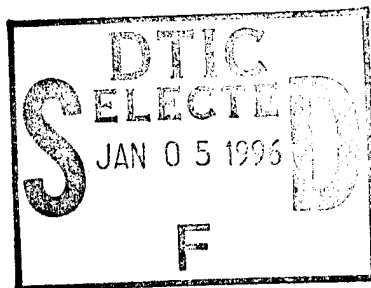


AFIT/GIR/LAR/95D-2



*DEVELOPMENT OF A METRIC EVALUATION
INSTRUMENT FOR USE IN MEASURING
ORGANIZATIONAL EFFECTIVENESS*

THESIS

John J. Dunks, Captain, USAF

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**DEVELOPMENT OF A METRIC EVALUATION INSTRUMENT FOR
USE IN MEASURING ORGANIZATIONAL EFFECTIVENESS**

THESIS

Presented to the Faculty of the Graduate School of
Logistics and Acquisition Management of the
Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Information Resource Management

John J. Dunks, B.S.

Captain, USAF

December 1995

Approved for public release; distribution unlimited

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John J. Dunks

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Abstract

Previous research has resulted in the development of instruments to measure organizational effectiveness. This thesis attempts to develop an instrument to measure how effective the organization's metrics are in relation to their organization effectiveness model, specifically, to the Competing Values Model of organization effectiveness developed by Quinn and Rohrbaugh. This should aid managers in determining whether or not they are measuring what they think they are measuring and how effective they are at measuring organizational effectiveness. The instrument developed can help determine the specific aspects of organizational effectiveness which metrics are measuring according to the Competing Values Model.

DEVELOPMENT OF A METRIC EVALUATION INSTRUMENT FOR USE IN MEASURING ORGANIZATIONAL EFFECTIVENESS

I. Introduction

Background

The Air Force has directed its commands to implement Total Quality Management (TQM) as a way of doing business. The push in this new direction is supposed to help the entire Air Force stay focused on the mission and provide uniformity of purpose to its units. The Air Force commonly addresses TQM as Quality Air Force (QAF). QAF is intended to help the Air Force streamline processes to accommodate the recent reductions in personnel and organizational restructuring throughout the Air Force. Doing higher quality work with less resources is key for the Air Force to successfully achieve its mission. With the recent implementation of QAF in the Air Force, there is a need to know how well the Air Force is achieving its QAF goals. In order to do this an effective system of process and quality measurement is essential. Unsuccessful companies tend to focus exclusively on financial measures and often lack some essential measures of quality. By lacking such measures, they learn of their quality problems only after severe damage has already been done to their organization (Juran, 1993:36).

Since an organization must measure processes to measure organizational effectiveness, how do they know when they have a good measure? "Recently the Air Force Quality Institute has begun to question whether or not the way we are measuring things and developing our measures is actually productive" (Stone, 1995). Additionally there appears to be confusion about metrics (measurements designed to identify improvement areas of processes), their design and what they are used for. Many organizations today measure themselves to baseline or benchmark their performance. The approaches used vary based on a wide range of assumptions about what constitutes effectiveness. Some organizations take a snapshot of themselves by using metrics to measure efficiency, effectiveness, and productivity. Often organizations measure what is convenient or easy to measure, rather than what is meaningful. This is often the case, because people in organizations do not understand what effectiveness is, nor the parameters which underlie it.

Once people in an organization select their metrics, how do they know if they have meaningful measures? That is, how do they know that what they are measuring will help them improve quality? People desire confidence in the fact that the measures being used mean something and can be used to control the processes within the organizations that the metrics measure. Better metrics will provide managers with better information to make better decisions. The objective

of this thesis is to provide managers with a tool to evaluate their metrics, identify how the metrics they possess can be best utilized, and identify areas where they could use metrics to monitor their organization.

Statement of the Problem

The basic statement of the problem is that people have generated many measures of productivity, but there seems to be a low level of confidence in the purpose or use of the measurements and in the meaning of the measures to the organization. Certain statistics have become embedded in management, and for management to stray from using these measures would not be "politically acceptable" (Stone, 1995). In general the measurements that are being used may not be supported by or built on substantiated models of organization effectiveness. They may not be part of a system to measure the organization; they may simply be measures of convenience with little relationship to effectiveness.

Purpose

The purpose of this thesis is to develop a system which can be used to place metrics of an organization within a substantiated model of organizational effectiveness. The thesis should provide organizations a way to evaluate metrics against a standard and as part of an organization-specific system.

Questions

The two major questions this thesis seeks to answer are:

1. Is there an adequate model available on which metric evaluation can be based?
2. Can an instrument be developed to evaluate metrics against such a model?

