfill the mission and meet efficiency dimensions. Those who manage and participate, by extension, are concerned with creating excellent organizations and attaining performance excellence.
2.9.3 Management by Objectives as a Management System

Drucker (1973) described the management by objectives (MBO) system as the only principle that gives full scope and common direction to the organization. A management system based on MBO utilizes a series of planning, action, and evaluation mechanisms combined into a prescriptive framework. The management system consists of processes to identify organizational strategy, to set the collaborative goal, to link rewards to goals, to develop action plans, and to review performance periodically. The MBO system seeks genuine understanding of goals plus responsibility for and commitment to self-control (Drucker, 1976).

In theory, a properly applied management by objectives and self-control system should provide appropriate definition, control, and results in terms of understanding, responsibility and commitment, resource allocation, organizational strategy, and decisions. With a MBO management system, goals are defined with tangible, verifiable and measurable characteristics. The system could expand and encompass from the individual level to organizational outcomes. Performance assessment in an MBO involves comparison of results to goals as the feedback mechanism for adjustments (Odiore, 1965; Morrissey, 1976; Swiss, 1983).

In practice, a MBO management system becomes a bureaucratic tool. The MBO system polarized into a management system that emphasized results instead of processes and performance measurement based on immediate and short-term approaches. Furthermore, in practice, the definition of objectives tend to be localized
and short term. With a MBO, efforts within the organization tend and concentrate toward the individual. Decisions and actions ignore strategic direction thus limiting the effectiveness of the management system for organizational adaptation. Improvement methods have been presented in the literature to deal with stated MBO execution weaknesses. Odiorne (1979) proposes an improved system framework to encompass and emphasize the processes for the entire management system and presents the approach as the MBO II system.

2.9.4 Total Quality Management as a Management System

Total Quality Management (TQM) is organization-wide programs that aim to integrate all functions with the objective of maximizing customer satisfaction through continuous improvements (Juran, 1988; Kreitner, 1992; Dean & Bowen, 1994; Lawler, Mohrman & Benson, 2001). Deming, regarded as the main proponent of total quality management, based his management system concept on a 14-point framework that must be implemented at all organizational levels (Deming, 1986; Dean & Bowen, 1994). The TQM organization is perceived to be decentralized with decision-making closer to the level of action involving the environment (Ulrich, 1989).

A TQM system follows the basic definition of quality: those features and characteristics of a product or service that affects the ability to satisfy customer’s needs (Deming, 1986; Stein, 1994; Lawler, Mohrman & Benson, 2001). Garvin (1982) contrasts that customer satisfaction is dependent upon a defined set of intrinsic and
extrinsic attributes and that customer satisfaction will be dependent on what competitors can offer. When quality is improved in innovative ways, costs are reduced and productivity is raised (Deming, 1986). Total Quality Management involves operations management of resources and processes associated with organization’s goods and services. An assessment of a business organization will evaluate two key drivers for performance: quality and productivity.

Efforts to improve quality or productivity could be interlinked either in a balanced way or conflicting manner. Therefore, management systems based on TQM frameworks emphasize operational concerns neglecting planning and evaluation elements of strategic management (Stein, 1994; Lawler, Mohrman & Benson, 2001). Priority competitive dimensions such as quality, cost and delivery can be related to process aspects such as conformity, reliability, speed, dependability, operating cost, and flexibility of processes (Garvin, 1993a). A structural system to create organization-wide participation in planning and implementing a continuous improvement process is built on the assumption that most problems stem from processes not the people involved.

### 2.9.5 Business Process Reengineering as a Management System

The broadest strategies for management system transformation include either evolutionary or revolutionary approaches. The TQM philosophy relies on an evolutionary approach involving incremental movements with the expectation that it may
result in long-term performance change. A revolutionary approach for planned change of the management system would be the Business Process Reengineering (BPR) philosophy embracing a radical method for process and structure alterations. Furthermore, a combination of elements from both approaches could be applied to drive the incremental changes necessary to transform management systems and organizational adaptation to environmental changes.

A series of techniques and designs for process management have been presented in the literature with process reengineering methodologies (Harrington, 1991; Hammer & Champy, 1993). Implementation of the process reengineering philosophy involves the management system structures and processes. An incremental change approach for a management system would be designed with initiatives of relatively low effort and duration to produce immediate business benefits. The approach will complement the realization of more complex and intense initiatives required for the overall change program. The organization will benefit with the speed, resource availability, and learning experience of completed initiatives.

A total improvement program with a reengineering approach focuses on organizational resources to balance quality, productivity, technology, and costs in a multi-step process (Harrington, 1995). The reengineering methodologies consist of selecting key processes, creating process maps, identifying problems or non-value-added areas, finding solutions for problem areas, redesigning processes, and then, implementation. Processes within the management system must identify the required changes and enable organizational adaptation as the reengineering activities unfold. A
management system based on BPR emphasizes constant and radical adaptation for the organization to cope with environmental changes (Harrington, 1995; Lawler, Mohrman & Benson, 2001).

2.9.6 ISO 9000 as a Management System

The ISO 9000 framework deals with standardization of quality of product and service, the quality standards, and of the activity itself. The objective is to ensure a consistent product and service by documenting the process and defining the activity standards as to the means and methods required for execution. Registration to the ISO 9000 standards emphasizes standardization and consistency. A management system based on the ISO 9000 framework is prescriptive in nature.

The International Organization for Standardization (ISO) is composed of national standards bodies with the purpose of developing and promoting the use of worldwide standards. The ISO 9000 standard for quality management systems has evolved from the initial Quality Systems version published in 1987 to revised versions released in 1994 and 2000 (ISO, 2000).

The ISO 9001:2000 standard defines minimum characteristics in the form of requirements to establish a Quality Management System (QMS). With the latest revision the standard evolved from a document-based to a process-based model with broader applications to product and service organizations. In defining the QMS, the organization must identify and describe the processes needed including their sequence,
interaction, control, monitoring, staffing, and means for their enhancement.

Within the management system framework released in 2000, the standard includes specific requirements to address characteristics related to customer satisfaction, continual improvement, and resources management. To demonstrate customer focus, the organization must describe how customer requirements drive organization’s processes with means to measure and analyze customer satisfaction. The management system follows the closed loop plan-do-study-act cycle and emphasizes continual improvement rather than prescriptive terms and clauses to provide implementation flexibility across the organization. Finally, the organization must plan and implement processes by allocating necessary resources to accomplish the stated objectives.

Compared to ISO 9001:1994, the new standard defines additional QMS requirements. In addition to the quality management system section in the 1994 version, detailed requirements were defined and grouped in the following sections: management responsibility, resources management, product realization, and measurement, analysis and improvement.

Based on eight quality management principles, ISO 9004:2000 complements the requirements defined in ISO 9001:2000. With ISO 9004:2000, an organization pursuing registration with the standard receives a set of guidelines intended to enhance business performance beyond the conformance requirements. Organizations attaining ISO 9001:2000 registration have the option to incorporate these guidelines into their management system to pursue excellence through continual improvement.
2.9.7 Malcolm Baldrige National Quality Award as a Management System

The Malcolm Baldrige National Quality Program (MBNQP) was established in 1987 to enhance the competitiveness, quality, and productivity of U.S. organizations. The federal government program develops and disseminates evaluation criteria and manages the Malcolm Baldrige National Quality Award. Created by a U.S. Congress act, the program was assigned to the National Institute of Standards and Technology (NIST) agency within the Commerce Department's Technology Administration. The American Society for Quality (ASQ) administers the annual Malcolm Baldrige National Quality Award (MBNQA) under contract to NIST.

The award framework has become a recognized model to describe performance excellence. “The Malcolm Baldrige National Quality Program provides global leadership in promoting performance excellence and in the learning and sharing of successful performance practices, principles, and strategies” (NIST, 2001, p. 58). The emphasis of MBNQA is on achieving customer satisfaction through continuous quality improvement and setting a foundation for performance improvement.

Malcolm Baldrige National Quality Program award criteria evolved in part from Deming-type quality principles to recognize organizations performance excellence. In choosing the Baldrige Award winners, examiners evaluate a written application and visit the participant’s sites. Overall, applicants are judged on the extent to which they are continually improving value to customers while maximizing their overall productivity and effectiveness.
In 1999, separate criteria for performance excellence were developed to tailor the Baldrige model for three distinct areas: business, education, and health care. The performance excellence model consists of seven criteria elements with a maximum combined score of 1,000 points. The criteria provide strong focus on business results with about one third of the scoring maximum value dedicated to results-oriented elements. The seven MBNQA criteria categories are: 1) Leadership; 2) Strategic Planning; 3) Customer and Market Focus; 4) Information and Analysis; 5) Human Resources Focus; 6) Process Management; and 7) Business Results. A systems perspective for organizational management includes the performance management system described in the Information and Analysis category with the other six categories describing the organization, operations, and performance results.

The Baldrige model for performance excellence has been adapted by several national and international entities dedicated to advancing business excellence in their organizations. Although applications were submitted for education and health care for the 1999 and 2000 award cycles, no organization received the performance excellence award until the year 2001.

2.9.8 Balanced Scorecard as a Management System

Decision-makers track the organizational performance at specific intervals to ascertain their progression toward goal attainment. Feedback on organizational performance assists employees in the readjustment of tactical objectives to better align
activities with the strategic interests of the organization. To be effective, executive managers do not make a great many decisions; they concentrate on the important ones (Drucker, 1967). The strategic decisions unify and direct the organization to effectively match or align organizational capabilities with environmental opportunities and threats.

Several performance management methodologies have evolved in the latter part of the 20th century. In 1954, a management methodology, Management by Objective (MBO), was introduced to establish direction by integrating a strategic element into the organization performance analysis (Drucker, 1954, p. 351-354). The methodology provided linkages to an organization’s mission statement and strategies by their conversion into quantifiable measures, specifically covering the areas of human resources, financial, productivity and innovation (Odiome, 1965, p. 78, fig. 5-1).

MBO set a trend which led to the invention of a variety of business performance management and process reengineering methodologies. The trend continued in the following years with practices such as benchmarking, total quality management (TQM), activity-based costing, business process reengineering and performance management (Wells & Doherty, 1994; National Partnership for Reinventing Government, 1997, 1999).

Kaplan and Norton (1992) argue that performance management practices had difficulty in achieving long-term effectiveness when associated solely on financial measurements. Using financial measurements for management decisions could produce consequences on the uncompleted chains of action extending beyond the time of measurement. The problem may even be aggravated if the company is in a situation in which it feels forced to pursue short-term financial results rather than the
organization’s long-term goals (Dearden, 1969; Kaplan, 1984).

For new investments Dearden shows that they are detrimental to the short-term return on investment, owing to asset valuation and depreciation policy. Managers may be reluctant to make such investments even if actions are of strategic interest for the organization. More recently, organizations have focused attention on strategy implementation, which causes deployment problems if there are gaps between the strategic plan and the actions performed on a daily basis (Mintzberg, 1994).

A balanced scorecard measures performance based on a set of goals and desired outcomes with measurements linking these four areas: customer satisfaction, employee satisfaction, financial management, and process improvement (Kaplan & Norton, 1992, 1996a, 1996b). As most organizations have experienced, the adaptation of the Kaplan and Norton concept provides a vehicle for undertaking the cause and effect relationship unique to each organization (Chesley & Wenger, 1999).

Organizations use a balanced scorecard to track their progress toward achieving strategies using performance measures specific to their work. Goal setting and measurement of performance is linked from the corporate level to the center level and then to each team and to the individual in the organization.

2.9.9 Management System Performance Limitations

Management system concepts from various movements have received ample exposure in literature and the literature demonstrates application in practice. In spite of
this, organizational researchers express concerns in achieving satisfactory results when implementing management system concepts related to TQM and BPR.

Drucker (1994, p. 95) viewed TQM management as a powerful system whose basic techniques direct considerable effort without achieving concrete outcomes for the organization. Empirical studies and surveys revealed that for most organizations a management system solely based on quality management principles is incomplete (Lawler, Mohrman & Benson, 2001). The main cause for that is quality management principles emphasize process improvement and operational efficiency within the management system. In some cases, management systems based on TQM programs failed to achieve their objectives (Harari, 1993) or failed to significantly impact the organizational performance while directing extensive time, effort and money (Napier, 1997). Methodologies developed around the task structure of the process fail to characterize and analyze the business processes in their full context. Commenting on the limitations of TQM and reengineering, Garvin (1995) explains that their application assumed isolation from environmental conditions and of process redesign from rethinking business strategy.

Dinesh and Palmer (1998) studied patterns of implementation for MBO and Balanced Scorecard (BSC) and performed a comparison between both management systems. According to their study, the MBO was not fully implemented and could not achieve goal congruency through collaboration. They extended their findings for the MBO as potential implementation difficulties for the BSC system and discussed in general their implication to performance measurement systems in business.
At the organizational level, the management system must align objectives to provide direction and congruency. Comprehensive empirical research on management practices and techniques reveal practical applications for objective alignment and their effect on organizational performance (Rigby, 2001; Lawler, Mohrman & Benson, 2001). A key finding is the use of mission and vision statements both in the United States (Lawler, Mohrman & Benson, 2001) and worldwide (Rigby, 2001) to direct the organizational efforts toward objectives.

The literature includes models developed to answer limitations of prescriptive frameworks specific to quality, environmental, and occupational health and safety areas. Integrated management system approaches have been proposed driven by the desire to consolidate requirements from multiple standards such as ISO 9001 and ISO 14001 as released by the International Organization for Standardization. However, the integration of prescriptive management systems generates a prescriptive system. Wilkinson and Dale (1999) developed various integration models but suggested that the approach to develop an integrated model should be based on the European Foundation for Quality Management (EFQM) Model for Business Excellence, a descriptive model.
To measure performance for a complex system, the organization must develop a framework for description and assessment of crucial characteristics. Measuring performance involves a set of factors and conditions affecting the organizations. The management system relies on a performance management system to collect and deliver timely, accurate, and meaningful information to decision makers. Performance management processes involve the organization at the individual and collective level. Performance management is embedded in the subsystem and processes that composed the organizational management system.

2.10.1 Performance Management

Performance management, sometimes referred to as managing for results, is the purposeful use of resources and information to achieve and demonstrate measurable progress toward organizational and program goals (Kaplan & Norton, 2001). The literature on performance management predominantly refers to individuals as the unit of analysis for measurement systems. Furthermore, the measurement process becomes the focus for action rather than how the information will be used to change and improve the organization based on strategic choices (Kaplan & Norton, 1992; 2001).

Organizations have relied on internal monitoring mechanisms based on
accounting methods as an accurate measure of performance (Barnard, 1938; Odiorne, 1965; Kaplan, 1984). Under those conditions, organizations have control on their internally generated accounting data as measurement information and lag indicators. The financial performance targets based on the accounting data are not subject to market biases and considered to have less noise (Healy, 1985; Lambert & Larcker, 1987). On the contrary, a performance management system solely based on financial information reports on past outcomes and promotes short-term actions (Kaplan & Norton, 2001).

The management system provides an understanding of the dynamic complexity of organizational performance factors affecting fit. The system encourages a more focused attention to diagnose and to act on organizational dysfunction than without the structure of the model (Drucker, 1995). The tendency for organizations is to live a shorter life. Some fail at any given stage and disappear, while others pursue linkages to increase their leverage and survivability in a dynamic environment. The choices for survival and growth are learning and adapting to a changing environment.

The equifinality principle means that an organization could reach final state regardless of the path taken and differing initial conditions (Boulding, 1956; Wright, 1989). The fit model includes combinations of factors to describe, to study, and to understand the levels of performance fit. Different factor combinations might provide equivalent levels of performance fit between the management system and the organization. Selection of a particular path might decrease the number of combinations available for performance fit. The acceleration of change, increasing complexity of
environment, and, consequently, the management system, demand increasing levels of efficiency creating maximum entropy production. In creating organizational response, actions could be irreversible limiting the number of combinations to create fit. Within the management system, equifinality and limiting conditions interact interdependently in a constantly fluctuating set of combinations to create levels of performance fit.

Organizational routines, actions and responses match a constant process of change and evolution (Argyris & Schon, 1978; Kotter, 1995). With adaptation, the organization expects to create a unique and sustainable competitive position (Barney, 2002). At any given state, the organization could define and select an adaptation path in response to present conditions (Quinn, 1996; Lynch, 2000). One possible adaptation path starts with a distinctive strategic direction integrated to the transformation processes within the management system. A different path could provide corrective action when organizational measures identify failure to achieve the level of desired performance. These processes must adapt continuously to counteract the complexity level and respond to uncertainties in the environment. At extreme conditions, when the management system cannot properly fit the organization it could lead to either decreased performance, to cope with a revolutionary path or to face possible death.

2.10.2 Organizational Performance Measurement

Conducting performance measurement on a complex system requires a framework for description and assessment of crucial characteristics. The problem with
selecting organizational performance measures is to determine what to measure (Steers, 1975; Meyer, 1997). The challenge includes measuring performance from the unique set of factors and conditions affecting the organizations. Multiple factors increase the difficulty to isolate and measure each unique contribution to organizational performance (Peters & Waterman, 1982; March & Sutton, 1997). For organizations, performance measurement involves a future state beyond the reach of simple measurement (Meyer, 1997).

Performance measurement information is influenced by who constructs the indicators and who does the measuring (Steers, 1975; Lawler & Rhodes, 1976; Sink & Tuttle, 1989; Kaplan & Norton, 2001). Additionally, there is no consensus on which criteria should be included in multivariate performance measurement models (Steers, 1975). Measurement of organizational performance is crucial to determine progress on strategic efforts and to establish when and how to institute corrective actions (Kaplan & Norton, 2001).

Management systems must include performance measurement. Sink and Tuttle (1989) describes a management system model as a mechanism for building more effective improvement cycles. The model portrays a management system as a process with improvement cycles and hence the model can be depicted as a plan-do-study-act process (Kotnour, 2000). The measurement system contributes data as an integral component of the improvement cycle and necessary for the study stage in the process. With the management system, organizational improvement is the end result with measurement and the improvement cycle as the means to achieve it (Atkinson,
Waterhouse & Wells, 1997).

The management system identifies changes in the processes and environment according to the expected degree of control and predetermined rules. The system will deliver timely, accurate and meaningful information to those who can act for effective decisions and to exploit opportunities in a controlled manner (Simon, 1976). To be effective, the rules are customized within the organization to reflect unique lines of authority and to remove sequential confirmation for each delegated decision process. In fact, the management system must provide the capability to assess the key internal processes influencing the level of organizational performance (Champy, 1995; Atkinson, Waterhouse & Wells, 1997).

The purpose of key measures is to improve performance management of an organization. Measures linked to the strategic goals guide the organization with broader and more comprehensive data for decision-making (Sink & Tuttle, 1989). Key measures from goals and objectives support the information through the organizational structure. To be effective, performance measures must focus on the vital few elements (Kaplan & Norton, 1996a). The vital few could be a combination of internal and external quantitative and qualitative performance information. As the measures focus on strategic goals, they also relate to the long-term well-being of the organization.

In the Management Systems Model (Kurstedt, 1985), measurement is a critical part of the performance improvement process. The process includes identification of potential organizational performance improvement interventions, implement the most feasible ones, and measure the impact of the interventions on achievement of strategic
goals and objectives. The process follows the plan-do-study-act improvement cycle by assessing the final state and making new performance improvement intervention decisions.

The research dependent variable measures the organizational performance in terms of effectiveness and efficiency. Harrington (1991) provides examples of effectiveness and efficiency measurements. Examples of the effectiveness measurements are:

- Appearance
- Accuracy
- Adaptability
- Costs
- Dependability
- Durability
- Performance
- Reliability
- Responsiveness
- Serviceability
- Timeliness
- Usability

Similarly, the efficiency measurements examples are:

- Percentage of valued-added time
- Processing Time
• Poor-quality cost
• Resources expended per unit of output
• Value-added cost per unit of output
• Wait time per unit

Dynamic in nature, the management system performance measures for organizational fit follow the plan-do-study-act improvement cycle.

2.10.3 Performance Management Links to Organization and Individual

Research suggests that individual performance evaluation represents the key element in the overall human resource management of an organization (Lawler, Mohrman & Benson, 1999). In the most effective organizations, individuals receive performance feedback in an ongoing and continuous mode. The overall performance measurement processes serve as the transfer mechanisms of multiple organizational objectives into performance plans for individuals. The measurement system linkages provide a general sense of the organization’s overall direction and focus improvements on individual’s performance. However, the allocation of multiple objectives could impose scattered priorities at the organization and individual levels rendering disappointing outcomes from the implementation of performance measurement systems (Lawler, 1996).

For performance fit, the investigation will study performance measurement at the
macro level. The relationship between an individual and the organization to establish performance fit can be described as interactive. Organizations have an influence on the individual performance and the individual influences the organizational performance. Through the management system infrastructure, the organization determines the extent of interactions one individual has with another and the processes to deal with external and internal factors. The management system integrates performance measures at the collective level to assess the level of fit attained by the organization.
2.11 How Do We Predict a Successful Fit?

To predict a successful fit, the research will explore the combination of factors from the management system elements and the organization. The discussion presents the management system as a conversion system for conditions and mechanisms to establish a level of fit for survival, to attain a predicted level and to restore performance to a desired level.

2.11.1 System Relationships for Success

Every organization represents a conversion system that continuously gathers inputs, uses and transforms them, and produces an output back to the environment, from which they originally came from. (Wright, 1989; Cook, Hunsaker & Coffey, 1997). The conversion system includes the management system that serves the organization. Systems theory emphasizes that a management system would be incomplete if we decided to reduce the system to some elements ordered in logical, linear, cause-effect relationships (Wright, 1989; Senge, 1990; Lee, Shiba & Wood, 1999). The reality is that the described elements would depict temporary states in a mesh of second- and third-order interactions which at best is a relational picture that does not translate neatly into words. Although this could dissuade the completion of a full relational model, the intention is to identify those important elements required to complement and influence

For Herbert Simon (1976), the organization is a complex series of interlocked decision-making processes where communication is critical. His concept of the organization as a system of exchange represents an extension of the classical approach toward emphasis on hierarchy as the system for framing and guiding organizational decisions. These decision-making processes provide objective outcomes to ensure that the subjective rationality of the organization properly interfaces with the surrounding environment. Hence, the organization provides a structured environment in which individual behavior is considered rational from both the internal organizational values, and the external values of the environment in which the organization exists.