Assumptions

The first assumption of this thesis is that aspects of effectiveness can be objectively measured. The second assumption is that each organization's effectiveness measurement needs are unique and, therefore, no single set of measurements will be appropriate for all organizations. The third assumption is that although each organization is unique, there will be general categories into which metrics can be grouped. The fourth assumption is that an organization's measurement needs can be identified. The final assumption is that organizations cannot depend on a single measurement of organization effectiveness, but rather, must depend on a "constellation" of measurements to judge their effectiveness.

Definition of Terms

Effectiveness - defined as the degree to which an organization realizes its goals (Etzioni, 1964:8).

Efficiency - Using resources to their maximum (Robbins, 1990:77).

- Accomplishment of or the ability to accomplish a job with a minimum expenditure of time and effort (Stein, 1980:421).

- An economic index of the ratio of measured inputs to measured outputs (Cummings, 1983:198).

- Achievement of the greatest output for the least input (Mott, 1972:17).

Measurement - The act or process of quantitatively comparing results to requirements to arrive at a quantitative estimate of performance (Holmes, 1994:108).

Metrics - a measurement, taken over a period of time, that communicates vital information about a process or activity (Holmes, 1994:108).

- meaningful measures that present data, leading to fact-based decisions (Holmes, 1993:57).

- of, relating to measurement (Stein, 1980:421).

Organization Effectiveness - the degree to which an organization attains its short-term and long-term goals, ends and means, the selection of which reflects

strategic constituencies and the self-interest of the evaluator (Robbins, 1990:77).

- The ability of an organization to mobilize its centers of power for action-production and adaptation (Mott, 1972:17).

Quality - Consistently meeting or exceeding customer expectations (Holmes, 1993:1).

- Fitness for use (Devor, 1992).

- The degree to which a product satisfies the wants of a customer (Evans, 1993).

- The degree to which a product conforms to design specification and engineering requirements (Evans, 1993).

Quality Air Force (QAF) - The Air Force approach to total quality management: a leadership commitment and operating style that inspires trust, teamwork and continuous improvement everywhere in the Air Force (Holmes, 1993:1).

Total Quality - A strategically integrated system for achieving customer satisfaction that involves all managers and employees and uses quantitative methods to continuously improve an organization's processes (Holmes, 1994:118).

Scope and Delimitation

This thesis will not provide the one best measurement system for organizations to evaluate all of their metrics. The thesis will develop a way to evaluate metrics, but will not validate any specific measurements. It is hoped that the thesis will provide a way for organizations to determine the balance of their measures, but it is not going to provide the one best set of measures for an organization to measure its effectiveness. The thesis might provide a way for organizations to determine the purpose of a metric, but it will not determine the purpose of any particular metrics.

Summary

This chapter established the focus of this research effort. It outlines the general background of the questions and outlines the questions that will attempt to be answered through research. Chapter II will examine current literature to assess the place of this thesis in relation to what has been or is being done in the area of organizational effectiveness research. Chapter III will outline the methodology that will be implemented to answer the research questions. Chapter IV will analyze the results of the data collected through the methods used. Chapter V will examine the results of the analysis and provide recommendations for future research.

II. Background

Chapter Overview

Before pursuing the research objective of developing an instrument to measure metrics, relevant information concerning organizational effectiveness and some of the diverse approaches used to measure it will be examined. The four approaches that will be examined are the goal attainment, systems, strategic constituencies, and competing values approaches. Each approach will be examined regarding its definition, assumptions, and problems. Finally, the four approaches will be compared in terms of value to the organization. The framework for this chapter is similar to one used by Robbins (1990) wherein he analyzes the assumptions, problems, and value to managers of various organizational effectiveness models. His outline and style of analysis are useful in evaluating effectiveness models and have been accepted as a model for this chapter.

Organizational Effectiveness

There are problems inherent in defining and measuring organizational effectiveness (Robbins, 1990:48). In the past researchers have found it difficult to determine what organizational effectiveness means. However, most agree that organizational effectiveness is central to organization theory. In fact, it is difficult to conceive of a theory of

organizations that does not include the concept of effectiveness (Goodman and Pennings, 1977:2).

Organizational effectiveness is a critical concept in organizational theory (Lawler and others, 1980:186).

Effectiveness is important to organizations because it measures its capabilities, its ability to attain its goals, or earning potential. Thus, effectiveness usually relates directly to profitability or mission effectiveness. The three most important criteria for determining an organization's effectiveness are quantity, quality and efficiency (Mott, 1972:17). Robbins suggests that structure is what determines an organization's effectiveness. Thus, the structure of the organization's people and jobs, along with their roles and relationships, are important determinants of whether an organization is successful. Unfortunately, there is not a universal definition of organizational effectiveness. One reason there are no best criteria for effectiveness is because there is no best constituency to define effectiveness (Cameron and Whetten, 1983:270). For example, effectiveness to stock holders is likely to be somewhat different than effectiveness to management. No agreed upon decision rule is available to identify one constituency's criteria as being more important than another constituency's criteria because it partly depends on the other decision guides and partly on personal biases of the evaluator. Nevertheless, organizations rarely

satisfy all their constituencies, and what appears to be high effectiveness from one point of view may be interpreted as being mediocre or low effectiveness from another point of view (Cameron and Whetten, 1983:270).