Decision-making processes enable the organization to establish and maintain a focus on those projects and activities that are critical to developing and maintaining a competitive edge (Argyris, 1976). The decision-making processes linkage to strategy clarifies what problems must be solved and, more importantly, how success is to be measured. Expectations are clearly understood at the beginning of the transformation process with translation of mission objectives into specific performance goals for the organization (Mintzberg & Westley, 2001). Therefore, the human element in the organization understands and directs all efforts to contribute to the desired collective performance.

Fit relationships for success must include a strategic orientation and mechanism to effectively deal with the organizational environment. Congruent with the system
principle of equifinality, organizational performance theories generally do not yield a
best way to organize and manage, but rather, several best ways (Miles & Snow, 1994).
In spite of the inherent equifinality in organizational performance outcomes,
organizational performance theories invoke the concept of strategic choice as an
explanation to develop constructs and particular approaches taken (Mintzberg, 1994).
When dealing with organization design, contingency theories of organizations have
shown that there is no one best structure (Child, 1977; Galbraith, 1995). The
identification of an organization’s environment is crucial for designing a structure that
provides the information and coordination needed for success.

A group of organizational performance models present multivariate measure of
success from the relationship between organizational characteristics and the
environment. Lawrence and Lorsch (1967) present a model where organizations
balance integration and differentiation of environmental factors for successful
performance. The degree of differentiation and the degree and pattern integrative
mechanisms determine the successful organizational adaptation to environmental
demands. Duncan (1973) presented a model with decision-making structures and
measures for integration, adaptation, and goal attainment when dealing with
environmental factors. Hanna (1988) defined an organization performance model
composed of business situation, strategy, culture, organizational design, and results as
the key factors and linked in a cause and effect chain. Successful organizational
performance depends on how relevant factors fit each other (Donaldson, 1999).

In Hanna’s (1988) model, the first factor involves the organization’s environment
and the second factor includes elements associated with strategic management processes. The third factor consists of variables such as organizational structure, technology, information systems, people, and decision-making processes. The fourth factor includes the behavior, values, rites, assumptions, rituals, folklore, heroes, creeds, physical artifacts, and climate as elements affecting organizational culture (Scholz, 1987). The fifth factor encompasses all outcomes relating to the variables from the business situation factor (Miller, 1992; Donaldson, 1999).

The fit relationships for performance for a management system and the organization involve multiple variables. Past research demonstrates that dominant performance variables exhibit nonlinear relationships where the input is not proportional to the output (Cyert & March, 1963; Tushman & Romanelli, 1985; March & Sutton, 1997). Nonlinear interdependence could represent the complex dynamic systems and multi-dimensional systems required for fit. Interdependence describes a relationship where the variables affect and are affected by each other in complex causality. The relationship between the organization and the management system is such that the discrete contribution to the dependent variable of organizational performance cannot be separated without considering the independent variables from each other (March & Sutton, 1997; Mintzberg & Lampel, 1999).

The research identifies strategy, structure and lifecycle as key organizational factors to establish fit and predict performance. For the management system, the design elements include the strategic management sub-system and processes for core business and decision-making. Additionally, knowledge management and resources
management processes contribute to the core business process. The management system design must match the environmental priorities affecting the key organizational factors to align for performance fit. Out of all possible design combinations, the human element decides and implements an approach to create a level of performance fit. An example of a management system design approach to predict a successful fit between a management system and the organization involves the knowledge management sub-process from core business processes and the control mechanisms within the system to provide information related to fit and performance.

The preparation and execution of a Space Shuttle mission is an example of effective use of information related to predicting and achieving a successful fit for organizational performance by utilizing knowledge management processes and control mechanisms. For every Space Shuttle mission, multiple channels of information form the backbone of formal communications, making their management a challenge. Each mission can involve more than one million documented operations coordinated and executed among participants and decision makers spanning across several organizations. The information structure relies on predetermined task sequences and accumulations of past experiences within the Space Shuttle launch team. The organization executes the complex operations for space missions by maintaining technical purview over requirements, establishing key decision points to proceed with activities and addressing any deviations with actions to ensure the desired outcomes take place.

To prepare for a Space Shuttle mission, the environment of the management
system resembles the conditions experienced by many complex enterprises (Brown & Svenson, 1988; Miller, Droge & Toulouse, 1988; Davenport, Jarvenpaa & Beers, 1996). Information flows within the system link to core processes and decision-making mechanisms to achieve organization goals. Managers for each element encompassing a Space Shuttle mission must contain costs, meet deadlines, and ensure safety while completing all necessary requirements. In working with different organizations on the project, a variety of methods come into play to address each culture, interfaces, procedures and different ways of handling information. Successful performance-driven fit between organization and management system is an imperative to prepare and conduct a Space Shuttle mission.

2.11.2 Performance Level Prediction

To determine the future level of organizational performance implies reaching full understanding of future states by removing the uncertainties associated with them. However, the path to the future state starts with the present state. To predict performance, an organization must anticipate the future and attempt to mold it while balancing short and long-term goals (Drucker, 1954; Kaplan & Norton, 1992). The organizational challenge comes from forecasting discontinuities where contingencies must be envisioned (Mintzberg, 1994). To mold the future, the organization and associated management system must adapt.

To predict management system performance, a valid question would be: what
performance level triggers system adaptation and change? Chandler (1962) and Child (1972) postulate that organizational performance has to become low before the performance level could trigger adaptive organizational change. Chandler (1962) conducted empirical research on satisficing theory associated with changes in organizational structure. When performance falls below the satisficing level as the organization deals with problems, managers institute structural changes to restore organizational performance to an acceptable level.

During adaptation to organizational change, Simon (1976) supports the theory that organizations tend to restore performance to satisfy to an acceptable level rather than maximize to full performance potential. In practice, the actual performance seldom matches the predicted optimum performance. Empirical research on organization evolution and adaptation involved studies of short-term adaptations, or retrospective case studies, with limited success in predicting future performance (Baden-Fuller & Stopford, 1992). The performance that the organization strives to maintain tends to be the minimum level considered to be satisfactory or acceptable by those judging it. An accepted explanation is that a performance judge will experience bounded rationality in the attained knowledge and decision-making capacity (March & Simon, 1958).

The risks and uncertainty involved in formulating and implementing appropriate strategies have intensified (Mintzberg & Lampel, 1999). To predict outcomes requires an organizational capability to develop strategies anticipating changing conditions in the turbulence of the external environment. The challenge stems in the definition of the organizational outcome before a predicted performance level could be determined.
Performance prediction requires objective decisions where the discrimination of the environment is unbalanced by the management past experience and organizational present situation (Barnard, 1938; p. 209). Prediction of performance requires information exchange between decision-makers and organization interfaces to the internal and external environments. The organization must rely on a management system to provide information paths with supporting decision-making processes.

An effective fit between a management system and the organization requires integration of a significant number of environmental resources (Miles & Snow, 1994; Donaldson, 1999). The integration involves both internal and external factors and a network of interdependent subsystems within the organization and the management system. A successful fit can deal with small perturbations where information, decisions and actions can be dealt at the local level and directed to the area demanding interaction. An effective fit might provide the network to a complex and robust system able to cope with large perturbations. An effective fit for organizational performance must be a function of environmental change.
2.12 Literature Gaps

A review of the literature in the fields of management, management systems, business management, strategic management, performance management, change management, organizational development, and organizational learning reveals a gap for studies or research focusing on the understanding and application of management systems models. In particular, a gap for models dealing with organizational development and corporate lifecycle stages theory to the change process, barriers to change, or intervention methods to accelerate the adoption of the proper match for organizational performance.

For the researched literature fields, I found no evidence of investigation or empirical work on organizational performance related to fit between an organization and the management system. The predominant management literature covers performance systems as they affect the individual or from the perspective of a manager. Performance concepts and empirical investigation usually are based on organizations exposed to production and manufacturing environments. A significant weakness in the body of knowledge is the conceptualization of actionable constructs for organizational performance (Cyert & March, 1963; Child, 1972; Pfeffer, 1997; March & Sutton, 1997). Actionable constructs are practical propositions consistent with achieving desired effects on organizational performance.

Whether the models were based on complex or simple constructs, they have
different implications for investigators. Simple constructs tend to reduce reality to specific relationships while complex constructs strive to encompass the factors deemed relevant for the investigation. Performance models with a casually dependent performance variable assume that the causal relationship with independent variables has been correctly made (March & Sutton, 1997). To create a complete image, complex models become impractical and difficult to study by other investigators outside the circle surrounding the model's proponent(s) (Steers, 1975; Pfeffer, 1997).

Empirical research suggests that there is no simple or universal model that could explain the concept of organizational performance (Child, 1972; Steers, 1975; Doty, Glick, & Huber, 1993; Pfeffer, 1997; March & Sutton, 1997). To compound the difficulties, defined constructs for theoretical and empirical models tend to reflect the environmental context at the time of conception. Researchers have found serious difficulties when attempting to integrate different organizational studies on performance (March & Sutton, 1997). As organizations develop, transform, and evolve in the knowledge era, significant changes in environmental conditions present a divergent context from the published literature made during the industrial and information periods. The investigation considers the environmental factors relevant in the creation of management system fit for organizational performance.

Investigations on the relationship between environmental factors and organizations have an extensive trail of history (Adams, 1918; Parsons, 1956; Chandler; 1962; Emery & Trist; 1965; Lawrence & Lorsch, 1967; Aguilar, 1967; Child; 1972; Duncan, 1973; Aldrich, 1979; Eisenhardt, 1989; Miller, 1992; Pfeffer, 1997; Kotnour,
2000). In general, organizations tend to have improved performance when they are properly matched to their environment. Usually, empirical research on environmental factors concentrates the investigation to a particular industry or market structure. Additionally, studies associated with the environment-performance fit tend to limit assessments to the effects from environmental factors related with financial performance. In that manner, the organizational performance literature neglects the interconnectedness of environmental factors by concentrating studies to limited issues or individual aspects of the environment (March & Sutton, 1997).

The knowledge era creates a unique set of environmental conditions significantly different from previous contexts studied in the literature and dominating the industrial and information eras. For contemporary organizations, the organizational context seems to have higher complexity and rate of change than those found in previous environments. A combination of nine environmental factors builds on the organizational body of knowledge and provides information about significant aspects of the external environment that could influence performance. Additionally, the research model presents environmental factors as moderating variables affecting the performance fit between an organization and the management system.

Studies indicate that different organizational structures might provide an explanation for the variations in performance (Chandler, 1962; Lawrence & Lorsch, 1967; Hall, & Saias, 1980; Donaldson, 1987). From the structural perspective, organizational performance can be influenced by the internal consistency among organizational size, diversity of operations, and distribution of power. On the contrary,
several researchers believe that models based solely on structural factors might be insufficient to describe performance (Child, 1977; Galbraith, 1995). Child (1977) argues that additional organizational factors other than those associated with structure might be needed to explain differences in performance levels. Galbraith (1995) proposes that structural and strategic factors must be included among the elements describing organizational performance.

Empirical evidence suggests that the key factors having an influence on organizational performance appear to be strategic in nature (Porter, 1980; Prahalad & Hamel, 1989; Pfeffer, 1997). Several models of organizational performance tend to build on key relationships and attempt to measure effectiveness using a multivariate criteria (Steers, 1975; March & Sutton, 1997). When measuring organizational effectiveness, change management for adaptability and flexibility is the predominant criterion found in the evaluation criteria (Steers, 1975). Consequently, the performance fit concept presented in the research model departs from the deterministic view with a strategic choice perspective (Hrebiniak & Joyce, 1985; Kiel 1994; Beeson & Davies, 2000). In fact, the organization is in control to establish their performance level with pertinent actions within strategic choices (Child, 1972; Mintzberg, 1994). Conversely, to prescribe a standard change and adaptation strategy might not fit the organizational context influencing performance.

Recognizing the importance of matching strategy to environment, several investigators conducted empirical studies utilizing factors of environment and strategy to explain variations in organizational performance (Child, 1972; Fahey, King &
Narayanan, 1981; Fredrickson & Mitchell, 1984; Eisenhardt, 1989). Organizations exposed to the same environment have developed differing strategies to achieve a similar level of success (Miles & Snow, 1978). Strategic variables matching the environment might require a combination of additional organizational factors. Furthermore, what determines the attained level of performance involves the relationship between strategy and organizational structure (Chandler, 1962; Miller, 1986; Miller, Droge & Toulouse, 1988). Cannon (1972) and Rumelt (1974) confirm that the fit between strategy and structure, rather than isolated strategic and organizational factors, provides a significant impact on organizational performance.

To conduct research on the influence of strategic and organizational factors for performance, Child (1972), Miller (1986), Miles and Snow (1994) and Galbraith (1995) propose configurations of strategy and structure. The primary intention was to find which internally consistent organizational structure could be the most appropriate for a particular strategy. Organizational forms designed for flexibility, effective decision-making, and knowledge creation appear to influence successful levels of performance. However, the strategy-structure congruence seemed to be approached as a one-way causal relationship rather than an interacting fit within a larger set of significant factors affecting performance.

Chandler (1962) and Child (1972) presented organizational structure as an effect resulting from the selected strategy. In the same manner, Rumelt (1974) provided evidence on the strategy-structure relationship, but limited the study of performance variations to financial indicators. Studies on organizational models involving multiple...
contingencies provide evidence that sometimes structure precedes strategy while, on other occasions, structure follows structure (Thompson, 1967; Child, 1977; Pfeffer, 1997; Donaldson, 1999). In general, the literature suggests that, as a minimum, the management system and the organization must include, and sometimes match, configurations of strategy and structure for organizational performance.

Prior research integrates a variety of management system and organizational factors within coherent configurations of strategy and structure as determinants of organizational performance (Child, 1972; Miles & Snow, 1978; Mintzberg, 1979; Miller, 1986; Donaldson, 1999). Although the literature provides examples of typologies of organizational structures, serious gaps could be found with respect to management system changes and organizational dimensions affecting performance. A serious gap pertains to the effect of management system design on organizational performance as the system match and create fit for an organization. In particular, the combination of strategy, structure, and organizational lifecycle has not been explored as prevailing factors to match organizations and management systems for performance.

Similarly, studies on organization lifecycle ignore the relationship between an organization and management system or changes to the management system as the organization develops. The current thinking on organizational lifecycle includes theories and methodologies from several researchers: Greiner (1972), Galbraith (1973), Kimberley and Miles (1980), Scott and Bruce (1980), Quinn and Cameron (1983), Miller and Friesen (1984a), Kazanjian (1988), and Adizes (1989, 1999). For each different perspective, the lifecycle constructs explain organizational response to growth and
environmental challenges. The combination of strategy-structure-lifecycle and their relationship to management systems is a literature gap pertaining to the exploration on the dominant factors influencing organizational performance. Consequently, lifecycle theories have neglected the fit between an organization and the management system to understand the effect on organizational performance.

To understand performance fit, the research will explore the organizational factors for strategy, structure, and lifecycle and their relationship to management systems as performance determinants for change and adaptation to the environment. For organizational lifecycle, the research model will use five developmental stages to investigate the lifecycle effect on the level of fit between an organization and a management system. The five stages were adapted from previous organizational research relevant to this investigation: Greiner (1972), Quinn & Cameron (1983), Churchill & Lewis (1983), Tushman & Romanelli (1985) and Adizes (1989, 1999). Stages of organizational lifecycles and the relationship to the organizational factors for structure and strategy and the management and control systems are presented in Table 8.
Table 8. Organizational Lifecycle Stages for Fit Research

<table>
<thead>
<tr>
<th>Lifecycle Stage</th>
<th>Introduction</th>
<th>Growth</th>
<th>Maturity</th>
<th>Decline</th>
<th>Renewal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td>Flat</td>
<td>Expanding</td>
<td>Stable</td>
<td>Rigid</td>
<td>Agile</td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>Centralize</td>
<td>Guided</td>
<td>Aligned</td>
<td>Lagging</td>
<td>Leading</td>
</tr>
<tr>
<td><strong>Management System Design</strong></td>
<td>Descriptive</td>
<td>Descriptive or Prescriptive</td>
<td>Descriptive or Prescriptive</td>
<td>Prescriptive</td>
<td>Descriptive or Prescriptive</td>
</tr>
<tr>
<td><strong>Control Systems</strong></td>
<td>Simple</td>
<td>Flexible</td>
<td>Elaborated</td>
<td>Reactive</td>
<td>Proactive</td>
</tr>
</tbody>
</table>


Exploration of fit factors contributes to the body of knowledge on organizational performance. Earlier investigations on fit models tend to describe congruence as a short-time condition within the studied alignment factors. The research model could be rearranged within the performance factors to study both short and long term fit. To balance both timescales, the investigation will explore the contradictions of stability and change on performance fit when an organization interfaces with their environment (Duncan, 1979; Eisenhardt, 1989; Miller, 1992).

In the past, fit constructs have been described and operationalized as a function of relative stable environmental states compromising the concept when the environment changes. With changing environments, an area of interest for the management system design is the flow of information within the organization. Information flow and internal processing reduce environmental uncertainty for decision-making processes and influence effective coordination and integration (Lawrence & Lorsch, 1967; Duncan,
Conceptual and empirical works show that information processing increases with higher levels of environmental uncertainty and complexity (Mintzberg, 1979; Duncan; 1979; Daft & Weick, 1984; Drucker, 1995). At the organizational level of analysis, information flow, decisions, and actions provide the interface mechanisms and processing capacity for desired outcomes (March & Simon, 1958; Galbraith, 1973; Weick, 1979; Nadler & Tushman, 1997).

A serious deficiency found in the literature pertains to investigations of changes in information processing for performance fit between an organization and the management system. Expectations about the future organizational performance are based on information obtained from experience (March & Sutton, 1997). Additionally, the current level of performance fit might be inaccurate because information processing feeds from delayed or incomplete data. The ability to identify and respond to environmental trends relies on proper information processing within the organization (Cockburn, Henderson & Stern, 2000).

A summary of literature gaps identified as areas of primary interest for study is presented in Table 9:

<table>
<thead>
<tr>
<th>Literature Gaps</th>
<th>Research Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship between performance - fit - management system -</td>
<td>Included in study</td>
</tr>
<tr>
<td>organization</td>
<td></td>
</tr>
<tr>
<td>Relationship between management system design - organizational</td>
<td>Included in study</td>
</tr>
<tr>
<td>factors</td>
<td></td>
</tr>
</tbody>
</table>

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2.13 Research Model for Investigation

The research model includes the effect of systematic information flow on performance fit. The investigation will study the influence of management system design in establishing consistency between strategic orientation and the flow of information, decisions, resources, actions, and outcomes from the organization. The research model includes testable propositions from sound theory on organizational performance to interact with empirical data (Hempel, 1966). Extending on Lawrence and Lorsch (1967) organizational concepts, the investigation will study the fit as a model for integration of efficiency and differentiation flexibility to achieve a target performance.

To test the model for variations in the dependent variable, measures of organizational performance, the research will consider the following independent variables: fit state, the management system design, and the organizational factors. The fit state will be determined from the combination between management system design and each organizational factor. Management system design will be categorized according to the prescriptive and descriptive forms. Organizational factors selected for study include strategy, structure and lifecycle. The research variables and relationship to study their influence on organizational performance are presented in Table 10.
Consequently, the research will determine congruency and fit between the management system and the organization and their effect on performance. The research will investigate the following relationships: management systems design and organizational performance; fit conditions and interaction for organizational performance; fit between organizational strategies and management system design; fit between organizational structure and management system design; and fit between organizational lifecycle and management system design.

These relationships will be tested with the following five hypotheses:

Management Systems Design and Performance

- Hypothesis 1: An organization is more likely to have higher levels of performance when management system is descriptive.

As the organization adapts to changes, a descriptive management system design provides higher levels of organizational performance (efficient and effective) over a prescriptive management system design.
Fit state and Organizational Performance

- Hypothesis 2: Correct fit state leads to an increase in organizational performance.

The relation between management system design and organizational strategy, structure, and lifecycle has an interactive effect in the level of fit for organizational performance. Factor interaction that improves fit increases performance; a misfit decreases performance.

Fit Between Organizational Strategy and Management System Design

- Hypothesis 3: Organizational Strategy will exist in between the leading and lagging extremes. A state of fit between the Organizational Strategy and the Management System Design will be positively associated to successful performance.

To match the organizational strategies, organizations will create a management system design between the prescriptive and descriptive extremes. A descriptive management system matched to an organization with leading strategic conditions could envision contingencies required to manage discontinuities (Mintzberg, 1994). In the same manner, a prescriptive management system design will be positively associated to successful performance for organizations with a lagging strategy. Both combinations
produce a fit state for the organization.

Fit Between Organizational Structure and Management System Design

- Hypothesis 4: Organizational Structure will exist in between the loose and rigid extremes. A state of fit between the Organizational Structure and the Management System Design will be positively associated to successful performance.

Organizational structure and controls in the structural elements at the environmental interfaces will exist in between the rigid (mechanistic) and loose (organic) extremes. To achieve successful performance, organizations will develop and operate with a management system design to match the organizational structure.

Fit Between Organizational Lifecycle and Management System Design

- Hypothesis 5: Organizational Lifecycle will exist in between the growth and decline extremes. A state of fit between the Organizational Lifecycle and the Management System Design will be positively associated to successful performance.

Over the course of time, organizations move through different phases of developmental lifecycle spanning between the growth and decline extremes. A fit state for management system design will be positively associated to successful performance.
for organizations matching the organizational lifecycle.

The relationships between research factors and hypotheses to investigate the effect on fit for organizational performance are illustrated in Figure 9.

![Figure 9. Research Factors and Hypothesis Relationships](image)

Organizational performance research is extensive, but in comparison, the literature on management system and the concept of performance fit seems minuscule. Overall, there is a deficiency of scholarly knowledge about the concept of performance fit as organizations design and modify the management system. The literature review confirmed that more research is needed to fully understand management systems fit for organizational performance.
The research will be conducted as presented in Chapter 3, Methodology, and the data analyzed in Chapter 4, Findings, to determine if these theories and models could affect the level of fit for organizational performance.
CHAPTER THREE: METHODOLOGY

The main focus is to operationalize for investigation the constructs identified and described in the previous chapter. The research methodology includes a description of the selected measures that represent the constructs, description of sample characteristics, source of the data, development of hypotheses, and analytical techniques applied for testing. The hypotheses development will be aimed at capturing the relationship between the constructs.

The conceptual constructs influences the analytical methods that can be appropriately selected to conduct hypotheses testing. The methodology describes the research process to test hypotheses and to determine whether the theoretically predicted results are observed. The methodology was designed to investigate how does fit between management systems and organizations influence organizational performance. In particular, how do different fit states across a variety of organizational forms, contexts, and internal processes relate to the dependent variables of primary interest.

3.1 Methodology Overview

Literature review revealed that the connection between an organization and the
management systems to establish their effect on performance is not clearly understood. The intended outcome of this investigation will increase the limited literature pertaining to matching management systems and organizations to understand the influence on performance as organizations adapt and transform.

A complete study on organizational fit will include the detailed processes related to organizational changes and will fully cover the characteristics of management systems. Similarly, a research design involving very intensive examination of a specific case sacrifices breadth to provide details increasing investigation depth (Mcphee, 1990). Trade-offs shaped the present research methodology because rarely complete studies or case studies are simultaneously accurate, general, and simple (Weick, 1979).

The focus of the research will be limited to developing and testing the constructs for fit and performance changes that are likely to affect or to occur in organizations. The selected study sample is the aerospace industry for a predetermined time period. Independent variables for this study are fit, the organizational factors from strategy, structure and lifecycle, and management system design. Dependent variables are organizational performance in three measures of effectiveness and efficiency successfully operationalized in previous research (Capon, Farley & Hoenig, 1990).

By utilizing analysis tools and statistical methods, research hypotheses will be tested. In this research, the primary relationship of interest is fit between the management system and the organization it serves. Secondary relationships of interest are the strategy, structure, and lifecycle between the organization and the management system and the corresponding effect on organizational performance.
A design plan will be followed to obtain data, analyze results and findings to answer the research questions. The researcher should anticipate the range of data collection strategies to be used to ensure that the study will have the necessary resources (Yin, 1994). To address the research questions, several research methods and sources of data will be applied (Creswell, 2003). The structured and overlapping employment of multiple research methods and multiple data sources increases the reliability of measures and produces triangulation (Krippendorf, 2004).

Triangulation refers to the combination of two or more data sources, methods, or investigators in one study of a single phenomenon to converge on a single construct. Triangulating is used to provide confirmation and completeness and attempts to counteract the threats to validity from each source of data. Case study and archival analysis will be applied as research methods for each selected organization (Yin, 1994). Forms of data collection for the study will include retrieval from archival information and content analysis of organizational documentation to tap into different dimensions of the research problem.

By using data identifiers specific to any given year in the time span, the present investigation is a cross-sectional study of organizational data which will help confirm the relationship between the constructs and variables that represent these constructs. Core concepts for the all case studies will be under the same theoretical model with archival analysis providing different data points for a past to present investigational degree of focus (Yin, 1994).
3.1.1 Why Does the Study Span from 1991 to 2005?

During the 1991 to 2005 period, the number of aerospace companies within the United States dramatically decreased with mergers and acquisitions (AIAA, 2005). Each business transaction differs in the way organizations interact (Anslinger & Copeland, 1996). Merger is a business transaction on a relatively equal basis where two firms agree to integrate their operations, resources and capabilities with the expectation that together they might create a stronger competitive advantage. An acquisition involves a transaction where one firm buys another firm. After completion of the transaction, the acquirer intends to gain core competence by making the acquired firm a subsidiary within the acquirer’s portfolio of businesses. When the target firm does not solicit the bid of the acquiring then the acquisition is a takeover.
3.2 Operationalizing the Constructs and Dimensions

Constructs for strategy, structure, lifecycle, management system, fit and performance will be defined in measurable terms for data collection and analysis. The constructs, measures and results are summarized in Table 11.

Table 11. Constructs, Measures and Results

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>strategy</td>
<td>direction</td>
<td>leading or lagging</td>
</tr>
<tr>
<td>structure</td>
<td>type</td>
<td>loose or rigid</td>
</tr>
<tr>
<td>lifecycle</td>
<td>stage</td>
<td>growth or decline</td>
</tr>
<tr>
<td>management system</td>
<td>design</td>
<td>prescriptive or descriptive</td>
</tr>
<tr>
<td>Fit</td>
<td>management system - strategy</td>
<td>fit /unfit</td>
</tr>
<tr>
<td></td>
<td>management system - structure</td>
<td>fit /unfit</td>
</tr>
<tr>
<td></td>
<td>management system – lifecycle</td>
<td>fit /unfit</td>
</tr>
<tr>
<td>Performance</td>
<td>Return on Assess</td>
<td>dependent variable</td>
</tr>
<tr>
<td></td>
<td>Return on Equity</td>
<td>dependent variable</td>
</tr>
<tr>
<td></td>
<td>Return on Investment</td>
<td>dependent variable</td>
</tr>
</tbody>
</table>

3.3 Hypotheses

The hypotheses guide the test performed in the statistical analysis. Each
individual hypothesis is first stated and then discussed with a translation of information gathered from theories, other research, and casual observation. Hypotheses for the research model are illustrated in figure 10.

![Figure 10. Hypotheses for Research Model](image)

The five hypotheses are:

- Hypothesis 1: An organization is more likely to have higher levels of performance when management system is descriptive.
- Hypothesis 2: Correct fit state leads to an increase in organizational performance.
- Hypothesis 3: Organizational Strategy will exist in between the leading and lagging extremes. A state of fit between the Organizational Strategy and the Management System Design will be positively associated to successful performance.
• Hypothesis 4: Organizational Structure will exist in between the loose and rigid extremes. A state of fit between the Organizational Structure and the Management System Design will be positively associated to successful performance.

• Hypothesis 5: Organizational Lifecycle will exist in between the growth and decline extremes. A state of fit between the Organizational Lifecycle and the Management System Design will be positively associated to successful performance.
3.4 The Organizational Performance Construct

To describe the construct for organizational performance, the selected performance measures and associated format will be explained in the following sections.

3.4.1 Organizational Performance Measures

Venkatraman & Ramanujam (1986) suggest collecting data on multiple performance measures in order to gather a multi-dimensional perspective on organizational performance. Two broad groups of objective measures for multi-dimensional perspective are accounting measures drawn from the accounting systems used by organizations to track their internal processes and financial market measures relating to the profit or loss observed in the operation of financial markets. As a result, both accounting and market-based performance measures will be utilized in the investigation.

Studies on a broad cross-section of firms in the United States economy identify measures of profitability as the only reliable measures of organizational performance (Capon, Farley & Hoenig, 1990). They analyzed hypothesized relationships of organizational performance as measured by accounting and market measures covering the level, variance and growth of profit as well as other outcomes such as assets,
equity, sales and debt. The consistency of these measures suggests that performance is being captured effectively with measures of profitability.

McGahan (1999) has assembled a large body of data on the performance of all publicly traded business segments and companies in the United States over the 1981 to 1994 period. McGahan (1999) concludes that industry and business-specific effects account for the largest variance in profitability. The investigation will concentrate on a publicly traded business, the aerospace industry in the United States.

3.4.1.1 Why Measure Performance in Ratios?

Main purpose of using performance data in the ratio form is to make the results comparable across business firms and over time by controlling for organizational size and time value of money for financial ratios. Prior research on performance ratios has been characterized by theoretical discussions about the ratio forms in financial ratio analysis. Form categories of financial ratios include profitability, capital structure and liquidity.

A number of studies have focused on techniques commonly used in the capital budgeting process and the relationship between methods of controlling capital investment, measures of performance, and the level of organizational autonomy to achieve profit and maintain liquidity. Gitman and Maxwell (1985) surveyed the Fortune 1000 companies and found that firms devote their main effort to performance ratios for the management of short-term working capital assets.
Deakin (1976) and Lee (1985) observed that financial ratios can be skewed and non-normally distributed. When financial ratios do not exhibit normal distribution, researchers attempt to use transformations to ensure normality. So (1987) studied the distribution of financial ratios and outliers presence. After removing the data outliers, So (1987) found that the ratios were still asymmetrically distributed and non-normal suggesting that the non-normality condition of financial ratios might be from other sources. Lau, Lau and Gribbin (1995) argue that removing outliers from empirical distributions of financial ratios is theoretically incorrect and practically unnecessary.

In spite of these data problems, a large body of evidence suggests that financial ratios might be useful to researchers to determine organizational conditions (Lev, 1969). When evaluating organizational performance, Gupta and Huefner (1972) suggest that industry segment ratios may be better targets than values extracted for the entire market population. Responding to market challenges, firms introduced analysis tools in terms of financial models specific to their market. Furthermore, segment ratios serve as sophisticated analytical tools employed for decision-making in a specific industry. McDonald and Morris (1984) perform empirical testing of the statistical validity of ratio models within a single industry concluding that financial ratio forms support comparisons within industry. Different annual distributions of the same ratio from a single parent population such as companies in the same industry can reasonably be measured from a cross-sectional sample (Lau, Lau & Gribbin, 1995).

Cowen and Hoffer (1982) studied 13 financial ratios for 72 firms in the oil-crude industry spanning from 1967 to 1975. Cowen and Hoffer suggest that inter-temporal
stability of financial ratios exist within a single classification in a homogeneous industry. Financial ratios meet the stated requirement of controlling for organizational size because the numerator and the denominator of a specific financial ratio remain proportional.

Research on financial ratio analysis provides observations of significant regularities for longitudinal studies. Watson (1990) examines the multivariate distributional properties of four financial ratios from a sample of 399 Compustat manufacturing firms for cross-sections of 1982, 1983 and 1984. To obtain approximate multivariate normality, multivariate outliers were deleted. However, these regularities are not necessarily stable over time across the different industries. Similarly, Venkatraman and Ramanujam (1986) concluded from their review of measurement approaches for organizational performance that the proportionality assumption for financial ratios is stronger within an industry than between industries.

For the investigation, data will be drawn within the aerospace industry and financial and performance ratios will be calculated from these indicators. For each aerospace organization, the research will evaluate organizational performance using these ratios and will compare entities within the industry.

As a measure of profitability, net earnings will be applied as the common numerator for all performance measures. The performance measures in this model are financial ratios for Return on Assets (ROA), Return on Equity (ROE) and Return on Investment (ROI). A financial ratio is of the form X/Y, where X and Y are figures derived from the financial statements. All three ratios use net earnings, also named net profit or
profit after taxes, as the X figure representing the measure of return. To provide a performance indicator these ratios are commonly expressed in percentage format. The main sources to obtain these ratios are financial statements such as income, cash flow, balance sheet and funds flow.

### 3.4.1.2 Return On Assets (ROA)

The ROA percentage provides a performance indicator of how effectively the organization generated revenue from all assets available (Barney, 2002). ROA will be defined as a measure of return on total investment in the firm, and will be calculated as:

\[
\text{ROA} = \frac{\text{profit after taxes}}{\text{total assets}}
\]

After-tax ROA is a measure of current returns. While discussions concerning appropriate measures of firm profitability are widespread in the literature (Venkatraman & Ramanujam, 1986), ROA is a widely used profitability measure (Roberts, 1999). Although the number will vary widely across different industries, ROA becomes a useful indicator for comparing competing companies in the same industry. Organizations in the aerospace industry will yield a low return on assets owing to the expensive assets and capital required to maintain these assets.
3.4.1.3 Return On Equity (ROE)

The ROE percentage provides a performance indicator of how well a company used reinvested earnings to generate additional earnings (Barney, 2002). ROE will be defined as a measure of return on total equity investment in the firm and will be calculated as:

\[ \text{ROE} = \frac{\text{net earnings}}{\text{total stockholder equity}} \]

ROE shows the rate of return on the investment made by the owners of the company also known as the company's stockholders or common shareholders.

3.4.1.4 Return On Investment (ROI)

The ROI is calculated by dividing net earnings by long-term debt plus equity yielding a ratio of the amount gained (positive) or lost (negative), relative to the basis. Referred to as net profit in financial statements, net earnings are defined as profit after taxes and the investment base is defined as long-term debt and other long-term liabilities added to total shareholders’ equity (Capon, Farley & Hoenig, 1990). The ROI formula is:

\[ \text{ROI} = \frac{\text{profit after taxes}}{\text{long-term debt and equity}} \]

ROI demonstrates how much return management has earned from available
long-term capital. The calculation is used for decisions on a proposed investment and to determine whether the stockholders will earn a profit or assume a loss. There is evidence suggesting that the ratio is the most widely used to measure profitability from capital investment (Jacobsen, 1988; Capon, Farley & Hoenig, 1990; Samiee & Roth, 1992).
3.5 The Management System Construct

To classify data from textual sources, the content analysis technique will be applied toward assessing the management system design. Content analysis is defined by Krippendorff (2004) as a research technique for making replicable and valid references from data to their contexts. By searching for structures and patterned regularities in the text, the researcher can make inferences on the basis of these regularities. Though the technique was regularly performed in the early part of the 20th century, it became a more credible and frequently used research method after the mid-1950s. Content analysis is used in many fields because the method can be applied to any piece of writing or recorded communication (Weber, 1990). The content analyses approach will be applied at three levels (sentences, concepts and semantic relationships) in order to capture the desired information from the text forms such as 10K annual reports, industry reports, business plans, news releases and leadership biographies. Information will be obtained for each of the aerospace firms from multiple data sources covering years between 1991 and 2005. The selected time period includes significant changes in the industry including mergers and acquisitions of aerospace companies.

For each data source with textual information, all words related to the management system design will be noted and categorized. The text or related phrase will be coded and tabulated as an instance that supports the defined concept. Following
the general principles put forth by Krippendorff (2004), the analysis proceeds with identification of each organizational management system design with one state based on the coding scheme developed to classify the data. Using several different sources of information and applying a corroboratory mode provides triangulation and converging lines of inquiry toward assessing the management system design as either prescriptive or descriptive (Yin, 1994).

Content analysis is not an easy task nor does it rely on simple counts of word frequency. To address distortions from personal bias and to ensure that content analysis reflects the context presented, all coded determinations will be based upon a set of simple rules. Rules will match theoretical logic consistent with management scholar definitions of factors affecting management system design and by examining their stated conditions (Weber, 1990; Ketchen, Thomas & McDaniel, 1996).

Consequently, management system design will be the sampling unit for the present content analysis.

Documents and information from different data sources will be converted into a portable data file format and merged into a single file. Using Adobe Acrobat 7.0, the integrated text will be searched with selected terms. Search results will be displayed in a window specially formatted to highlight the text and serve as pointer for actual location in the document. A sentence will be defined as the context unit for each match of selected terms. After pulling up the sentence in which that word was used, the search results will be examined for context since a string could have more than one meaning.

To remove any ambiguities that might be present, a concordance of the text unit
will be made to the unique patterns previously defined for management system design based on the literature review. Finally, valid results will be categorized between either a prescriptive or descriptive entry.

With the content analysis results, the final value will be determined with the proportion of descriptive entries among the categorized entries. The management system design measure will be labeled MS Design and will have a range from 0 to 1. For values of 0.5 and above the design will be categorized as descriptive and coded as 1. A prescriptive design will have values less than 0.5 and will be coded as 0. To measure management system design, the result will be a coded value per observation for each organization during the study period.

3.5.1 Management System Design Hypothesis Testing

As presented in the research model introduced in section 3.3, hypothesis 1 states that:

H1: As the organization adapts to changes, a descriptive management system design provides higher levels of organizational performance over a prescriptive management system design.

The hypothesis will explore the relationship from the research model as illustrated in figure 11 as a sub-model:
The starting point is the hypothesis that the fit level has an effect on organizational performance. Performance data will be collected to form a multi-dimensional perspective on organizational performance with measures of return on assets (ROA: operating income / assets), return on equity (ROE: operating income / equity) and return on investment (ROI: net earnings / long-term debt plus equity). The three dependent variables are generally accepted measures of financial and market based organizational performance (Capon, Farley & Hoenig, 1990).

The first hypothesis has three sub-hypotheses statements. The hypothesis will test the theoretical relationship between each of the three performance variables and the Management System Design. The three sub-hypotheses statements are:

- **H1a**: An organization is more likely to have higher levels of ROA when the management system design is descriptive.
H1b: An organization is more likely to have higher levels of ROE when the management system design is descriptive.

H1c: An organization is more likely to have higher levels of ROI when the management system design is descriptive.

These statements propose that there may exist a positive relationship between a management system with descriptive design and the selected measures for performance. Relating to the research question to be tested, the null hypothesis assumes no difference between measures for organizational performance for both management system designs. To test these propositions, the coded data for management system design will be segmented between prescriptive and descriptive observations for all organizations. The segments will be tested to determine if higher levels of ROA, ROE and ROI are associated with management systems found to have a descriptive design.


3.6 The Fit Construct

The fit concept in the research model is based on the systems approach (Drazin & Van de Ven, 1985). A fit based on the systems approach utilizes organizational patterns that “are internally consistent” (Drazin & Van de Ven, 1985; p. 521).

Lev (1969) demonstrates in a longitudinal analysis that industry averages may serve as targets for financial ratios and argues for ratio homogeneity within an industry sector. While a particular financial indicator might have significant variability over the broad cross section of companies, there is evidence on similarity of financial characteristics for companies within sectors.

Lee (1985) supports the idea that inferences on the organization’s financial structure may be drawn directly from the financial ratio by comparing the ratio with an industry benchmark. In this case, the preferred benchmark will be the mean of the financial ratios for companies operating in the aerospace industry during the study period.

Numerous algorithms exist for partitioning the collected data for fit. Prior research cautions that hierarchical and K-means segmentation approaches suffer from partitions made from unknown sample structure, and they become difficult with increasing sample size (Punj & Stewart, 1983; Milligan & Cooper, 1985). A binary approach can be used to categorize fit into homogeneous groups in terms of use of the a priori segmentation approach.
Used among researchers and practitioners, a binary clustering approach has a number of advantages (Myers & Tauber, 1977). Binary clustering partitions data into mutually exclusive, exhaustive and measurable segments (Kotler, 1988). A priori binary data segmentation takes place according to a criterion that is expected to cause heterogeneity among observations and operationally useful segments (Milligan & Cooper, 1985). Prior to starting the data collection, the segmentation procedure defines the threshold value to segment binary data for the study.

A combination of coded measures from the management system design and the three organizational factors will operationalize the fit construct. A binary indicator will be determined if whether or not there is fit for the combination of the management system design and each organizational factor, strategy, structure and lifecycle.

The relationship between management system design and each organizational factor will be coded according to the states shown in the following figure and table:

![Figure 12. Fit States Diagram](image)

Figure 12. Fit States Diagram
Table 12. Fit States for Organizational Factors and MS Design

<table>
<thead>
<tr>
<th>State</th>
<th>Organizational Factor</th>
<th>Management System Design</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Fit</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>Unfit</td>
</tr>
<tr>
<td>3</td>
<td>-1</td>
<td>0</td>
<td>Unfit</td>
</tr>
<tr>
<td>4</td>
<td>-1</td>
<td>1</td>
<td>Fit</td>
</tr>
</tbody>
</table>

The data must be appropriately analyzed to answer if there are significant differences in organizational performance between the organizations with fit and those that are unfit (Drazin & Van de Ven, 1985; Dimitriadou, Dolnicar & Weingessel, 2002). For each segment coded as either fit or unfit, descriptive statistics will be determined and graphical representations will be examined.

3.6.1 Fit Hypothesis Testing

To test for fit, hypothesis 2 states that:

H2: Correct fit state leads to an increase in organizational performance.

The hypothesis will test the relationship between fit and organizational performance as illustrated in the following figure based on the research model:
The second hypothesis has three sub-hypotheses statements to test each performance measure. These are:

H2a: Correct fit state leads to an increase in return on assets.
H2b: Correct fit state leads to an increase in return on equity.
H2c: Correct fit state leads to an increase in return on investment.

All four statements propose that there may exist a positive relationship between the expected fit level and the selected measures for performance. Each sub-hypotheses statement will be tested for three combinations of organizational performance and management system design.
3.7 The Strategy Construct

Organizational strategy deals with decisions to insure long-term profit maximization and increased returns to its stockholders. The decisions at the organizational level entail resource allocation to each of the business segments. Aspesi & Vardham (1999) studied strategy implementation and the alignment between corporate strategy and corporate strengths involving 40 companies in the energy and pharmaceutical industries. Defining excellent strategy implementation as top quartile shareholder returns, Aspesi & Vardham (1999) case studies found that 60% of the companies studied delivered excellent results from strategy implementation.

The dimensions of the strategy construct capture the uncertainty element of the environment predominantly used in strategic management research (Steiner, 1979; Bourgeois, 1980; Miler, 1992; Sink & Poirier, 1999). Measures considered to operationalize strategy were business diversification, customer orientation and debt to equity ratio. As a consequence of numerous mergers and acquisitions, the number of aerospace organizations in the market reduced during the study period. Measures for business diversification and customer orientation were discarded because mergers and acquisitions were primarily between aerospace companies and the customer base stayed relatively stable for the study period (AIAA, 2005; 2006).

Strategy at the organizational level will be operationalized using the ratio between the measures of long-term debt and shareholder's equity. Hax and Majluf
(1991) argue that adjustments to the debt, equity or their ratio reflect the strategic actions implemented by the organization toward internal and external positions and processes. Dess and Davis (1984) suggest that the use of such ratio as a measure for strategy is essential in capturing the systematic risk that the organization is exposed to and achieving competitive advantage for their operations, resources and capabilities. The annualized measures of long-term debt and shareholder’s equity for the time period 1991 to 2005 will be used to determine the organizational strategy.

3.7.1 Strategy to Management System Design Fit

To study the fit between the strategy and management system design, industry specific long-term debt to equity ratio will be used to determine the organizational strategy. Almazan and Molina (2005) analyzed 1,146 firms within 73 industries for the differences among their long-term debt to equity ratios within industries and to relate these differences to industry characteristics. For the time period 1992–2000, the study findings suggest that competition reduces differences in capital structures within industry such as the long-term debt to equity ratios. For the aerospace industry, the average and dispersion of the long-term debt to equity ratios are consistent with Almazan and Molina (2005).

The annual long-term debt to equity ratio for the aerospace industry was collected for the time period 1991 through 2005 to determine a single measure for average long-term debt to equity ratio for the investigation from the AIAA and Mergent
data sources. To code each strategy observation into a binary state, a threshold value was determined from the calculated value of long-term debt to equity ratio. Each organization will be classified as either above or below the set up threshold. For the selected time period, 0.403 is the average long-term debt to equity ratio set as threshold for coding. Observations equal or above 0.403 will be coded as 1 and labeled as a leading strategy. Otherwise, the observations will be coded as 0 and labeled as a lagging strategy. The following table describes the combinations and results:

<table>
<thead>
<tr>
<th>State</th>
<th>Strategy</th>
<th>Management System Design</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 - Leading</td>
<td>0 - Prescriptive</td>
<td>Unfit</td>
</tr>
<tr>
<td>2</td>
<td>1 - Leading</td>
<td>1 - Descriptive</td>
<td>Fit</td>
</tr>
<tr>
<td>3</td>
<td>-1 - Lagging</td>
<td>0 - Prescriptive</td>
<td>Fit</td>
</tr>
<tr>
<td>4</td>
<td>-1 - Lagging</td>
<td>1 - Descriptive</td>
<td>Unfit</td>
</tr>
</tbody>
</table>

### 3.7.2 Management System-Strategy Fit Hypothesis Testing

The relationship between management system design and strategy will be coded according to the states shown in the following figure:
A fit state from the combination of organizational strategy and management system design is hypothesized to have a positive relationship. The following statements will be used to test the relationship between organizational strategy and management system design:

- **H3**: Organizational strategy will exist in between the leading and lagging extremes. A state of fit between the Organizational Strategy and the Management System Design will be positively associated to successful performance.

- **H3a**: A state of fit between the Organizational Strategy and the Management System Design will be positively associated to have higher levels of ROA.

- **H3b**: A state of fit between the Organizational Strategy and the Management System Design will be positively associated to have higher levels of ROE.

- **H3c**: A state of fit between the Organizational Strategy and the Management System Design will be positively associated to have higher levels of ROA.
System Design will be positively associated to have higher levels of ROI.

These hypotheses will test the strategy to management system design fit and their relationship to organizational performance as illustrated in the following figure based on the research model:

![Figure 15. Strategy Fit Factors Research Sub-model](image)

The third hypothesis has three sub-hypotheses statements to test each performance measure. All four statements propose that there may exist a positive relationship between the fit states for the selected measures for performance. A fit state will exist either with a leading strategy aligned to a descriptive management system design or when the strategy level is lagging and aligned to a prescriptive management system design. Each sub-hypotheses statement will be tested for combinations of organizational strategy and management system design for all each performance measures. To test these propositions, the coded data for each combination of
organizational strategy and management system will be segmented between fit and unfit observations for all organizations. The segments will be tested to determine if higher levels of ROA, ROE and ROI are associated with strategy and design matching the expected state for each combination.
3.8 The Structure Construct

From empirical research, Galbraith (1973) concludes that there is no one best way for designing organizations and structuring of organizations. Galbraith acknowledges the diversity in organization designs and respective management systems by suggesting that a single way of organization design is not equally effective in all circumstances. During the study period of 1991-2005, the aerospace industry sales increased while numerous aerospace organizations completed mergers and acquisitions to integrate their operations, resources, and capabilities with the expectation that together they might create a stronger competitive advantage.

The structure construct will combine general and administrative (G&A) expenses and total net sales per year to measure internal and external mechanisms designed to handle the environmental forces acting on the organization. Miles and Snow (1994) expose the relationship between the core operating logic and the organization’s structural form viewed from an internal arrangement and external orientation. For competitive performance, the operating logic from management processes and structural design must meet the demands, and cope with the increasing rates of change (Ashkenas, 1995).

Reported on the income statement, the G&A expenses are the sum of all direct and indirect selling expenses and other general expenses of a company. The organization incurs G&A expenses that cannot be directly linked to a specific final
product or service, but which are proportionally allocated to all outputs during a certain period. Net sales per year, also called net revenue, include income from sales of goods and services, minus returns, discounts, allowances, and the cost associated with products returned or undelivered. The G&A expenses as a percentage of sales will be compared to other companies in the same industry. The comparison provides a measurement of organizational efficiency associated to the structure and whether the structure aligns to the management system interfaces established for organizational operation.

3.8.1 Structure to Management System Design Fit

An organization must control expenses and reduce corporate overhead to realize financial gains and to improve their ability to secure additional funding (Mintz, 1999). The study will employ established financial measures for comparison of general and administrative expense items as a percentage of net sales across firms within an industry or over time for a specific firm (White, Sondhi & Fried, 1997; Banker & Johnson, 1993; Lazere, 1996; Calabro, 2004). For percentages below 14.7, the measure will be coded as 1 meaning that the structure is loose. For percentages above 14.7, the measure will be coded as -1 to represent a rigid structure.

The structure will be measured with the G&A expenses divided by total net sales. The following table describes results for combinations of structure and management system design:
Table 14. Fit States for Organizational Structure and MS Design

<table>
<thead>
<tr>
<th>State</th>
<th>Structure</th>
<th>Management System Design</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 - Loose</td>
<td>0 - Prescriptive</td>
<td>Unfit</td>
</tr>
<tr>
<td>2</td>
<td>1 - Loose</td>
<td>1 - Descriptive</td>
<td>Fit</td>
</tr>
<tr>
<td>3</td>
<td>-1 - Rigid</td>
<td>0 - Prescriptive</td>
<td>Fit</td>
</tr>
<tr>
<td>4</td>
<td>-1 - Rigid</td>
<td>1 - Descriptive</td>
<td>Unfit</td>
</tr>
</tbody>
</table>

3.8.2 Management System-Structure Hypothesis Testing

The relationship between management system design and the organizational factor for structure will be coded according to the states shown in the following figure:

![Figure 16. Management System – Structure Fit States Diagram](image)

A fit state from the combination of organizational structure and management system design is hypothesized to have a positive relationship. A fit state will exist either
with a loose structure aligned to a descriptive management system design or when the structure is rigid and aligned to a prescriptive management system design. The following statements will be used to test the relationship between organizational structure and management system design:

- **H4**: Organizational Structure will exist in between the rigid and loose extremes. A state of fit between the Organizational Structure and the Management System Design will be positively associated to successful performance.

The fourth hypothesis has three sub-hypotheses statements to test each performance measure:

- **H4a**: A state of fit between the Organizational Structure and the Management System Design will be positively associated to have higher levels of ROA.
- **H4b**: A state of fit between the Organizational Structure and the Management System Design will be positively associated to have higher levels of ROE.
- **H4c**: A state of fit between the Organizational Structure and the Management System Design will be positively associated to have higher levels of ROI.
These hypotheses will test the structure to management system design fit and their relationship to organizational performance as illustrated in the following figure based on the research model:

![Diagram](image)

Figure 17. Structure Fit Factors Research Sub-model

All four statements propose that there may exist a positive relationship between the structure level and a descriptive management system design for the selected measures for performance. Each sub-hypotheses statement will be tested for combinations of organizational structure and management system design for all each performance measures. To test these propositions, the coded data for each combination of organizational structure and management system will be segmented between fit and unfit observations for all organizations. The segments will be tested to determine if higher levels of ROA, ROE and ROI are associated with structure and design matching the expected state for each combination.
3.9 The Lifecycle Construct

Numerous researchers have argued and empirically examined the concept that organizations evolve in a consistent and predictable manner through various stages of development (Greiner, 1972; Quinn & Cameron, 1983; Churchill & Lewis, 1983; Tushman & Romanelli, 1985; Adizes 1999). The concept suggests that organizations have finite lives. Even though researchers differ as to the number of organizational stages, common lifecycle characteristics exist.

An organization goes through various relatively stable evolutionary stages that are separated by periods of revolution or dramatic changes (Greiner, 1972; Tushman & Romanelli, 1985). As the organization grows and matures, management struggles between the dichotomy of organizational flexibility and controllability (Quinn and Cameron, 1983; Churchill & Lewis, 1983). Management makes choices based on the tasks and conditions associated with each stage to maintain a balance between growth and controllability. Managers can extend the lifecycle by identifying significant forces in the environment, driving organizational change and allocating resources to control forces driving change (Adizes, 1999).

The literature on lifecycle characteristics can be categorized into the four stages presented in the research model. The stages of introduction, growth, maturity, and decline/renewal have predictable patterns of sequential and progressive behavior associated with each organization's lifecycle stage. However, the study will be limited to
the measurement of growth and decline as distinct stages.

To observe organizational lifecycle changes through stages, the study will span several years. Some researchers argue that organizational studies should encompass at least three years to detect possible lifecycle changes (Quinn & Cameron, 1983; Adizes, 1999). Over the selected period, 1991-2005, sales increased while total industry employment declined substantially. Also, the disarmament following the end of the Cold War changed the relative contributions of military and civil markets to the aerospace industry sales.

Average growth in net sales over the last three years will be selected to reflect the past actions and modes of organizational behavior for companies within the sample. To calculate the lifecycle, a three year average sales growth will be used to obtain a single measure of organizational lifecycle. Capon, Farley and Hoenig (1990) analyzed statistical results in the literature from 320 studies published between 1921 and 1987 on organizational, strategic and environmental factors related to financial performance. They found that there is a positive relationship between financial performance and growth in revenue and assets. The study will examine the organizational lifecycle variables with a measure of average revenue growth for the previous three years. A positive value for average revenue growth will be categorized as growth. Conversely, a negative value for average revenue growth will be categorized as decline.
3.9.1 Lifecycle to Management System Design Fit

Researchers recognize the complex and difficult choice in operationalizing lifecycle. For an organization, specific types of organizational growth measures considered include variables like growth in assets or number of new products introduced in the market. However, these measures may have the disadvantage of variation across firms in different industries. Average sales and the number of years since founding are more generally applicable measures that can make full use of the longitudinal aspects of the data (Capon, Farley & Hoenig, 1990).

The study will employ the average net sales over the last 3 years as an established measure for the lifecycle independent variable. The difference in net sales for the two preceding years and the current year were calculated, divided by the most recent year and then averaged across the 3 year time period to obtain a single measure of the organizational lifecycle for every year between 1991 and 2005.

For percentages above zero from a 3 year average on net sales, the measure will be coded as 1 meaning that the lifecycle state is growth. For percentages below zero, the measure will be coded as -1 to representing a decline lifecycle.

Combinations of organizational lifecycle and management system design and resulting fit state follows:
Table 15. Fit States for Organizational Lifecycle and MS Design

<table>
<thead>
<tr>
<th>State</th>
<th>Lifecycle</th>
<th>Management System Design</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 - Growth</td>
<td>0 - Prescriptive</td>
<td>Unfit</td>
</tr>
<tr>
<td>2</td>
<td>1 - Growth</td>
<td>1 - Descriptive</td>
<td>Fit</td>
</tr>
<tr>
<td>3</td>
<td>-1 - Decline</td>
<td>0 - Prescriptive</td>
<td>Fit</td>
</tr>
<tr>
<td>4</td>
<td>-1 - Decline</td>
<td>1 - Descriptive</td>
<td>Unfit</td>
</tr>
</tbody>
</table>

3.9.2 Management System-Lifecycle Hypothesis Testing

The relationship between management system design and lifecycle will be coded according to the states shown in the following figure and table:

Figure 18. Management System – Lifecycle Fit States Diagram

A fit state from the combination of organizational lifecycle and management system design is hypothesized to have a positive relationship. A fit state will exist either
with a growth lifecycle aligned to a descriptive management system design or with a
decline lifecycle aligned to a prescriptive management system design. The following
statements will be used to test the relationship between organizational lifecycle and
management system design:

- H5: Organizational Lifecycle will exist in between the growth and decline
  extremes. A state of fit between the Organizational Lifecycle and the
  Management System Design will be positively associated to successful
  performance.

The fifth and final hypothesis has three sub-hypotheses statements to test each
performance measure:

- H5a: A state of fit between the Organizational Lifecycle and the
  Management System Design will be positively associated to have higher
  levels of ROA.
- H5b: A state of fit between the Organizational Lifecycle and the
  Management System Design will be positively associated to have higher
  levels of ROE.
- H5c: A state of fit between the Organizational Lifecycle and the
  Management System Design will be positively associated to have higher
  levels of ROI.
These hypotheses will test the lifecycle to management system design fit and their relationship to organizational performance as illustrated in the following figure based on the research model:

Figure 19. Lifecycle Fit Factors Research Sub-model

All four statements propose that there may exist a positive relationship between the lifecycle level and a descriptive management system design for the selected measures for performance. Each sub-hypotheses statement will be tested for combinations of organizational lifecycle and management system design for all performance measures. To test these propositions, the coded data for each combination of organizational lifecycle and management system will be segmented between fit and unfit observations for all organizations. The segments will be tested to determine if higher levels of ROA, ROE, and ROI are associated with lifecycle and design matching the expected state for each combination.
3.10 Data Collection

The investigation requires a design that would satisfactorily consider the trade-offs with respect to the efficiency of data collection techniques and time span of the data. For case studies, Yin (1994) argues that capturing both rapid and evolutionary changes requires archival data collection spanning over a long period of time. Rules for data classification will be developed and tested prior to their application to the study data. Archival data collection from several sources will be used in the investigation to determine organizational characteristics, performance, and management system design.

3.10.1 Level of Analysis

The level of analysis entails organizations as the unit of analysis with single business firms and the particular segments of multi-business firms that operate within the aerospace industries. Observations from the selected sample will be collected for each year during a 15 year time period.

3.10.2 Sample

The organizations for this study will be drawn from the population of firms in the aerospace business within the United States. Hypotheses will be tested using
longitudinal data over 15 one-year periods (1991–2005) on publicly traded firms. Data collected from sources such as Mergent, Hoovers, and COMPUSTAT will be obtained starting with year 2005 and preceding years. To be included in the sample, organizations must be publicly traded companies in a U.S. stock market reporting revenues from their aerospace products and services.

Scholars argue that the relationship between the external environment and dominant organizations mutually influence and reinforce each other to the detriment of smaller organizations competing for business (Emery & Trist, 1965; Duncan; 1973; Pfeffer, 1982; Romanelli, 1991; Galbraith, 1995). The U.S. aerospace business is dominated by five companies with revenues exceeding 76% of the total market for 2005. Publicly traded companies with less than $250 million in revenue are categorized as small companies in the aerospace business segment (Hass, Burnaby & Bierstaker, 2005). For U.S. publicly traded companies, regulations and available business finance programs differ with revenues of less than $250 million (SEC, 2006).

To enter the Fortune 1000 listing, companies must be publicly traded for at least three years on a U.S. stock exchange and must reach at least $500 million market capitalization (Fortune, 2006). For 2005, the last entry at position 1000 easily surpassed this entry level with revenues of $1,429 million. Organizations with revenues equal to or more than $250 million for 2005 will be considered in the study. For 2005, the US aerospace industries generated $170 billion in revenues (Napier, 2006). Companies with revenues of less than $250 million, representing 0.15% of the total aerospace market for 2005, will be excluded from the study.
To meet the revenue condition, organizations with a 33641 North American Industrial Classification System (NAICS) code will be identified and only those with revenue greater than $250 million will be included in the sample. Before NAICS, the U.S. government used the SIC (Standard Industrial Classification) codes to track national economic statistics. Although NAICS provides a more comprehensive system, the selected online databases have the option of searching organizations by SIC codes. The SIC codes applicable to the aerospace industry are:

- 3721 Aircraft
- 3724 Aircraft engines and engine parts
- 3728 Aircraft parts and auxiliary equipment
- 3761 Guided missiles and space vehicles
- 3764 Space propulsion units and parts
- 3769 Space vehicle equipment, not elsewhere classified

To test the hypothesis, an information database will be developed from eligible organizations meeting the selection criteria. An initial list of organizations with any operations in the aerospace industry within the United States will be compiled. Private aerospace companies will be excluded from the list. To identify the aerospace firms meeting the selection criteria, Gale Business & Company Resource Center was selected as the source with a large database featuring the most comprehensive search capabilities compatible with the study. An initial list of potential organizations prepared
on April 2006 included 29 publicly traded companies located within the United States. After removing those companies with revenues less than $250 million for 2005, the initial list reduced to 21 firms. In 2001, Rockwell-Collins initiated their operations as a totally new company. Similarly, L3 Communications was founded in 1997. Both companies were removed from the list of eligible companies with continuous operations in the aerospace industry between 1991 and 2005. Generating over 97% of the revenues for the total market in 2005, the final list comprises 19 companies with operations in the aerospace industry within the United States.

3.10.3 Observations

To prepare the study database, observations will be collected from all 19 eligible organizations in the aerospace industry. The database will be compiled with information drawn from sources such as EDGAR, COMPUSTAT, Mergent, Hoovers, Gale, Fortune, Aerospace Industries Association of America, and other sources with multiple year data. Data requirements for selected sources include availability of financial statements and corporate information for each organization during the period from 1991 through 2005. To calculate average revenue growth, an additional two years will be required for a time total span from 1989 to 2005. The final database will include all direct measures and information used to determine calculated measures.

For all eligible companies, the study will collect an observation for each measure per year during the period from 1991 through 2005 for a total of 15 observations. For
each measure, a total of 285 observations will be generated from all 19 aerospace industry companies in the sample for the 15 years study span.

3.10.4 Why Aerospace?

The U.S. aerospace industry is one of the most unique industries of the American economy. Aerospace and Defense is part of the fourth largest sector in the S&P 500 stock market index composing 11.8% of the index value.

The United States employs nearly one-third of all scientists and engineers and accounts for one-third of global research and development spending (NSF, 2006). Aerospace industry is unique in utilizing a large pool of scientific talent and combining complex production with high technology research activities (Canning, 1992). The aerospace industry allocates more money on research and development activities than any other sector of the American economy (NSF, 2006). Primary customers for the aerospace industry include airlines on the commercial side and the U.S. government on the military side (AIAA, 2005).

As a major buyer of aerospace products and services for defense programs, the U.S. government can use their buying power to influence the size, structure, conduct and performance of the aerospace industry. The government also exercises control over exports, regulates the capital market, and influences firm ownership and support for the aerospace market.
3.10.5 Why Single Industry?

In 2003, U.S. high-technology industry accounted for more than 42% of the global value (NSF, 2006). Montgomery (1985) states that industry structure affects organizational performance. Companies within the aerospace industry in the United States share a common environment while maintaining a long leading position in the global marketplace. The U.S. aerospace industry dominates the world market with over 60% on the basis of sales reaching a record level of $170 billion in 2005 (AIAA, 2006).

A longitudinal study of the U.S. aerospace industry offers an opportunity to test the hypotheses in the environmental context of technological change and uncertainty. Since the mid 1980s, the aerospace industry had been undergoing technological changes, dramatic mergers and acquisitions, and reduced defense contracts after the communist block collapse.

For the study period, several mergers and acquisitions involved organizations within the aerospace industry and related industries. Datta, Rajagopalan and Rasheed (1991) argue that the efficiency in integrating operations and core skills obtained in related diversification offset the costs and the smaller variances in revenues generated by unrelated diversification. Rumelt (1985) suggests that selecting the right strategy for diversification with related organizations could lead to better performance. Montgomery (1985) claims that managers must link firm diversification to performance with strategic logic.
3.10.6 Why Longitudinal?

The collected data from a variety of sources will be studied using longitudinal data and content analysis methods. Longitudinal data methods have been extensively applied in research and published in the literature (McPhee, 1990). Sources for the longitudinal data will include documentation and archival records (Yin, 1994). Documentation sources will include financial reports, administrative documents, proposals, progress reports, internal documents, and agendas. Archival records sources will include organizational records, organizational charts, legal filings, and historical records.

Pettigrew (1990) argues that organizational research with longitudinal comparative case study to explore the context, content and process of change is theoretically sound and practically useful. The research model interconnects the independent variables in organizational settings that will be used to explore their effect on fit for a time-series research in the past and present performance.

By applying longitudinal data analysis, the research will benefit from the combination of regression and time-series analysis (Jensen & Rodgers, 2001). By collecting longitudinal data the research will produce observations for a cross section of the aerospace organizations over time. Unlike time-series data, multiple organizations can be observed within the same data collection model. Over time these observations from a cross section of organizations will allow the study of dynamic aspects on the fit construct and effects on organizational performance.
The vast majority of organizational empirical research has been limited to a simple point in time and conducted to gather cross sectional data to establish correlations based on strict assumptions (Mcphee, 1990). While partially missing data, a problem that has to be dealt with in data analysis, it is aggravated when the data are longitudinal. However, investigation on the organizational lifecycle requires a longitudinal research design with duration to cover the time period necessary to observe for punctuated change and equilibria (Tushman & Romanelli, 1985).

Scholars address the issue of theoretical time specification by developing research design to correspond to current knowledge in organizational science. Although the study will cover 15 years, there is no precise time specification to establish the pattern duration for each stage of organizational lifecycle (Adizes, 1999). Therefore it can at least to some extent handle the problem that the time span will include cases at different stages of development when sampled. At specific times within the 15 years, the research model will be used to gather different-data points for each independent variable to measure for fit and organizational performance.
3.11 Data Sources

Multiple sources will be used to obtain the necessary information for measures. San Miguel (1977) compared the information in the COMPUSTAT database with the information contained in financial reports submitted to the Securities and Exchange Commission. Comparisons indicated numerous inaccuracies between these sources of financial information suggesting the use of multiple sources for data items where differences are found. Errors in observations include data entry mistakes and calculations based on the incorrect formula or factors. In order to overcome the potential information errors and deficiencies in reliability that might arise from drawing information from any single source, the study will use multiple sources of overlapping data to triangulate information and reduce errors toward assessing measures (Jick, 1979). When inaccuracies are detected, the value of the observation will be determined and replaced with correct information from the available data sources.

Several data sources will be reached to find the information relevant for the study. The investigation data sources include the Securities and Exchange Commission disclosures in EDGAR, COMPUSTAT, Mergent, Hoover's Online, Gale, Fortune 500, Aerospace Industries Association of America (AIAA), and company websites. A brief overview of data sources will follow with the approach taken to extract the relevant information for the integrated study database.
3.11.1 EDGAR

EDGAR is the Electronic Data Gathering, Analysis, and Retrieval system. For public companies, the U.S. Securities and Exchange Commission (SEC) requires filing registration statements, periodic reports, and other forms electronically through EDGAR. The EDGAR system performs automated collection, validation, indexing, acceptance, and forwarding of submissions by all companies and other organizations required by law to file forms with the SEC. EDGAR includes search capability for key words in records and annual statement text data such as the management's discussion, president's letter, exhibits, and financial statement footnotes. Documents available for retrieval in EDGAR start with filings required for the year 1994.

3.11.2 COMPUSTAT

Started in 1957, the Standard & Poor's (S&P) 500 is a list of 500 publicly held U.S. companies ordered by market capitalization. Companies listed reflect the U.S. stock market and trade on major U.S. stock exchanges such as the New York Stock Exchange and NASDAQ. Owned and maintained by S&P, COMPUSTAT files provide annual and income statement, balance sheet, statement of cash flows, and supplemental data items on actively traded and inactive companies.

Updated annually, COMPUSTAT Current Data file covers financial information for the most recent 20 years. The Research file contains companies that have been
deleted as a consequence of bankruptcy, acquisition or merger, leveraged buyout, or after privatization. The Industrial file contains the largest companies on the New York and American Stock Exchanges and industry segment information in the Business Information file.

### 3.11.3 Mergent

Mergent databases include business information and financial data on more than 15,000 publicly listed U.S. companies. The Mergent research tools include EventsData, a web-based reporting of corporate actions and events, and U.S. Corporate Executive Biographies, a management team insight with in-depth access to corporate information on over 200,000 executives of publicly listed U.S. companies. Content analysis will be applied to Mergent databases to identify decision-making authority for corporate executives, to investigate and expand on management system controls and access information on significant organizational changes. Mergent limits the retrieval of financial information to the previous 15 years starting from the query date.

### 3.11.4 Hoover’s Online

Hoover’s, Inc., a Dun & Bradstreet company, provides in-depth coverage about U.S. industries, companies and key decision makers. Hoover’s Online delivers comprehensive company, industry, and market data with access to detailed information
about company's parent, subsidiaries, and/or branch locations, and their relationship within the overall corporate hierarchy. The database search platform includes a list-building capability with access to over 16 million companies and providing information on industries, officers, competitors, and customers. Content analysis will be applied on Hoover’s databases for a comprehensive view of each management system.

3.11.5 Gale

A business of The Thomson Corporation, Gale publishes reference material and maintains the Business & Company Resource Center database. The database provides a wide variety of business information such as company profiles with corporate parent/sibling relationships, industry statistics and rankings, products and brands, and financial data. Additionally, the database provides access to industry news and coverage of business events and trends from 1980 to the present. Records are searchable by criteria such as company name, type of business, geographic area, financial information, full-text fields, subsidiaries, number of shareholders or employees, owners, officers, and directors.

3.11.6 Fortune 500

Published annually by Forbes Magazine, the Forbes 500 keep track of over 4,000 organizations and ranks the top 500 American publicly or privately held
companies by a balanced evaluation of revenues, income, assets, market capitalization and employees. Every year the business magazine publishes the Fortune 1000, a list of the 1,000 largest public American companies ranked on gross revenues.

3.11.7 Aerospace Industries Association of America

Representing the United States major aerospace companies, the Aerospace Industries Association of America (AIAA), compiles annual aerospace facts, figures and statistical review on the state of the aerospace industry.

An annual data book of aerospace facts and figures includes summary data such as a balance sheet and income statement for the industry. The Association publishes quarterly analysis of key economic indicators and aerospace statistics including general industry statistics, employment statistics and, production statistics. Additionally, AIAA publishes reports, periodicals, newsletters and executive reports providing industry insight on issues and important information affecting the aerospace industry.

3.11.8 Integrated Data for Investigation

Merging data from multiple databases is a major challenge. Often data from different sources will be found in the wrong form requiring significant collation and reorganization in order to become useful for the study. To prepare the integrated data, information must be combined, converted, and normalized to make measures
The investigation will employ merged data drawn from multiple sources including electronic databases. The study data requires access to multiple documents within each electronic database with serious difficulties such as the lack of unique company identifier common to all databases. Furthermore, programs developed to manage electronic databases and sources with online information were created for a specific software application. The researcher must be cautious to recognize when information does not share common data formats (McCarthy, 1998).

To identify the correct organization several methods will be used to manually match and merge the data using key information such as the parent company name, address, SIC codes, industry groups, sales, and employment. To properly match the information from data sources to each organization, the investigation will employ the listings in the Standard & Poor's Register of Corporations, Directors, and Executives; Ward's Directory of 50,000 Largest U.S. Corporations; and Thompson Worldscope.

Properly converting the scattered data across multiple programs in a variety of formats will address the challenge of having incompatible sources during data collection to the operationalized study format. The primary sources used to draw data to each construct and related measures is summarized in Table 16.
Table 16. Primary Sources for Integrated Database

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure</th>
<th>Description</th>
<th>Primary Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy direction</td>
<td>debt/equity</td>
<td></td>
<td>Mergent, Hoovers, Compustat, Gale, Edgar, Fortune 500</td>
</tr>
<tr>
<td>Structure type</td>
<td>general and administrative expenses/sales</td>
<td></td>
<td>Mergent, Hoovers, Compustat, Gale, Edgar, Fortune 500</td>
</tr>
<tr>
<td>Lifecycle stage</td>
<td>3 year average sales</td>
<td></td>
<td>Mergent, Hoovers, Compustat, Gale, Edgar, Fortune 500</td>
</tr>
<tr>
<td>Management System</td>
<td>Prescriptive or descriptive</td>
<td></td>
<td>AIAA, Worldscope, Mergent, Hoovers, Compustat, Gale, Edgar, Fortune 500</td>
</tr>
<tr>
<td>Fit state</td>
<td>Fit/unfit</td>
<td></td>
<td>AIAA, Worldscope, Mergent, Hoovers, Compustat, Gale, Edgar, Fortune 500</td>
</tr>
<tr>
<td>Performance</td>
<td>Return on Assets (ROA) net income/assets</td>
<td></td>
<td>Mergent, Hoovers, Compustat, Gale, Edgar, Fortune 500</td>
</tr>
<tr>
<td></td>
<td>Return on Equity (ROE) net income/equity</td>
<td></td>
<td>Mergent, Hoovers, Compustat, Gale, Edgar, Fortune 500</td>
</tr>
<tr>
<td></td>
<td>Return on Investment (ROI) net income/(long-term debt + equity)</td>
<td></td>
<td>Mergent, Hoovers, Compustat, Gale, Edgar, Fortune 500</td>
</tr>
</tbody>
</table>
3.12 Data Analysis

Normality is neither required nor even desirable for explanatory variables (Deakin, 1976). The study will collect data for analysis with a distribution that might include outliers. To make the best inferences possible on organizational performance and fit, neither ignoring nor deleting outliers are acceptable solutions. In fact, outliers might be valid observations and responsible data analysis must be open to explore these anomalies.

3.12.1 Approach to Quantitative Analysis

Statistical analysis procedures will be performed with the computing package SPSS version 14.0 (SPSS, 2005). Procedures will include data cross tabulation, descriptive statistics and non-parametric tests for hypothesis. If applicable, hypothesis testing might involve t-tests. Descriptive statistics will be used to examine the data and to verify the expected non-normal distribution using measures of skewness and kurtosis for coded indicators and performance ratios. For the study database, a cross tabulation procedure will be applied to summarize data, to identify valid and missing cases, and to report association with measures for the correlation between variables.

The binary coding of management system design might not exhibit a normal distribution. A possible solution will be to transform the data to improve symmetry and
to diminish the impact of outliers. Permissible transformations of a measurement scale assume preservation of relevant relationships obtained from the measurement process. However, the method selected for data transformation is arbitrary and might hide other information (Tukey, 1962; So, 1987). Furthermore, data transformations assume that the data will follow a normal distribution when transformed.

To deal with the non-normal distribution of cross sectional financial ratios, the study will be conducted with non-parametric tests for data analysis. As the selected procedure for initial data analysis involves non-parametric tests, the main trade-off is the loss of statistical power. For the study, the fit level will be coded into a dichotomous variable ("fit" and "unfit") to run the analysis. The fit coding and non-normal distribution of financial ratios clearly meets the criteria for running a non-parametric test.

In addition to non-parametric procedures, the investigation will pursue applying more robust tests during data analysis. The central limit theorem states that as the sample size becomes large, the sampling distribution of the mean becomes approximately normal and centered at the population mean of the original variable regardless of the distribution of the original variable (Scheaffer & McClave, 1990). For each dependent variable, the underlying distribution of the data associated with a maximum sample of 285 observations might fulfill minimal conditions necessary to apply parametric t-tests (Cohen, 1992; Zimmerman, 1995).

The number of observations is directly related to power where power is the ability to detect differences in organizational performance for the limited population of aerospace companies in the United States. Effect size refers to the size of the
difference found where the null hypothesis (Ho) for each hypothesis assumes that the
difference is zero. Cohen (1992) defines three effect-size conventions based on
empirical research either as small (0.20), medium (0.50), or large (0.80). In order to
reject the Ho, power should be at least 0.80.

A small effect size extends beyond the investigation research objectives and the
selected case study methodology. In order to understand organizational performance
based on the fit between an organization and the management systems, the
investigation will study medium and large effect sizes limited to organizational
performance for the aerospace industry. For a medium-to-large effect size, 64
observations per management system design category should lead to about 0.8 power
(Cohen, 1992; p. 158). For large effects detection at the 0.8 power, each management
system design category requires 26 observations.

Although an approach to perform quantitative analysis can be described, there
are problems in defining a complete set of operations prior to conducting data analysis.
In some situations, data analysis involves multi-stage operations where decisions to
proceed with alternate procedures stem from results obtained in the early stages of
analysis (Tukey, 1962). The study methodology uses complex reasoning that is
multifaceted, iterative, and simultaneous as strategies of inquiry to answer the research
questions. Different strategies will be applied to address questions and fulfill
investigation objectives. Departing from prior research, concepts were operationalized
to ensure that they were measurable using cross sectional and longitudinal data
collection procedures. Triangulation during data collection will further establish validity
and reliability of research methodology implementation within the defined constructs (Creswell, 2003).

As a non-parametric data analysis procedure, the validity of the Mann-Whitney tests is not affected by whether the distribution of the variable in the population is normal. If all necessary conditions are met, t-test will be applied as the data analysis procedure to compare fit groups and report results. For either normality condition, the investigation will report on applied tests during data analysis and associated results.

### 3.12.2 Hypothesis Testing

For each hypothesis, the null hypothesis (Ho) will state that the predicted relationship for the sample under test does not differ significantly from the population. Alternate hypothesis 1 will involve the fit and unfit states for management system design and the organizational performance. Alternate hypotheses 2, 3, 4 and 5 will involve the fit state relationships with the management system design and organizational factors. The null hypothesis for these five hypotheses assumes that randomness takes place with equal distribution among the categories. If this assumption is correct then the frequencies that fall into the fit and unfit categories are not different from a distribution caused by chance.

A predetermined $\alpha$ decreases the probability of a Type I error of rejecting the null hypothesis when it is true. The term probability value ($p$) is the actual level of significance obtained after the study data have been collected and analyzed. For all
hypothoses, the null hypothesis will be rejected if the $\alpha$ value reach a significance level of $p<0.05$.

The entire set of hypotheses for test is summarized in the following tables:

Table 17. Hypothesis for MS Design and Fit State Factors

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Factor</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1aMS</td>
<td>Management System Design</td>
<td>ROA</td>
</tr>
<tr>
<td>H1bMS</td>
<td>Management System Design</td>
<td>ROE</td>
</tr>
<tr>
<td>H1cMS</td>
<td>Management System Design</td>
<td>ROI</td>
</tr>
<tr>
<td>H2a</td>
<td>Fit state</td>
<td>ROA</td>
</tr>
<tr>
<td>H2b</td>
<td>Fit state</td>
<td>ROE</td>
</tr>
<tr>
<td>H2c</td>
<td>Fit state</td>
<td>ROI</td>
</tr>
</tbody>
</table>

Table 18. Hypothesis for Organizational Fit Factors

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Organizational Factor</th>
<th>Management system</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>H3aMSSA</td>
<td>strategy design</td>
<td></td>
<td>ROA</td>
</tr>
<tr>
<td>H3bMSSA</td>
<td>strategy design</td>
<td></td>
<td>ROE</td>
</tr>
<tr>
<td>H3cMSSA</td>
<td>strategy design</td>
<td></td>
<td>ROI</td>
</tr>
<tr>
<td>H4aMSSU</td>
<td>structure design</td>
<td></td>
<td>ROA</td>
</tr>
<tr>
<td>H4bMSSU</td>
<td>structure design</td>
<td></td>
<td>ROE</td>
</tr>
<tr>
<td>H4cMSSU</td>
<td>structure design</td>
<td></td>
<td>ROI</td>
</tr>
<tr>
<td>H5aMLSC</td>
<td>lifecycle design</td>
<td></td>
<td>ROA</td>
</tr>
<tr>
<td>H5bMLSC</td>
<td>lifecycle design</td>
<td></td>
<td>ROE</td>
</tr>
<tr>
<td>H5cMLSC</td>
<td>lifecycle design</td>
<td></td>
<td>ROI</td>
</tr>
</tbody>
</table>

The first 3 propositions in Table 17 will be tested with the coded data for
Management System Design (MS Design) and segmented between prescriptive and descriptive design categories for all 285 observations. The segments will be tested to determine if higher levels of ROA, ROE and ROI are associated with a descriptive design.

The second set of 3 propositions in Table 17 will be tested with the coded data for fit state and will be segmented between fit and unfit observations for all 285 entries. Each entry will be categorized into two segments from the fit state combination for each organizational factor to management system design. The first segment will be coded as 1 representing the Full Fit category. Full Fit will group entries determined to have a fit state on all three combinations of coded MSSA, MSSU and MSLC. For other combinations of coded fit including entries determined with no fit for any given observation, their entries will be grouped into the second segment (Partial Fit) and coded as 0. These two segments will be tested to determine if higher levels of ROA, ROE and ROI are associated with Full Fit combinations of fit state compared to the Partial Fit state.

To test the propositions in Table 18, the coded data for fit state for each combination of organizational factor and management system will be segmented between fit and unfit observations for all 285 entries. The segments from coded MSSA, MSSU and MSLC entries will be tested to determine if higher levels of ROA, ROE and ROI are associated with fit level found to match the expected state for each combination.
3.12.3 Mann-Whitney Tests

The Mann-Whitney test is a non-parametric test for assessing whether the difference in medians between the two observed distributions is statistically significant (Scheaffer & McClave, 1990). Equivalent to the t-test, the Mann-Whitney test is based on calculating ranks for each observation.

For independent samples divided in two groups, the Mann-Whitney U will report on the locations of one set of scores relative to the locations of the other set of scores. The research will divide observations into two groups as defined in the previous section and test the propositions for all five hypotheses. When the U test statistic is not significant then the rankings of one set of scores are similar to the rankings of the other set of scores.

The Statistical Package for the Social Sciences (SPSS, 2005) calculates the Mann-Whitney U value representing the amount by which the ranks for both groups deviate from the null hypothesis condition of equal means. SPSS then calculates the probability of this U value occurring under the null hypothesis for even distribution of ranks across both groups. At the 0.05 significance level, the null hypothesis can be rejected if the 2-tailed significance is less than 0.05.

The sampling distribution of U approaches a normal curve when the sample sizes for both groups are larger than 20 (Conover, 1980). When both groups surpass this number of observations, SPSS transforms U into a normally distributed z statistic and then compute a normal approximation for p value. Under this condition, the z score
based on the U distribution can be calculated and reported in the SPSS output. With moderate to large sample sizes, the power of the Mann-Whitney tests becomes similar to that of the equivalent two-sample t tests. Specifically, the statistical power reaches about 96% of that of the equivalent parametric t tests for moderate sample sizes (Cohen, 1992).

The Mann-Whitney test will be applied to assess whether the difference in mean ranks for organizational performance from management system design is statistically significant as stated in hypothesis 1. The Mann-Whitney test also will be applied to assess hypothesis 2, 3, 4 and 5 whether the difference in mean ranks for organizational performance from fit level is statistically significant. For all test cases, the null hypothesis is that mean ranks for both populations are equal. A group distribution with identical location as predicted by the null hypothesis will have a z score of 0.

The alternate hypothesis (Ha) is supported when the Ho is rejected. The significance of differences between mean ranks will be determined by applying the Mann-Whitney test procedure with a level set at <0.05. Using the Mann-Whitney procedure in the SPSS statistical package, ±1.96 are the critical z values to test whether to reject the null hypothesis at the <0.05 level of significance. The farther the observed numbers are from their expected values, the larger |z| value will become. Therefore, the rejection rule for the two-tailed test for each null hypothesis is to reject Ho if $z < -1.96$ or if $z > 1.96$.

For the investigation, procedures and conditions for hypothesis testing are summarized in Table 19.
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Test Method</th>
<th>Categories</th>
<th>Condition</th>
<th>Performance prediction</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Mann-Whitney</td>
<td>Descriptive/Prescriptive</td>
<td>All cases</td>
<td>Descriptive &gt; Prescriptive</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>H2</td>
<td>Mann-Whitney</td>
<td>Full Fit/Partial Fit</td>
<td>All cases</td>
<td>Full Fit &gt; Partial Fit</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>H3</td>
<td>Mann-Whitney</td>
<td>Leading/Lagging</td>
<td>Design = Descriptive</td>
<td>Fit &gt; Unfit</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>H4</td>
<td>Mann-Whitney</td>
<td>Loose/Rigid</td>
<td>Design = Descriptive</td>
<td>Fit &gt; Unfit</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>H5</td>
<td>Mann-Whitney</td>
<td>Growth/Decline</td>
<td>Design = Descriptive</td>
<td>Fit &gt; Unfit</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Non-parametric tests: Mann-Whitney (α = 0.05, a significance level of p<0.05)
If applicable, parametric tests: t-test (α = 0.05, a significance level of p<0.05)
CHAPTER FOUR: FINDINGS

4.1 Data Collection

Data collected from all sources consisted of quantitative and qualitative data. The quantitative data analysis and testing of all propositions presented in Chapter 3 involved the use of the Statistical Package for the Social Sciences (SPSS, 2005) computer program for statistical analysis. The qualitative data gathered from the organizational documentation were processed and assessed by content analysis procedures and incorporated into the integrated database. Data collected was reviewed and analyzed in relation to the propositions presented for the research model.

4.1.1 Problems of Data Collection

A total of 2280 data entries were collected for all 19 companies from 6 direct variables, company name and year, for 15 years. To calculate average sales, 38 data entries from two additional years of total sales were included for all 19 companies. For the study database, the direct data could potentially generate a total of 2318 entries if
every single entry can be used in the study.

Although expected, some difficulties occurred in collecting data as a result of the presence of either missing or wrong observations from any particular source (San Miguel, 1977). Prior to the data analysis, issues with accuracy of data entry or missing values for any given source were addressed to ensure reliability. With reference to the selected data sources for the integrated database, the data categories in the study will have negligible within sample differences in measurement across the population of firms due to standardization in the measurement method used by the selected data sources.

When found, missing observations from any given source were identified and addressed with overlapping information from the other sources previously identified in Chapter 3. Invalid data entries for a particular source were identified using data triangulation with the invalid source excluded for that particular entry. After confirmation from majority vote from the remaining sources, the correct observation was entered in the study database.

All missing values and every incorrect data entry for specific source fields were addressed, determined, and properly entered in the study database. Only 21 out of the total 2318 entries, about one percent (1 %) of entries, required correction after completing the triangulation process. Consequently, the completion of the triangulation procedure minimized the presence of data errors and possible source biases to ensure that subsequent researchers would be able to obtain the same integrated data and study results with the given scenario (Yin, 1994).
4.2 Aerospace Companies

For 2005, the sample included in the study represents 97% of the total United Stated aerospace market. Fully meeting the selection criteria, the sample includes 19 aerospace. Table 20 depicts the company name arranged by alphabetical order, assigned company number and database name for each company in the study.

Table 20. Aerospace Companies and Study Database Information

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Co #</th>
<th>Database Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliant Techsystems Inc.</td>
<td>1</td>
<td>Alliant</td>
</tr>
<tr>
<td>Boeing Company</td>
<td>2</td>
<td>Boeing</td>
</tr>
<tr>
<td>Fairchild Corporation</td>
<td>3</td>
<td>Fairchild</td>
</tr>
<tr>
<td>GenCorp Inc</td>
<td>4</td>
<td>GenCorp</td>
</tr>
<tr>
<td>General Dynamics Corporation</td>
<td>5</td>
<td>GenDyn</td>
</tr>
<tr>
<td>General Electric Company</td>
<td>6</td>
<td>GE</td>
</tr>
<tr>
<td>Goodrich Corporation</td>
<td>7</td>
<td>Goodrich</td>
</tr>
<tr>
<td>Honeywell International, Inc.</td>
<td>8</td>
<td>Honeywell</td>
</tr>
<tr>
<td>Kaman Corporation</td>
<td>9</td>
<td>Kaman</td>
</tr>
<tr>
<td>Lockheed Martin Corporation</td>
<td>10</td>
<td>Lockheed</td>
</tr>
<tr>
<td>Moog, Inc</td>
<td>11</td>
<td>Moog</td>
</tr>
<tr>
<td>Northrop Grumman Corporation</td>
<td>12</td>
<td>Northrop</td>
</tr>
<tr>
<td>Orbital Sciences Corporation</td>
<td>13</td>
<td>Orbital</td>
</tr>
<tr>
<td>Pemco Aviation Group Inc</td>
<td>14</td>
<td>Pemco</td>
</tr>
<tr>
<td>Precision Castparts Corporation</td>
<td>15</td>
<td>Precision</td>
</tr>
<tr>
<td>Raytheon Company</td>
<td>16</td>
<td>Raytheon</td>
</tr>
<tr>
<td>Sequa Corporation</td>
<td>17</td>
<td>Sequa</td>
</tr>
<tr>
<td>Textron Inc.</td>
<td>18</td>
<td>Textron</td>
</tr>
<tr>
<td>United Technologies Corporation</td>
<td>19</td>
<td>UTC</td>
</tr>
</tbody>
</table>

The cross-sectional combination of 19 aerospace companies covering the 15-year study period between 1991 and 2005 yielded a total of 285 company-year entries.
4.3 Integrated Database

An integrated database was generated to conduct statistical procedures for analysis and to comprehensively represent data with summary and graphical methods with the SPSS software package. After developing the database structure that integrates the measures for study, the resulting integrated database was comprised of defined data elements from the research model.

Following collection of the data, descriptive statistics were generated in SPSS to describe the basic features of the data used in the investigation. For all measures, descriptive statistics included the minimum, maximum, and sample mean. For the sample mean, the standard error is the standard deviation of the sampling distribution of the mean. Since the sample size of 285 entries was sufficiently large, the sampling distribution of the sample mean was assumed to be approximately normal to determine the standard error of the sample mean. No data transformations were performed in order to retain a better interpretability of the results. Transformations might make the resulting nature for each variable more difficult to interpret as they might take on a different meaning (So, 1987).

Although some extreme values can be identified within the integrated database, no data entries were excluded (Tukey, 1962; So, 1987). The case associated with company 14 for year 2004 exhibited the most extreme value with respect to a dependent variable. After careful examination and evaluation on the potential to exclude this Return on Equity entry from the integrated database, the data was retained.
Company 14 exhibited a positive change in Return on Equity from year 1999 to 2000 that sustained until the year 2004. For all three dependent variables, additional extreme values were evaluated and deemed appropriate to retain within the study data set.

Table 21 summarizes the values for maximum, minimum, mean, and standard error of the mean for all measures and variables used in the investigation.

| Table 21. Descriptive Statistics for Integrated Database |

<table>
<thead>
<tr>
<th>Statistic</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co</td>
<td>285</td>
<td>1</td>
<td>19</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Year</td>
<td>285</td>
<td>1991</td>
<td>2005</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Net sales</td>
<td>285</td>
<td>68.92</td>
<td>152363</td>
<td>14176.454</td>
<td>1488.689</td>
</tr>
<tr>
<td>General &amp; Admin</td>
<td>285</td>
<td>9.46</td>
<td>13300</td>
<td>1199.673</td>
<td>113.886</td>
</tr>
<tr>
<td>Net profits (loss)</td>
<td>285</td>
<td>-1046.00</td>
<td>16593</td>
<td>845.105</td>
<td>144.427</td>
</tr>
<tr>
<td>Total assets</td>
<td>285</td>
<td>46.33</td>
<td>750330</td>
<td>29923.017</td>
<td>5765.437</td>
</tr>
<tr>
<td>Total Long-term Debt</td>
<td>285</td>
<td>.17</td>
<td>253701</td>
<td>7904.264</td>
<td>1728.225</td>
</tr>
<tr>
<td>Total shareholders’ equity</td>
<td>285</td>
<td>-73.00</td>
<td>110284</td>
<td>5448.598</td>
<td>760.976</td>
</tr>
<tr>
<td>Average Net sales (3 yrs)</td>
<td>285</td>
<td>-62</td>
<td>6.09</td>
<td>.111</td>
<td>.032</td>
</tr>
<tr>
<td>Total Debt to Equity</td>
<td>285</td>
<td>-54.00</td>
<td>139.65</td>
<td>1.481</td>
<td>.535</td>
</tr>
<tr>
<td>G&amp;A/Sales</td>
<td>285</td>
<td>.02</td>
<td>.89</td>
<td>.141</td>
<td>.008</td>
</tr>
<tr>
<td>MS Raw</td>
<td>285</td>
<td>.24</td>
<td>.76</td>
<td>.581</td>
<td>.008</td>
</tr>
<tr>
<td>LC Lifecycle Coded</td>
<td>285</td>
<td>-1</td>
<td>1</td>
<td>.40</td>
<td>.054</td>
</tr>
<tr>
<td>SA Strategy Coded</td>
<td>285</td>
<td>-1</td>
<td>1</td>
<td>.47</td>
<td>.052</td>
</tr>
<tr>
<td>SU Structure Coded</td>
<td>285</td>
<td>-1</td>
<td>1</td>
<td>.44</td>
<td>.053</td>
</tr>
<tr>
<td>MS Management System</td>
<td>285</td>
<td>0</td>
<td>1</td>
<td>.72</td>
<td>.027</td>
</tr>
<tr>
<td>MSLC</td>
<td>285</td>
<td>0</td>
<td>1</td>
<td>.74</td>
<td>.026</td>
</tr>
<tr>
<td>MSSA</td>
<td>285</td>
<td>0</td>
<td>1</td>
<td>.66</td>
<td>.028</td>
</tr>
<tr>
<td>MSSU</td>
<td>285</td>
<td>0</td>
<td>1</td>
<td>.72</td>
<td>.027</td>
</tr>
<tr>
<td>Return on Assets (%)</td>
<td>285</td>
<td>-71.55</td>
<td>30.13</td>
<td>3.093</td>
<td>.416</td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>285</td>
<td>-516.92</td>
<td>4476.09</td>
<td>27.278</td>
<td>15.899</td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>285</td>
<td>-233.66</td>
<td>1620.56</td>
<td>49.635</td>
<td>8.436</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Mean is not meaningful for either company or year.
For all measures, the data shows no missing values in the integrated database.

For each measure, the minimum and maximum values provide the data range including coded measures with only two possible values (0, 1). The coded measures in the study are LC Lifecycle, SA Strategy, SU Structure, MS Management System, MSLC, MSSA and MSSU.

Data correlations were measured with the Spearman's rho procedure in SPSS and reported in Table 22.

Table 22. Spearman's rho Correlations

<table>
<thead>
<tr>
<th></th>
<th>Average Net sales (3 yrs)</th>
<th>Total Debt to Equity</th>
<th>G&amp;A/Sales</th>
<th>MS Mgmt System</th>
<th>Return on Assets (%)</th>
<th>Return on Equity (%)</th>
<th>Return on Investment (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Net sales</td>
<td>Cor Coefficient</td>
<td>.006</td>
<td>-.144(*)</td>
<td>.282(**)</td>
<td>.158(**)</td>
<td>.085</td>
<td>.117(*)</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.926</td>
<td>.015</td>
<td>.000</td>
<td>.008</td>
<td>.152</td>
<td>.049</td>
</tr>
<tr>
<td>Total Debt to Equity</td>
<td>Cor Coefficient</td>
<td>.006</td>
<td>1.000</td>
<td>-.107</td>
<td>.111</td>
<td>-.382(**)</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.926</td>
<td>.070</td>
<td>.062</td>
<td>.000</td>
<td>.878</td>
<td>.000</td>
</tr>
<tr>
<td>G&amp;A/Sales</td>
<td>Cor Coefficient</td>
<td>-.144(*)</td>
<td>-.107</td>
<td>1.000</td>
<td>-.298(**)</td>
<td>-.268(**)</td>
<td>-.430(**)</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.015</td>
<td>.070</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>MS Management System</td>
<td>Cor Coefficient</td>
<td>.282(**)</td>
<td>.111</td>
<td>-.298(**)</td>
<td>1.000</td>
<td>.325(**)</td>
<td>.488(**)</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.062</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Assets (%)</td>
<td>Cor Coefficient</td>
<td>.158(**)</td>
<td>-.382(**)</td>
<td>-.268(**)</td>
<td>.325(**)</td>
<td>1.000</td>
<td>.725(**)</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.008</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>Cor Coefficient</td>
<td>.085</td>
<td>.009</td>
<td>-.430(**)</td>
<td>.488(**)</td>
<td>.725(**)</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.152</td>
<td>.878</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>Cor Coefficient</td>
<td>.117(*)</td>
<td>-.454(**)</td>
<td>-.211(**)</td>
<td>.221(**)</td>
<td>.860(**)</td>
<td>.567(**)</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.049</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
A Spearman’s rho correlation was used to examine the relationship between measures. Significant correlations were found between several measures for 2 tailed tests. As expected, the Spearman's rho correlations involving the relationship between ROA, ROE and ROI are significantly large (above 0.5) and positive at p=0.01. All three performance measurements, ROA, ROE and ROI, involve a ratio that employs the net earnings (profit) as the numerator. With the same numerator, there is a significant relationship between ROA and ROE (0.725); ROA and ROI (0.860) and ROE and ROI (0.567).

Additionally, medium correlation can be found at the p=0.01 between Total Debt to Equity and ROA (-0.382); Total Debt to Equity and ROI (-0.454); G&A/Sales and ROE (0.430); MS and ROA (0.325) and; MS and ROE (0.488).

4.4 Normality Tests

Normality tests were applied to examine the integrated data set for normality and to use the results to make a judgment of what procedure to use and, decide between proceeding with parametric and nonparametric statistical tests (Tukey, 1962; Conover; 1980; So, 1987). Tests of normality test include Kolmogorov-Smirnov and Shapiro-Wilk procedures and determining skewness and kurtosis of the integrated database.

The Kolmogorov-Smirnov and Shapiro-Wilk normality procedures test the integrated database against a Gaussian distribution (Conover, 1980). The Kolmogorov-Smirnov normality test compares the cumulative distribution of the data with the
expected cumulative Gaussian distribution and reports a P value on the largest discrepancy. The Shapiro-Wilk normality procedure tests the null hypothesis. The data are sampled from a Gaussian distribution and reports a P value on the chance of randomly sampling data that deviates from a Gaussian distribution.

Table 23 summarizes results from the Kolmogorov-Smirnov and the Shapiro-Wilk normality tests on the dependent variables for Return on Assets, Return on Equity and Return on Investment.

Table 23. Normality Statistics for Dependent Variables

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov(a)</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
</tr>
<tr>
<td>Return on Assets (%)</td>
<td>.194</td>
<td>285</td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>.414</td>
<td>285</td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>.306</td>
<td>285</td>
</tr>
</tbody>
</table>

a  Lilliefors Significance Correction

When applying the Lilliefors significance correction to the Kolmogorov-Smirnov normality test, the correction reduces the likelihood that reporting of non-normality results might be conservative. The Shapiro-Wilk statistic compares the distribution under test with a perfect normal distribution. For both normality tests, the zero probability in the significance results indicates non-normality in the data distribution associated with the three dependent variables for the study.

Statistical methods to determine skewness and kurtosis were applied to assess normality of measures in the integrated data (Conover, 1980). The skewness statistic characterizes the degree of asymmetry of a distribution around the mean. Kurtosis
compares the relative peak or flat characteristic of a distribution from the normal distribution. The skewness and kurtosis procedure results are depicted in Table 24.

Table 24. Skewness and Kurtosis Statistics for Measures and Variables

<table>
<thead>
<tr>
<th>N</th>
<th>Skewness Statistic</th>
<th>Skewness Std. Error</th>
<th>Kurtosis Statistic</th>
<th>Kurtosis Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Net sales (3 yrs)</td>
<td>285</td>
<td>8.774</td>
<td>.144</td>
<td>85.646</td>
</tr>
<tr>
<td>Total Debt to Equity</td>
<td>285</td>
<td>11.889</td>
<td>.144</td>
<td>198.709</td>
</tr>
<tr>
<td>G&amp;A/Sales</td>
<td>285</td>
<td>3.247</td>
<td>.144</td>
<td>11.685</td>
</tr>
<tr>
<td>MS Raw</td>
<td>285</td>
<td>-.701</td>
<td>.144</td>
<td>-.647</td>
</tr>
<tr>
<td>LC Lifecycle Coded</td>
<td>285</td>
<td>-1.887</td>
<td>.144</td>
<td>-1.222</td>
</tr>
<tr>
<td>SA Strategy Coded</td>
<td>285</td>
<td>-1.061</td>
<td>.144</td>
<td>-.881</td>
</tr>
<tr>
<td>SU Structure Coded</td>
<td>285</td>
<td>-.81</td>
<td>.144</td>
<td>-1.045</td>
</tr>
<tr>
<td>MS Management System</td>
<td>285</td>
<td>-.81</td>
<td>.144</td>
<td>-1.045</td>
</tr>
<tr>
<td>MSLC</td>
<td>285</td>
<td>-4.780</td>
<td>.144</td>
<td>47.646</td>
</tr>
<tr>
<td>MSSA</td>
<td>285</td>
<td>16.118</td>
<td>.144</td>
<td>268.452</td>
</tr>
<tr>
<td>MSSU</td>
<td>285</td>
<td>6.979</td>
<td>.144</td>
<td>62.761</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The standard error terms for skewness and kurtosis are 0.144 and 0.288, respectively. To consider any measure to be from non skewed distributions at p=0.05 as indicated by the skewness statistic, the absolute value must be less than 1.96 times the standard error or 0.282 for the present study (Tabachnick & Fidell, 1996). Similarly, the kurtosis measures must be less than 0.564 at p= 0.05 for acceptable distributions. For this study, all measures exhibit unacceptable skewness and kurtosis statistics and cannot be considered normal distributions.
As indicated previously, no data transformations will be performed to attempt normalization of study data in order to preserve the nature of data distributions for analysis and interpretation of results. When using graphical displays, values identified as either extreme or outlier were studied to gain knowledge, but there was no intention to exclude these values from the integrated database (Tukey, 1962; So, 1987). For brevity, no detailed discussions will be presented since each case required special attention and additional information from the study data sources to understand their presence in the distribution.

In summary, all 285 cases in the integrated database were retained after careful evaluations of extreme values that were present within the dependent variables. Therefore, hypothesis tests for the non-normal distributions of the integrated database will be conducted with the Mann-Whitney non-parametric test procedures.

4.5 Mann-Whitney Test Procedures

Summary statistics, test results and graphical representations will be presented for each hypothesis. To test the propositions under study, the integrated database will be categorized into the required sets of data, as previously described, in order to conduct the Mann-Whitney test procedures.
4.5.1 Management System Design and Performance

The integrated database for aerospace companies requires case segmentation into the descriptive and prescriptive categories defined for Management Systems Design. The segmentation provides the desired data to test for the relationship between Management Systems Design and organizational performance. The proposition in Hypothesis 1 (H1) states that:

- H1: An organization is more likely to have higher levels of performance when management system is descriptive.

Mann-Whitney U tests were used to examine significant differences between descriptive and prescriptive management system designs and their organizational performance. The nonparametric Mann-Whitney U statistics indicate significant difference between these variables. The Mann-Whitney test results are:

- Cases with a descriptive management system design (Mean rank=159.72) were found to score significantly higher (U=4773.0, z=-5.482, p<.05) than cases with a prescriptive management system design (Mean rank=100.16) in terms of ROA.

- Cases with a descriptive management system design (Mean rank=168.06) were found to score significantly higher (U=3063.0, z=-8.217, p<.05) than
cases with a prescriptive management system design (Mean rank=78.79) in terms of ROE.

- Cases with a descriptive management system design (Mean rank=154.37) were found to score significantly higher (U=5869.0, z=-3.728, p<.05) than cases with a prescriptive management system design (Mean rank=113.86) in terms of ROI.

### 4.5.1.1 Analysis of Management System Design and Performance

Prior to performing data categorization, graphical displays of data were produced to explore and maximize insight into the integrated data associated with Management Systems Design. A set of plots were generated to study data structure, to detect anomalies, to perceive broad features, and to represent differences in raw measures for Management Systems Design.

A scatterplot to represent background information and the relationship between raw score for Management Systems Design and each year within the study period is presented in Figure 20.
As presented in the descriptive statistics in Table 21, representation of all MS Design Raw scores extends the range between the 0.24 minimum and 0.76 maximum values. By examining the scatterplot, the graphic shows the lowest range in MS Design Raw score during the years 1993 and 2003 and the widest range during the years 1998, 1999 and 2004. For year 2005, the graph shows the largest gap between any given set of raw scores for MS Design. For any given year, concentration of data appears to be in the upper range of the MS Design Raw scores.

Similarly, a scatterplot to represent the relationship between raw score for Management Systems Design and each aerospace company within the study is presented in Figure 21.
The scatterplot in Figure 21 presents the lowest range in MS Design Raw score for companies 6 and the widest range for companies 13 and 14. For company 14, the graph shows the largest gap between raw scores. As with the previous scatterplot in Figure 20, concentration of data appears to be in the upper range of the MS Design Raw scores. By further examining the spread of data, the figure shows that large variations of raw scores manifest for scores obtained from all 19 companies.

The next three scatterplots represent the relationship for raw score for management system design with Return on Assets (Figure 22); with Return on Equity (Figure 23); and with Return to Investment (Figure 24).
Figure 22. Scatterplot of MS Raw and Return on Assets

Figure 23. Scatterplot of MS Raw and Return on Equity
For all three scatterplots in Figures 22, 23 and 24, each dependent variable and the MS Design Raw Score appears to have positive slope relationship. An increase in raw score will indicate an increase in the value of the dependable variable. Each plot shows extreme values in terms of the dependent variable and the raw score associated with these cases. For ROA (Figure 22), the plot shows negative returns as the largest extreme values. For ROE (Figure 23) and ROI (Figure 24), positive returns are the largest extreme values. Compared to the values represented in each plot, increased dispersion of ROA (Figure 22) and ROI (Figure 24) values show in their respective plots for raw score near the 0.46 to 0.52 range.

Prior to coding into either prescriptive or descriptive design, the raw measures for Management System Design (MS Design) could have values between 0 and 1. For the
integrated data presented in the Descriptive Statistics in Table 21, the raw measures for Management System Design ranged from a minimum of 0.24 to a maximum of 0.76. The raw scores range represented in Figures 20, 21, 22, 23 and 24 shows consistency with the data summarized in the descriptive statistics.

A set of plots of the MS Design Raw Score response over time for each company were generated to explore the location and sequence of raw scores for MS Design. The set of plots were combined into a composite plot to explore the relationship between MS Design Raw Score by company during the study period. To identify the threshold for MS raw scores in the composite plot, a line divides the raw score scale into descriptive and prescriptive MS design. Figure 25 represents the composite plot for MS Design Raw Score by company during the 15 year study period.
Figure 25. Management System Raw Score by Company During Study Period
For each company in Figure 25, the red line divides the raw score scale between descriptive (equal or above 0.5) and prescriptive (< 0.5.) designs. Each bar represents the raw score for MS Design in any given year. Exploring the data in Figure 25, only company 6 presents all MS Design Raw Scores in a single category (above 0.5 or descriptive). All other companies exhibit variations of raw scores between the prescriptive and descriptive design for the 15 year period. The graph shows companies 1, 5, 6, 11, 15, 18, and 19 with at least 10 continuous years of raw scores within the descriptive design category. Companies 2, 5, 9, 13, 14, 15, and 17 exhibit at least 3 continuous years of raw scores within the prescriptive design category.

A raw score for Management System Design with values of 0.5 and above were categorized as descriptive and coded as 1. A design raw score less than 0.5 was categorized as a prescriptive design and coded as 0. Following coding of Management System Design raw score, a set of boxplot for coded Management System Design and each dependent variable were generated. Boxplots of the two possible coded values were lined up side by side on a common scale for comparison. Each boxplot includes the representation of coded data for all 285 cases in the study.

Relative to a normal population, the SPSS will display distinct symbols in each boxplot for values determined as either extreme or outliers. However, no particular model is assumed or fitted to the data which avoids the need to transform the data under study. Any value located more than three box lengths from either end of the box is labeled as extreme and denoted with an asterisk. Any value located between one and a half and the outlier region from either end of the box is labeled as extreme and

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denoted with a circle.

Figure 26 represents the boxplot for coded MS Management System and Return on Assets.

Figure 26. Boxplot of MS Management System and Return on Assets
Comparing the horizontal line within each box representing the median for each data set in Figure 26, the MS Management System displays a higher Return on Assets value for code 1 (descriptive design). Medians for both codes present their location skewed toward the lower end of the box. The Return on Assets value location and box length for code 0 (descriptive design) gives an indication of larger sample variability than those cases coded as 1.

A total of 6 values are represented outside of the limits for boxplot whiskers associated with cases coded as prescriptive (0). Similarly, a total of 8 values are represented outside of the boxplot whiskers for cases coded as 1. However, these values are closer to the Return on Assets median and split into groups of 4 values on each end. Cases located beyond the lower whisker indicate negative values of Return on Assets for both coded boxes in Figure 26. In the same manner, all cases located beyond the upper whisker indicate positive values of Return on Assets for both coded boxes. Consistent with the ROA and MS Design scatterplot in Figure 22, the boxplot in Figure 26 shows negative Return on Assets as the largest deviations from the data set median.

Figure 27 presents the boxplot generated from coded MS Management System and Return on Equity. After initial inspection, case 205 associated with company 14 for year 2004 became immediately apparent as an extreme value. Consistent with the large positive value in the ROE and MS Design scatterplot presented in Figure 23, the boxplot in Figure 27 clearly displays in the distribution the positive Return on Equity associated with case 205 as the largest deviation from the data set median.
To present a useful boxplot for analysis, case 205 will be removed from the graphical representation in the boxplot. Then again, case 205 is present and properly coded in the data set for descriptive MS Design since no case will be deleted from the
integrated database. The revised boxplot diagram for coded MS Management System and ROE showing 284 cases but determined from all cases is presented in Figure 28.

Figure 28. Revised Boxplot of MS Management System and Return on Equity
Figure 28 improves the representation of information with the removal of case 205 from the graphical display and adjusting the scale for Return on Equity to cover all the remaining 284 values located between the range from -300% to 500%. All 285 cases were present in the calculation of coded MS Management System medians, upper and lower quartiles and, except for case 205, in the graphical representation of minimum, maximum and extreme values.

The MS Management System median displays a higher Return on Equity value for code 1 (descriptive design) when compared to the median for code 0 (prescriptive design). For each data set in Figure 28, the medians for both codes present their location skewed toward the lower end of the box. The location for Return on Equity values and box length for descriptive design cases (coded as 0) appears to have larger sample variability than the prescriptive cases (coded as 1).

For MS Management System coded as 0, case 190 shows the largest distance from the mean. A total of 13 ROE values with cases coded as prescriptive (0) are represented outside of the limits for boxplot whiskers with 10 of these 13 values distributed below the ROE median.

For Figure 28, a total of 16 values are represented outside of the boxplot whiskers for cases coded as 1. Cases located beyond the upper whisker, indicating positive values of Return on Equity, include 12 cases from the total of 16 cases.

In the same manner as the two dependent variables previously depicted, the boxplot for coded MS Management System and Return on Investment is presented in Figure 29.
Comparing the graphical portrayal of median for each data set in Figure 29, the MS Management System displays a higher Return on Assets value for code 1 (descriptive design). Medians for both codes present their location skewed toward the
lower end of the box. The range from the highest to lowest value in the Return on Investment box length and values location for code 1 (descriptive design) gives an indication of larger sample variability than those cases coded as 0.

Both coded categories for Return on Investment are characterized with values outside the whiskers. Within both coded data, the distribution of extreme and outlier values present as the most frequent data location Return on Investment percentage above the limits of whiskers. The values outside the whiskers split into 34 values above and 7 below each end of the boxplot. A total of 16 values are represented outside of the limits for boxplot whiskers associated with cases coded as prescriptive (0). Also, a total of 25 values are represented outside of the boxplot whiskers for cases coded as 1.

In the same way as presented in the ROI and MS Design scatterplot (Figure 24), the boxplot in Figure 29 shows positive values of ROI as the largest deviations from the data set median.

In summary, the scatterplots for MS Design Raw Score by Company and year illustrate data points consistent with the descriptive statistics presented in Table 21. Likewise, boxplots for coded MS Design and the dependent variables are consistent with the corresponding MS Design raw score scatterplots in the identification of extreme values. Concerning the use of nonparametric procedures in the analysis of the integrated data, these methods are the most appropriate for the study.

To compare the rank order of cases with respect to the dependent variables for organizational performance, a series of Mann-Whitney tests will be performed with the coded data for Management System Design in the integrated database. The Mann-
Whitney test for Management System Design ranks is presented in Table 25.

Table 25 Mann-Whitney Test Rank Results for Management System Design

<table>
<thead>
<tr>
<th>MS Management System</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Assets (%)</td>
<td>0</td>
<td>80</td>
<td>100.16</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>205</td>
<td>159.72</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>0</td>
<td>80</td>
<td>78.79</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>205</td>
<td>168.06</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>0</td>
<td>80</td>
<td>113.86</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>205</td>
<td>154.37</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For Management System Design, the coded data includes 80 prescriptive and 205 descriptive cases. Both categories group a number of cases surpassing the required 64 observations to identify a medium-to-large effect size at the 0.8 power (Cohen, 1992). The maximum U between the sum of ranks for Management System Design coded data will be 16,400 and the sample W is the sum of ranks for the smallest group for each dependent variable. Using the SPSS procedure to compute test statistics U for each dependent variable, test results are reported in Table 26.

Table 26. Mann-Whitney Test Statistics for Management System Design

<table>
<thead>
<tr>
<th></th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Assets (%)</td>
<td>4773.0</td>
<td>8013.0</td>
<td>-5.482</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>3063.0</td>
<td>6303.0</td>
<td>-8.217</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>5869.0</td>
<td>9109.0</td>
<td>-3.728</td>
<td>.000</td>
</tr>
</tbody>
</table>

Grouping Variable: MS Management System
Mann-Whitney U tests were used to examine significant differences between descriptive and prescriptive management system designs and their organizational performance. As presented in Tables 25 and 26, the nonparametric Mann-Whitney U statistics indicate significant difference between these variables. The Mann-Whitney test results are:

- Cases with a descriptive management system design (Mean rank=159.72) were found to score significantly higher (U=4773.0, z=-5.482, p<.05) than cases with a prescriptive management system design (Mean rank=100.16) in terms of ROA.

- Cases with a descriptive management system design (Mean rank=168.06) were found to score significantly higher (U=3063.0, z=-8.217, p<.05) than cases with a prescriptive management system design (Mean rank=78.79) in terms of ROE.

- Cases with a descriptive management system design (Mean rank=154.37) were found to score significantly higher (U=5869.0, z=-3.728, p<.05) than cases with a prescriptive management system design (Mean rank=113.86) in terms of ROI.
4.5.2 Fit State and Performance

As presented in section 3.6, a binary indicator will be used to determine a fit state for each case when examining the combination of the coded Management System Design (MS Design) with each coded organizational factor for strategy, structure and lifecycle. The integrated database for aerospace companies will be segmented into cases where there is either Full Fit or Partial Fit. Full fit requires a fit state for all three combinations of coded Management System Design and each organizational factor.

The segmentation between Full and Partial Fit provides the desired data to test for the relationship between fit state and organizational performance. The proposition in Hypothesis 2 (H2) states that:

- Hypothesis 2: Correct fit state leads to an increase in organizational performance.

Mann-Whitney U tests were used to examine significant differences between Full and Partial Fit states and their organizational performance. The nonparametric Mann-Whitney U statistics indicate significant difference between these variables. The test results are:

- Cases with a Full Fit state (Mean rank=164.42) were found to score significantly higher (U=7148.5, z=-3.275, p<.05) than cases with Partial Fit.
state (Mean rank=131.06) in terms of ROA.

- Cases with a Full Fit state (Mean rank=183.47) were found to score significantly higher (U=5205.0, z=-6.189, p<.05) than cases with Partial Fit state (Mean rank=120.44) in terms of ROE.

- Cases with a Full Fit state (Mean rank=155.88) were found to score significantly higher (U=8019.5, z=-1.969, p<.05) than cases with Partial Fit state (Mean rank=135.82) in terms of ROI.

4.5.2.1 Analysis of Fit State and Performance

The relation between management system design and organizational strategy, structure and lifecycle has an interactive effect in the level of fit for organizational performance. Factor interaction that improves fit increases performance; a misfit decreases performance.

A set of plots of the MS Management System Coded response over time for each company were generated to explore the location and sequence of coded values for MS Design. The set of plots were combined into two composite graphs for descriptive (1) and prescriptive (0) MS design to explore the relationship between MS Design by company during the study period. Figure 30 represents the composite plot for Return on Assets and MS Design Coded values by company during the 15 year study period.
Figure 30. Composite Graph of ROA, Coded MS Design, Company and Year

Cases shown as blue circles in the composite graph in Figure 30 denote a Full Fit state for the combination of the coded Management System Design with each coded Year.
organizational factor for strategy, structure, and lifecycle. Any other combination of results for fit state from these factors were grouped as Partial Fit and shown as red circles.

Examining the graph in Figure 30, a larger number of Full Fit cases were grouped in the descriptive MS Design category. Only four Full Fit cases appear in the prescriptive category. Three of those four cases were in sequence and associated with company 9 and one for company 10. Although the graph does not present any company with a Full Fit state for every year, companies 1 and 6 indicate Full Fit for 12 and 13 years, respectively, within the 15 year study period. With cases in the prescriptive and descriptive categories for Management System Design, companies 3, 11 and 17 present a Partial Fit for the entire study period.

The largest number of Full Fit cases for any given year is displayed in year 2000 with a total of eight cases solely located in the descriptive Management System category. However, the graph displays the largest number of Partial Fit cases in year 1993 with seven cases in the descriptive category and eight in the prescriptive category for a total of 15 companies.

The MS Design Raw score will be used to show the distribution of Full and Partial Fit between MS Design Coded data and Return on Assets. Figure 31 shows the complete data set in the left graph and the segmented data by coded MS Design in the right graphs for each fit condition with respect to Return on Assets.
For MS Design coded as prescriptive (0), the graphs in Figure 31 indicates more variation of Return on Assets values than variation for cases coded as descriptive (1). These graphs show the largest variation of ROA values at both extremes of the MS Design Raw Score range with the largest variation associate with prescriptive cases (0).

Categorization of Full Fit cases for Return on Equity as dependent variable is the same as the composite graph shown in Figure 30 for Return on Assets and MS Design Coded values by company during the 15 year study period. However, the location of particular cases in the graph will be determined by the specific Return on Equity percentage. The composite plot for Return on Equity, MS Design Coded by company and year is shown in Figure 32.
Comparing Figure 32 with ROA distribution in Figure 30, there are only minor differences. These differences are the higher ROE percentage associated with the case for company 14 in year 2000 and there no appreciable change in ROE percentage for

Figure 33 shows the complete data set (left graph) and the segmented data by coded MS Design (right graphs) for each fit condition with respect to Return on Equity.

![Figure 33. Scatterplots of ROE, Coded MS Design and Fit](image)

As with previous representations of Return on Equity distribution, the graphs in Figure 33 display the extreme value identified to company 14 in year 2004. Although the scale in Figure 33 expands a larger range than the scale presented for Return on Assets in Figure 31, the scatterplots provide a visual categorization of MS Design coded data. For MS Design coded as prescriptive (0), the graphs in Figure 33 indicates more variation of Return on Equity values than variation for cases coded as descriptive (1). The graphs show a larger number of Full Fit cases were grouped in the descriptive MS
Design category with the four Full Fit cases visible in the prescriptive category.

Figure 34 shows the composite plot for Return on Equity, MS Design Coded by company and year.

Figure 34. Composite Graph of ROI, Coded MS Design, Company and Year
As reported previously, only four Full Fit cases appear in the prescriptive category for Figure 34. Comparing Figure 34 with ROA distribution in Figure 30 and ROE distribution in Figure 32, the main visible different is a change in ROI percentage for company 5 between years 1992 and 1995.

A Full Fit (1) state requires a fit state for each organizational factor. Therefore, the distribution of Full Fit cases for Return on Investment by company during the 15 year study period presents the same distribution of cases as the composite graphs shown in Figure 30 for Return on Assets and MS Design Coded and, Figure 32 for Return on Equity and MS Design Coded.

Similarly, the complete data set and the segmented data by coded MS Design for each fit condition with respect to Return on Investment follow in Figure 35.

Figure 35. Scatterplots of ROI, Coded MS Design and Fit
By graphically displaying the relationship with MS Design Raw Score, the graphs in Figure 35 show the same four Full Fit cases in the prescriptive MS Design category as presented in Figures 31 and 33. Within coded data for both MS Design categories, the distribution of extreme values of Return on Investment in Figure 35 appears to be associated with the Partial Fit cases. In addition to their association with Partial Fit state, these largest extreme values display closer to the largest observed values for each MS Design Raw Score category. Similarly, the largest variation of empirical values of Return on Investment percentages present more frequently at both extremes of the MS Design Raw Score range.

In summary, the distribution and variation of cases related to fit state were studied and analyzed with graphical methods. These methods included a composite graph of the dependent variables, coded MS Design, company and year, and fit state scatterplots for each dependent variable from the categorization of cases based on the MS Design Coded and Raw Scores. Cases categorized with a descriptive management system design present the largest number in the combined plots and scatterplots of Full Fit cases distribution for each dependent variable of organizational performance.

To compare the rank order of cases with respect to the dependent variables for organizational performance, a series of Mann-Whitney tests will be performed with the coded data for Fit state in the integrated database. The Mann-Whitney test for Fit state ranks is presented in Table 27.
The integrated database was segmented into cases where there is either Full Fit or Partial Fit. When examining the combination of the coded Management System Design with each coded organizational factor for strategy, structure and lifecycle, the coded data includes 102 Full Fit state and 183 Partial Fit states cases. Both fit state categories include more than the required 64 observations to identify a medium-to-large effect size at the 0.8 power (Cohen, 1992). For Fit state coded data, the maximum U between the sum of ranks will be 18,666. The sample W is the sum of ranks for the smallest group for each dependent variable. By applying the Mann-Whitney procedure in SPSS to compute test statistics U for each dependent variable, the following test results were collected and are reported in Table 28.

<table>
<thead>
<tr>
<th>Return on Assets (%)</th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7148.5</td>
<td>23984.5</td>
<td>-3.275</td>
<td>.001</td>
</tr>
<tr>
<td>1</td>
<td>5205.0</td>
<td>22041.0</td>
<td>-6.189</td>
<td>.000</td>
</tr>
<tr>
<td>Total</td>
<td>8019.5</td>
<td>24855.5</td>
<td>-1.969</td>
<td>.049</td>
</tr>
</tbody>
</table>

Table 27. Fit Ranks for Full and Partial Fits

<table>
<thead>
<tr>
<th></th>
<th>Full Fit</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Assets (%)</td>
<td>0</td>
<td>183</td>
<td>131.06</td>
<td>23984.5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>102</td>
<td>164.42</td>
<td>16770.5</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>0</td>
<td>183</td>
<td>120.44</td>
<td>22041.0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>102</td>
<td>183.47</td>
<td>18714.0</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>0</td>
<td>183</td>
<td>135.82</td>
<td>24855.5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>102</td>
<td>155.88</td>
<td>15899.5</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mann-Whitney U tests were used to examine significant differences between full and partial fit states and their organizational performance in terms of ROA, ROE and ROI. As presented in Tables 27 and 28, the nonparametric Mann-Whitney U statistics indicate significant difference between the fit state and performance variables. The test results are:

- Cases with a full fit state (Mean rank=164.42) were found to score significantly higher (U=7148.5, z=-3.275, p<.05) than cases with a partial fit state (Mean rank=131.06) in terms of ROA.

- Cases with a full fit state (Mean rank=183.47) were found to score significantly higher (U=5205.0, z=-6.189, p<.05) than cases with a partial fit state (Mean rank=120.44) in terms of ROE.

- Cases with a full fit state (Mean rank=155.88) were found to score significantly higher (U=8019.5, z=-1.969, p<.05) than cases with a partial fit state (Mean rank=135.82) in terms of ROI.
4.5.3 Management System Design-Strategy Fit and Performance

The following statements will be used to test the relationship between organizational strategy and management system design:

Hypothesis 3 (H3): Organizational Strategy will exist in between the leading and lagging extremes. A state of fit between the Organizational Strategy and the Management System Design will be positively associated to successful performance.

Mann-Whitney U tests were used to examine significant differences between fit states for management system design and strategy (MSSA) and their organizational performance. The test results are:

- Cases with a fit state (Mean rank=158.18) were found to score significantly higher ($U=6202.5$, $z=-4.364$, $p<.05$) than cases with unfit state (Mean rank=113.11) in terms of ROA.

- Cases with a fit state (Mean rank=163.48) were found to score significantly higher ($U=5201.5$, $z=-5.886$, $p<.05$) than cases with unfit state (Mean rank=102.68) in terms of ROE.

- Cases with a fit state (Mean rank=155.42) were found to score...
significantly higher (U=6725.0, z=-3.569, p<.05) than cases with unfit state (Mean rank=118.55) in terms of ROI.

4.5.3.1 Analysis of MS Design-Strategy Fit and Performance

The third hypothesis proposes that a positive relationship might exist with the selected performance measures for organizations with a fit state combinations with either a leading strategy and a descriptive management system design or a lagging strategy and a prescriptive management system. To test these propositions, the coded data for each combination of organizational strategy and management system will be segmented between fit and unfit observations for all cases. The segments will be tested to determine if higher levels of ROA, ROE, and ROI are associated with strategy and design matching the expected state for each combination as described in section 3.7.2.

The combination of coded strategy and management system design will be called MSSA and will generate 4 distinct states: 2 Fit and 2 Unfit. The MS Design Raw score will show the distribution of Fit (MSSA=1) and Unfit (MSSA=0) states between MS Design Coded data and Strategy. The relation for fit between management system design and organizational strategy will be presented in graphical representation for each dependent variable. The fit categories will be tested with the Mann-Whitney procedure and test results will be reported.

With respect to Return on Assets, Figure 36 shows a scatterplot from segmented data coded by Management System (MS) Design for the complete data set of 285
cases. The Management System Design-Strategy Fit cases (MSSA=1) are represented with blue circles and the Unfit cases (MSSA=0) with red circles. A line is shown at MS Raw score of 0.5 to visually divide the cases into prescriptive and descriptive MS Designs.

![Scatterplot of ROA for Fit Between MS Design and Strategy](image)

Figure 36. Scatterplot of ROA for Fit Between MS Design and Strategy

The graph presents a larger number of cases associated with descriptive design than cases associated with prescriptive design (205 versus 80) as determined in section 4.5.2 for Management System Design. Except for the most extreme negative of value
ROA, the distribution of data points for MSSA Fit state (1) shows dispersion of MS Raw scores in the range between approximately 0.35 and 0.75. However, the distribution of data points for MSSA Unfit state (0) appears to span most of the range for MS Raw. The graph indicated a larger number of MSSA Fit state (1) cases associated with MS descriptive design when compared to MSSA Unfit state (0) cases.

Figure 37 shows a scatterplot from segmented data coded by Management System (MS) Design with respect to Return on Equity for the complete data set of 285 cases.

Figure 37. Scatterplot of ROE for Fit Between MS Design and Strategy
Due to the extreme ROE percentage for the case previously identified to company 14 in year 2004, a graphical representation with a different scale might present a useful scatterplot for graphical analysis. Then again, no case will be deleted from the integrated database and this case for company 14 will still be present and properly coded in the data set for MS Design. To represent the categorization of 284 cases, the revised scatterplot will depict a ROE range between -525% and 325%. Figure 38 shows the revised scatterplot from segmented data coded by Management System (MS) Design with respect to Return on Equity for the data set.

![Figure 38. Revised Scatterplot of ROE for Fit Between MS Design and Strategy](image-url)
Reducing the ROE scale improved distinguishing the distribution of data points between MSSA for Fit (1) and Unfit (0) states. Except for the extreme ROE value above 200%, the lower range of prescriptive MS Design cases was associated with an MSSA Unfit (0) state. Very few MSSA Unfit cases can be identified in the descriptive MS design portion of the display. The graph presents a larger number of cases for MSSA Fit (1) associated with descriptive design than those associated with prescriptive.

In the same manner as ROA and ROE, Figure 39 shows a scatterplot from segmented data coded by Management System (MS) Design with respect to Return on Investment for the integrated data set.

Figure 39. Scatterplot of ROI for Fit Between MS Design and Strategy
The graph presents a larger number of cases with MSSA Fit (1) state in the descriptive management system design category compared to those cases associated with prescriptive design. The most extreme values for Return on Investment show at the upper range for both MS Design Raw scores. However, the extreme values in the MS Prescriptive were associated to Full Fit state while the extreme values in the MS Descriptive were associated to Partial Fit cases.

In summary, the distribution and variation of cases related to Management System Design-Strategy (MSSA) fit state were studied and analyzed with a set of scatterplots for each dependent variable from the categorization of cases based on the MSSA fit state.

To compare the rank order of cases with respect to the dependent variables for organizational performance, a series of Mann-Whitney tests will be performed with the coded data for MSSA fit state in the integrated database. The Mann-Whitney test for MSSA fit state ranks is presented in Table 29.

<table>
<thead>
<tr>
<th>MSSA</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Assets (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>96</td>
<td>113.11</td>
<td>10858.5</td>
</tr>
<tr>
<td>1</td>
<td>189</td>
<td>158.18</td>
<td>29896.5</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>96</td>
<td>102.68</td>
<td>9857.5</td>
</tr>
<tr>
<td>1</td>
<td>189</td>
<td>163.48</td>
<td>30897.5</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>96</td>
<td>118.55</td>
<td>11381.0</td>
</tr>
<tr>
<td>1</td>
<td>189</td>
<td>155.42</td>
<td>29374.0</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For Management System Design to Strategy Fit, the coded data includes 96 unfit state and 189 fit state cases. To identify a medium-to-large effect size at the 0.8 power, both MSSA fit state categories include a number of cases surpassing the required 64 observations (Cohen, 1992). The maximum U between the sum of ranks for Management System Design to Strategy Fit coded data will be the product of each sample size yielding 18,144. For each of the dependent variables, the sample W is the sum of ranks associated with the smallest group. Applying the SPSS procedure to compute the test statistics U for each dependent variable, a report on test results follows in Table 30.

Table 30. Management System to Strategy Fit Test Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Assets (%)</td>
<td>6202.5</td>
<td>10858.5</td>
<td>-4.364</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>5201.5</td>
<td>9857.5</td>
<td>-5.886</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>6725.0</td>
<td>11381.0</td>
<td>-3.569</td>
<td>.000</td>
</tr>
</tbody>
</table>

Grouping Variable: MSSA

Mann-Whitney U tests were used to examine significant differences between fit states for Management System Design and Strategy (MSSA) and their organizational performance. As presented in Tables 29 and 30, the test results are:

- Cases with a fit state (Mean rank=158.18) were found to score significantly higher (U=6202.5.0, z=-4.364, p<.05) than cases with unfit state (Mean rank=113.11) in terms of ROA.
• Cases with a fit state (Mean rank=163.48) were found to score significantly higher (U=5201.5, z=-5.886, p<.05) than cases with unfit state (Mean rank=102.68) in terms of ROE.

• Cases with a fit state (Mean rank=155.42) were found to score significantly higher (U=6725.0, z=-3.569, p<.05) than cases with unfit state (Mean rank=118.55) in terms of ROI.

4.5.4 Management System Design-Structure Fit and Performance

To test the relationship for fit state from the combination of organizational structure and management system design the following propositions will be used:

• Hypothesis 4 (H4): Organizational Structure will exist in between the loose and rigid extremes. A state of fit between the Organizational Structure and the Management System Design will be positively associated to successful performance.

Mann-Whitney U tests were used to examine significant differences between fit states for Management System Design and Structure (MSSU) and their organizational performance. The test results are:
• Cases with a fit state (Mean rank=156.48) were found to score significantly higher (U=5437.0, z=-4.419, p<.05) than cases with unfit state (Mean rank=108.46) in terms of ROA.

• Cases with a fit state (Mean rank=163.77) were found to score significantly higher (U=3941.5, z=-6.812, p<.05) than cases with unfit state (Mean rank=89.77) in terms of ROE.

• Cases with a fit state (Mean rank=153.59) were found to score significantly higher (U=6029.5, z=-3.472, p<.05) than cases with unfit state (Mean rank=115.87) in terms of ROI.

4.5.4.1 Analysis of MS Design-Structure Fit and Performance

Hypothesis 4 proposes that cases with a loose structure and a descriptive management system or rigid structure and a prescriptive management system might have higher organizational performance with the selected measures. To test these propositions, the coded data for each combination of organizational structure and management system will be segmented between fit and unfit observations for all 285 cases in the integrated database. The fit state segments will be tested to determine if higher levels of ROA, ROE and ROI are associated with a structure and design
matching the expected fit state for each of the four combinations as described in section 3.7.3.

Coded Structure and Management System Design for each case will be combined and named MSSU to generate all 4 states as discussed in the previous section for coded Strategy and Management System Design (MSSA.) The relation for fit between Management System Design and organizational structure will be presented using graphical depictions for each dependent variable. To maintain the same frame of reference for each graphic, the color convention and MS Design Raw score as introduced in the previous section will be used to depict the distribution of Fit (MSSU=1) and Unfit (MSSU=0) states between MS Design Coded data and structure.

Figure 40 shows the scatterplot from segmented data by coded MSSU and Management System (MS) Design for the complete data set of 285 cases.
The graph in Figure 40 indicates a larger number of MSSU Fit state (1) cases associated with MS descriptive design when compared to MSSU Unfit state (0) cases. A difference from the ROA scatterplot for MSSA displayed in Figure 36 is that the distribution for MSSU Fit state (1) in Figure 40 shows dispersion of data points covering most of the MS Raw range. The largest data point dispersion pertains to cases with unfit MSSU (0) state for prescriptive MS Design. Several data points shown as MSSU Fit state (1) in Figure 40 appeared as MSSA Unfit state (0) in Figure 36. For example, the two largest negative values for ROE switch fit state when comparing the MSSA and MSSU combinations.
The full scale representation of segmented data coded by Management System (MS) Design with respect to Return on Equity is presented in Figure 41.

![Figure 41. Scatterplot of ROE for Fit Between MS Design and Structure](image)

The full scale in Figure 41 provides an overall view including the ROE extreme value for descriptive MS Design. As described for the Return on Assets variable in MSSA, the same reduced scale between -325% and 500% will be employed with MSSU for the ROE scatterplot to improve displaying the distribution of data. Figure 42 displays a revised scatterplot with 284 cases from MSSU segmented data coded by Management System Design with respect to Return on Equity.
Figure 42. Revised Scatterplot of ROE for Fit Between MS Design and Structure

The graph in Figure 42 presents a larger number of cases for MSSA Fit (1) associated with descriptive design than those associated with prescriptive design. A difference from the ROE distribution for MSSA as displayed in Figure 38 is that the distribution for MSSU Fit state (1) in Figure 42 reveals more dispersion of data points in the MS Raw prescriptive category. Several extreme data points in Figure 42 appeared as the opposite MSSU state for fit in Figure 38 including the 5 most extreme cases for ROE value and the case identified to company 14 in year 2004.

Figure 43 depicts a scatterplot from MSSU segmented data coded by
Management System (MS) Design with respect to Return on Investment for the integrated data set.

Consistent with previous results, the graph in Figure 43 presents a larger number of cases with MSSU Fit (1) state in the descriptive management system design category compared to those cases associated with prescriptive design. The most extreme values for Return on Investment show at the upper range for both MS Design Raw scores.

Several data points shown as MSSU Fit state (1) in Figure 43 appeared as MSSA Unfit state (0) in Figure 39. Comparing the most extreme ROI values in the positive direction
with the distribution of MSSA fit state cases in Figure 39, a change of MSSU fit state for both MS Design categories associated to the 8 most extreme cases represented in Figure 43.

To summarize, the distribution and variation of cases related to Management System Design-Strategy (MSSU) fit state were studied and analyzed with a set of scatterplots for each dependent variable from the categorization of all 285 cases based on the MSSU fit state. Additionally, the analysis included a cursory review to contrast detected visual differences between the distributions from MSSU and MSSA fit state for each dependent variable.

A series of Mann-Whitney tests will be performed with the coded data for MSSU fit state in the integrated database to compare the rank order of cases with respect to Return on Assets, Return on Equity and Return on Investment. The Mann-Whitney test for MSSU fit state ranks each dependent variable for organizational performance is presented in Table 31.

<table>
<thead>
<tr>
<th></th>
<th>MSSU</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Assets (%)</td>
<td>0</td>
<td>80</td>
<td>108.46</td>
<td>8677.0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>205</td>
<td>156.48</td>
<td>32078.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>285</td>
<td></td>
<td>40755.0</td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>0</td>
<td>80</td>
<td>89.77</td>
<td>7181.5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>205</td>
<td>163.77</td>
<td>33573.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>285</td>
<td></td>
<td>40755.0</td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>0</td>
<td>80</td>
<td>115.87</td>
<td>9269.5</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>205</td>
<td>153.59</td>
<td>31485.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>285</td>
<td></td>
<td>40755.0</td>
</tr>
</tbody>
</table>

Table 31. Ranks for Management System to Structure Fit
For Management System Design to Structure Fit, the coded MSSU data includes 80 unfit state and 205 fit state cases. Both categories arrange a number of cases surpassing the required 64 observations to identify a medium-to-large effect size at the 0.8 power (Cohen, 1992). The maximum $U$ between the sum of ranks for Management System Design to Structure Fit coded data will be 16,400 and the sample $W$ is the sum of ranks for the smallest group for each dependent variable. Using the SPSS procedure to compute test statistics $U$ for each dependent variable, test results are reported in Table 32.

<table>
<thead>
<tr>
<th></th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Assets (%)</td>
<td>5437.0</td>
<td>8677.0</td>
<td>-4.419</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>3941.5</td>
<td>7181.5</td>
<td>-6.812</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>6029.5</td>
<td>9269.5</td>
<td>-3.472</td>
<td>.001</td>
</tr>
</tbody>
</table>

Grouping Variable: MSSU

Mann-Whitney U tests were used to examine significant differences between fit states for Management System Design and Structure (MSSU) and their organizational performance. As presented in Tables 31 and 32, the test results are:

- Cases with a fit state (Mean rank=156.48) were found to score significantly higher ($U=5437.0$, $z=-4.419$, $p<.05$) than cases with unfit state (Mean rank=108.46) in terms of ROA.
• Cases with a fit state (Mean rank=163.77) were found to score significantly higher (U=3941.5, \( z=-6.812, \ p<.05 \)) than cases with unfit state (Mean rank=89.77) in terms of ROE.

• Cases with a fit state (Mean rank=153.59) were found to score significantly higher (U=6029.5, \( z=-3.472, \ p<.05 \)) than cases with unfit state (Mean rank=115.87) in terms of ROI.

4.5.5 Management System Design-Lifecycle Fit and Performance

The fit states for the combination of organizational lifecycle with a growth state and management system design determined as descriptive and organizational lifecycle with a decline state and management system design determined as prescriptive are hypothesized to have a positive relationship. The following statements will be used to test the relationship between organizational lifecycle and management system design:

• H5: Organizational Lifecycle will exist in between the growth and decline extremes. A state of fit between the Organizational Lifecycle and the Management System Design will be positively associated to successful performance.
Mann-Whitney U tests were used to examine significant differences between fit states for Management System Design and Lifecycle (MSLC) and their organizational performance. The test results are:

- Cases with a fit state (Mean rank=163.48) were found to score significantly higher (U=3575.0, z=-7.018, p<.05) than cases with unfit state (Mean rank=85.67) in terms of ROA.

- Cases with a fit state (Mean rank=158.19) were found to score significantly higher (U=4684.5, z=-5.207, p<.05) than cases with unfit state (Mean rank=100.46) in terms of ROE.

- Cases with a fit state (Mean rank=162.51) were found to score significantly higher (U=3777.0, z=-6.689, p<.05) than cases with unfit state (Mean rank=88.36) in terms of ROI.

4.5.5.1 Analysis of MS Design-Lifecycle Fit and Performance

Organizational Lifecycle is the third organizational factor to explore and to test for the relationship between fit state and organizational performance. Mutually exclusive, exhaustive and measurable segments between Fit and Unfit states will be made from the combination of coded Lifecycle and Management System Design. Labeled as
MSLC, the combination provides 2 Fit and 2 Unfit states in the same manner as described for MSSA and MSSU.

The MS Design Raw score will help illustrate the distribution of Fit (MSLC=1) and Unfit (MSLC=0) states between MS Design Coded data and Lifecycle. As in the previous combinations of organizational factors, graphical representation for each dependent variable will be generated to depict the relation for fit between Management System Design and organizational lifecycle. The fit categories will be tested with the Mann-Whitney procedure and test results will be reported.

Figure 44 shows a scatterplot from segmented data coded by Management System (MS) Design for the complete data set with respect to Return on Assets. The Management System Design-Lifecycle Fit cases (MSLC=1) are represented with blue circles and the Unfit cases (MSLC=0) with red circles. To serve as a visual aid, a line at MS Raw score of 0.5 divides the cases into prescriptive and descriptive MS Designs.
The distribution of data points for either MSLC Fit state spans most of the MS Raw range. The graph indicated a larger number of MSLC Fit state (1) cases associated with MS descriptive design when compared to MSLC Unfit state (0) cases. Except for the most extreme ROA negative value, the 6 most extreme values of negative ROA were associated to a MSLC Unfit state (0). For these extreme values, the MS Design Raw scores were located at the lowest end of the observed range for each category. Conversely, the 6 most extreme values of positive ROA were associated to a MSLC Fit state (1) with five cases located in the descriptive MS Design category.

Figure 44. Scatterplot of ROA for Fit Between MS Design and Lifecycle
The full scale representation of segmented data for MSLC coded by Management System Design with respect to Return on Equity is presented in Figure 45.

![Figure 45. Scatterplot of ROE for Fit Between MS Design and Lifecycle](image)

Figure 45 shows a scatterplot from segmented data coded by Management System (MS) Design with respect to Return on Equity for the reduced range as previously described for the fit combinations for MSSA and MSSU.
The graph presents a larger number of cases for MSLC Fit (1) associated with descriptive design than those associated with prescriptive design. Different from the segmentation of MSSA and MSSU, cases for MSLC Fit (1) state associated with descriptive design covers the entire range of MS Design Raw score. Except for the extreme ROE value for case identified to company 14 in year 2004 (Appendix), the 6 most extreme cases associated with a descriptive design appears in the MSLC Unfit (0) state category.

Similarly, Figure 47 shows a scatterplot from segmented data coded by
Management System (MS) Design with respect to Return on Investment for the integrated data set.

![Scatterplot of ROI for Fit Between MS Design and Lifecycle](image)

Figure 47. Scatterplot of ROI for Fit Between MS Design and Lifecycle

As expected from previous results, the graph presents a larger number of cases with MSSA Fit (1) state in the descriptive management system design category compared to those cases associated with prescriptive design. Contrary to results for MSSA and MSSA, the 6 most extreme values for positive ROI percentages were associated to a MSLC Fit state and equally split into 3 cases in each MS Design.
category. Similarly, the 5 most extreme negative percentages for ROI values were associated to cases in the MSLC Fit state.

To summarize, the distribution and variation of cases related to Management System Design-Lifecycle (MSLC) fit state were studied and analyzed with a set of scatterplots for each dependent variable from the categorization of cases based on the MSLC fit state.

In order to compare the rank order of cases with respect to the dependent variables for organizational performance, a series of Mann-Whitney tests will be performed with the coded data for MSLC fit state in the integrated database. The Mann-Whitney test for MSLC fit state ranks is presented in Table 33.

<table>
<thead>
<tr>
<th>MSLC</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>75</td>
<td>85.67</td>
<td>6425.0</td>
</tr>
<tr>
<td>1</td>
<td>210</td>
<td>163.48</td>
<td>34330.0</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MSLC</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>75</td>
<td>100.46</td>
<td>7534.5</td>
</tr>
<tr>
<td>1</td>
<td>210</td>
<td>158.19</td>
<td>33220.5</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MSLC</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>75</td>
<td>88.36</td>
<td>6627.0</td>
</tr>
<tr>
<td>1</td>
<td>210</td>
<td>162.51</td>
<td>34128.0</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For Management System Design to Lifecycle Fit, the coded data includes 75 unfit state and 210 fit state cases. Both MSLC categories include number of cases surpassing the required 64 observations to identify a medium-to-large effect size at the 0.8 power (Cohen, 1992). The maximum U between the sum of ranks for Management
System Design to Lifecycle Fit coded data will be 15,750 and the sample W is the sum of ranks for the smallest group for each dependent variable. Using the SPSS procedure to compute test statistics U for each dependent variable, test results are reported in Table 34.

Table 34. Management System to Lifecycle Fit Test Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Assets (%)</td>
<td>3575.0</td>
<td>6425.0</td>
<td>-7.018</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Equity (%)</td>
<td>4684.5</td>
<td>7534.5</td>
<td>-5.207</td>
<td>.000</td>
</tr>
<tr>
<td>Return on Investment (%)</td>
<td>3777.0</td>
<td>6627.0</td>
<td>-6.689</td>
<td>.000</td>
</tr>
</tbody>
</table>

Grouping Variable: MSLC

Mann-Whitney U tests were used to examine significant differences between fit states for Management System Design and lifecycle (MSLC) and their organizational performance. The test results are:

- Cases with a fit state (Mean rank=163.48) were found to score significantly higher (U=3575.0, z=-7.018, p<.05) than cases with unfit state (Mean rank=85.67) in terms of ROA.

- Cases with a fit state (Mean rank=158.19) were found to score significantly higher (U=4684.5, z=-5.207, p<.05) than cases with unfit state (Mean rank=100.46) in terms of ROE.
Cases with a fit state (Mean rank=162.51) were found to score significantly higher (U=3777.0, z=-6.689, p<.05) than cases with unfit state (Mean rank=88.36) in terms of ROI.
4.6 Test Results Summary

A summary for the distribution of coded data and test results will be presented.

The distribution of cases for Management System Design follows in Table 35:

Table 35. Distribution of Coded Management System Design

<table>
<thead>
<tr>
<th>Factor</th>
<th>Total Cases</th>
<th>Coded MS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>P-Prescriptive</td>
</tr>
<tr>
<td>Management System (MS)</td>
<td>285</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D-Descriptive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>205</td>
</tr>
</tbody>
</table>

The integrated data segmentation of 285 cases into the coded Management System Design categories was split into 80 prescriptive cases (28%) and 205 descriptive cases (72%).

The distribution of cases for each set of Management System Design and organizational factors follows in Table 36:

Table 36. Distribution of Fit State and Management System - Organizational Factors

<table>
<thead>
<tr>
<th>Management System (MS )-Organizational Factor</th>
<th>Total Cases</th>
<th>Fit State</th>
<th>Coded MS</th>
<th>Unfit State</th>
<th>Coded MS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>P</td>
<td>D</td>
<td>P</td>
<td>D</td>
</tr>
<tr>
<td>Fit State</td>
<td>285</td>
<td>102</td>
<td>4</td>
<td>98</td>
<td>183</td>
</tr>
<tr>
<td>MS-Strategy (MSSA)</td>
<td>285</td>
<td>189</td>
<td>30</td>
<td>159</td>
<td>96</td>
</tr>
<tr>
<td>MS-Structure (MSSU)</td>
<td>285</td>
<td>205</td>
<td>40</td>
<td>165</td>
<td>80</td>
</tr>
<tr>
<td>MS-Lifecycle (MSLC)</td>
<td>285</td>
<td>210</td>
<td>45</td>
<td>165</td>
<td>75</td>
</tr>
</tbody>
</table>
The segmentation of Fit state for all 285 cases was split into 102 Full Fit cases (36%) and 183 Unfit cases (64%). For the period of 1991-2005, Aerospace Companies in the United States exhibiting a Full Fit for more than 8 years include General Electric (13 years), Boeing Company (12 years), Lockheed-Martin (11 years), Textron (10 years) and Precision Castparts Corporation (8 years).

The summary of test results for each hypothesis can be seen in Table 37.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Factor(s)</th>
<th>Dependent Variable</th>
<th>Significance (2-tailed)</th>
<th>Result</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1aMS</td>
<td>MS Design</td>
<td>ROA</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Descriptive &gt; Prescriptive</td>
</tr>
<tr>
<td>H1bMS</td>
<td>MS Design</td>
<td>ROE</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Descriptive &gt; Prescriptive</td>
</tr>
<tr>
<td>H1cMS</td>
<td>MS Design</td>
<td>ROI</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Descriptive &gt; Prescriptive</td>
</tr>
<tr>
<td>H2a</td>
<td>Fit state</td>
<td>ROA</td>
<td>0.001</td>
<td>Ho rejected</td>
<td>Full Fit &gt; Partial Fit</td>
</tr>
<tr>
<td>H2b</td>
<td>Fit state</td>
<td>ROE</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Full Fit &gt; Partial Fit</td>
</tr>
<tr>
<td>H2c</td>
<td>Fit state</td>
<td>ROI</td>
<td>0.049</td>
<td>Ho rejected</td>
<td>Full Fit &gt; Partial Fit</td>
</tr>
<tr>
<td>H3aMSSA</td>
<td>MS-Strategy</td>
<td>ROA</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Fit &gt; Unfit</td>
</tr>
<tr>
<td>H3bMSSA</td>
<td>MS-Strategy</td>
<td>ROE</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Fit &gt; Unfit</td>
</tr>
<tr>
<td>H3cMSSA</td>
<td>MS-Strategy</td>
<td>ROI</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Fit &gt; Unfit</td>
</tr>
<tr>
<td>H4aMSSU</td>
<td>MS-Structure</td>
<td>ROA</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Fit &gt; Unfit</td>
</tr>
<tr>
<td>H4bMSSU</td>
<td>MS-Structure</td>
<td>ROE</td>
<td>0.000</td>
<td>Ho rejected</td>
<td>Fit &gt; Unfit</td>
</tr>
<tr>
<td>H4cMSSU</td>
<td>MS-Structure</td>
<td>ROI</td>
<td>0.001</td>
<td>Ho rejected</td>
<td>Fit &gt; Unfit</td>
</tr>
<tr>
<td>H5aMSLC</td>
<td>MS-Lifecycle</td>
<td>ROA</td>
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<td>Ho rejected</td>
<td>Fit &gt; Unfit</td>
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<tr>
<td>H5bMSLC</td>
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<td>H5cMSLC</td>
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<td>Fit &gt; Unfit</td>
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Mann-Whitney non-parametric tests performed for all 285 cases at p<0.05.
CHAPTER FIVE: CONCLUSION

This chapter provides a summary of findings and conclusions of the research including particular points on limitations of the study and recommendation for future research. A brief overview of the study findings will be followed by an overall summary of the significant findings and conclusions.

5.1 Overview of Study Findings

The intend of the research was to answer: “How does fit between management systems and organizations influence organizational performance?.”

The expected goals of the investigation were to offer insight into the organizational performance field of study and to present a practical tool for managers. To fulfill these goals, the present study developed a model of fit for organizational performance after identifying management system elements and organization characteristics. Furthermore, the study provided interpretation of the research model and development of investigation constructs. Constructs for strategy, structure, lifecycle, management system, fit, and performance were defined in measurable terms for data collection and analysis.

Primary objectives of the study were met by testing hypotheses from the
research model with case studies on aerospace companies to understand the fit between an organization and the management systems, and by reporting investigation findings on fit results.

To minimize the errors and biases and increase reliability of results, this investigation developed a case study protocol and an integrated database (Yin, 1994). Case studies preclude experimentation to improve internal validity. To promote validity, the study used multiple sources of evidence and performed triangulation from archival data (Yin, 1994). Additionally, case selection from single industry and use of indicators relevant to the industry specific data set reinforced internal validity.

One major contribution from this investigation is the inclusion of the lifecycle factor in the organizational model. The ongoing problem is to apply the classification and ranking procedure across different perspectives while the process remains simple and robust.

5.2 Significant Findings

The hypotheses testing revealed that there exists significant relationship between the independent constructs for management system design, fit and organizational factors. The results from Mann-Whitney tests suggest that significant differences exist in organizational performance from fit factors between a management system design and the organization. Present study results from data analysis included cases where the organizational performance were in terms of Return on Assets, Return on Equity,
and Return on Investment.

In summary, the major findings from the study are:

1. A descriptive management system design was associated with higher levels of organizational performance over a prescriptive management system design.

2. Cases with a full fit state (management system design and organizational factors aligned) were found to score significantly higher than cases with a partial fit state suggesting that a correct fit state is associated with higher levels of organizational performance.

3. Cases with a fit state for the Organizational Strategy with the Management System Design were found to score significantly higher than cases with unfit state suggesting that a correct fit state is associated with higher levels of organizational performance.

4. Cases with a fit state for the Organizational Structure with the Management System Design were found to score significantly higher than cases with unfit state suggesting that a correct fit state is associated with higher levels of organizational performance.
5. Cases with a fit state for the Organizational Lifecycle with the Management System Design were found to score significantly higher than cases with unfit state suggesting that a correct fit state is associated with higher levels of organizational performance.

5.3 Conclusions

The performance measures used in the present study have been extensively investigated in the research fields associated with organizational management (Capon, Farley & Hoenig, 1990). The research model under study departed from comprehensive and exhaustive investigations on relevant perspectives on management systems and fit concepts. The study contributes with interpretation of a fit model associated with management systems, organizational factors, and the fit between them. The researcher suggests that the operationalization of the research model into widely used performance measures might contribute to understanding management system fit associated with organizational performance.

Present study results from data analysis included cases where the dependent variable reached equifinality with differing combinations of fit factors. These results suggest that there are multiple paths to develop effective fit to any given level of organizational performance (Doty, Glick & Huber, 1993).

Consistent with the literature, the present study continues to stress the relationship between fit and organizational structure and strategy and contributes
organizational lifecycle as fit factor within the research domain for organizational performance management. Although results indicate significant differences in organizational performance associated with the fit constructs, emphasis must be made on study limitations and implications that warrants research efforts in the future.

5.4 Limitations

Previously introduced in section 1.8 of this investigation, there are some inherent limitations that should be expanded and taken into account when interpreting the investigation findings. By stating the limitations, the researcher recognizes that further research must be undertaken to improve understanding of the study area. In particular, the researcher recognizes the limitations from the investigation’s lack of experimental control with the case study design and issues related to the reliability, validity, and scope of the measures. Although there is the possibility that causation exists, the study design precludes causation or suggestion that specific fit states result into either low or high levels of organizational performance despite the significant differences indicated by findings in the present investigation.

Study variables were operationalized using secondary sources of published information, standardized across organizations and widely accepted in the literature and by the corporate world. The operationalized variables represent real-life data sets used by managers and analysts for decision-making purposes fulfilling the investigation goal.
of presenting a practical investigation for managers to gain insight into their
organizational performance.

   Particular points on limitations of the study follow:

   1. There is no known investigation with similar empirical data on which to base a
      comparison with the results from this study.

   2. Findings of this research may not be generalized to every organization as the
      environment, strategy, structure and lifecycle of each line of business are
      rather unique.

   3. It is also possible that the results from this investigation cannot be generalized
      to other organizations outside the United States for the same reason.

   4. The study involved 19 organizations in the United States. Any relationships
      found can only be indicative of a possible trend rather than a definitive causal
      link.

   5.5 Implications for Further Research

   The findings from this investigation suggest a number of areas that might require
   attention in future research. An area recommended for future study is the possible
effects from corporate restructuring of organizations such as mergers and acquisitions. Although there were no evident effects detected with the measures employed in the investigation, the relationship might be worth exploring to understand the concept of management system fit in the context of organizational change. For example, organizational changes leading to a lifecycle state of death could not be explored in relation to management systems and performance with the case selection methodology employed in the present study.

Further research on fit with an analysis based on multiple measures of each factor for organizational strategy, structure and lifecycle, and management system might increase applicability of the fit model and could expand on relationships for fit not explored in the present study.

To further explore the research model, the study period could be expanded beyond the presented 15 years with access to the appropriate data for the aerospace industry. In future research efforts, the fit model can be developed into constructs applicable to organizations in different contexts.

This study raises an important question: How organizations reached equifinality to any given level of organizational performance from the multiple paths and differing combinations of fit factors for management systems and organizations? Understanding of the mechanism and relationships for equifinality could be further developed in future research efforts.
LIST OF REFERENCES


Duncan, R. B. (1979). What is the right organization structure?; Decision tree analysis provides the answer. Organizational Dynamics, winter, 59-80.


Weick, K. E. (1979). The social psychology of organizing. Reading, MA: Addison-Wesley