The early approaches defined effectiveness as the degree to which an organization realized its goals (Etzioni, 1964:8). Hidden in this definition, however, were many ambiguities that severely curtailed both research on the subject and practicing managers' ability to grasp and use the concept (Robbins, 1990:49). One condition most researchers agree is necessary for an organization's success is survival (Kimberly, 1979:438). Of course, this assumes that we can identify the death of an organization. In reality most organizations merge, sell off parts or liquidate, but no actual "death" is identifiable. Additionally if an organization is its people, then the members of an organization rarely die when the organization fails to exist. For some organizations death practically never occurs, while in some cases, the organization commits suicide to escape eventual death in the most effective manner (Pfeffer, 1978). Most important of all, we must recognize that even a commonly agreed upon term like survival, collapses under close analysis.

The belief that organizational effectiveness defies definition has been widely accepted (Robbins, 1990:51). However, this belief is mainly due to the previous research

done on the subject highlighting the differences or weaknesses among organizational effectiveness models. Previous writing has largely aimed at replacing older perspectives on effectiveness rather than adding to them (Cameron and Whetten, 1983:261). The more recent studies are starting to examine the similarities or commonalities of organizational effectiveness criteria (Cameron, 1986:539). It is widely agreed that organizational effectiveness requires multiple criteria, that different organizational functions have to be evaluated using different characteristics, and organizational effectiveness must consider both means (process) and ends (outcomes) (Robbins, 1990:51). We still have to wait for some gifted theorist who can develop a paradigm that can unify the present accomplishments and provide theoretical guidance for those who wish to tackle this construct (Pennings, 1978:539).

Organizational assessment models are basically theories of organizational functioning (Lawler and others, 1980:121). As theories they display certain characteristics (Kerlinger, 1964). Organization theories typically contain a particular construct called effectiveness. This provides a means for evaluating the performances of an organizational system, not just describing it (Lawler and others, 1980:121).

Using a model for assessing an organizations' effectiveness effort can provide many benefits.

At the most simplistic level, using a model facilitates communication among the evaluators, who will be able to approach their task with a common set of terms and frame of reference and avoid confusing, nonproductive, and personalized abstractions of the domain to be covered. Indeed, if the model can be represented graphically, it becomes a "map" of that domain to which everyone can refer and return when necessary. Further, the model makes clear the factors and relationships that are of interest and, by implication, those that are not. (Lawler and others, 1980:133)

A model is perhaps most beneficial in that it defines what should be assessed. One way to understand the problem of specifying the domain of organizational effectiveness is to briefly examine the indicators used in organizational effectiveness studies. Campbell provides an outline for understanding these indicators (Table 2-1).

Table 1. Top 30 Organizational Effectiveness Indicators

Overall effectiveness	Motivation	Managerial task skills
Productivity	Morale	Information management
Efficiency	Control	Readiness
Profit	Conflict-cohesion	Utilization of the environment
Quality	Flexibility-adaptation	Evaluation by external entities
Accidents	Planning and goal setting	Stability
Growth	Goal consensus	Value of human resources
Absenteeism	Internalization of goals	Participation and shared influence
Turnover	Role and norm congruence	Training and development emphasis
Job satisfaction	Managerial interpersonal skills	Achievement emphasis

(Campbell and others, 1974)

What can be learned from this list? First although the list is long, it is not exhaustive. We can think of other criteria which might be used to measure organizational

effectiveness. For example, stock prices or company publications. Second, not all of the indicators are likely to be relevant for all types of organizations. For example, service versus product oriented firms and small versus large firms would probably have different indicator lists. Additionally, some of the indicators may be determinants, that is, causes of other indicators (Lawler and others, 1980:194). The remainder of this chapter attempts to outline some of the diverse approaches to studying organizational effectiveness that utilize indicators to evaluate organizational effectiveness.

The Goal Attainment Approach

An organization is, by definition, created deliberately to achieve one or more specified goals (Perrow, 1961:854). Thus, the most widely used method to measure organization effectiveness is the goal attainment approach. An example of a common goal attainment approach is called "Management by Objective" (MBO) and is defined as:

A management process whereby the supervisor and the subordinate, operating under a clear definition of the common goals and priorities of the organization established by top management, jointly identify areas of responsibility in terms of results expected and use these measures as guides for operating the unit and assessing the contributions of each of its members. (Odiorne, 1965:55-56)

The goal attainment approach focuses on the ends rather than the means or process. It is profit maximization, growth, increased productivity, the bottom line, winning the

game or war, reduction of disease or restoring a patient's health that counts. The commonality is that the end for which the organization was created is the primary consideration. In these terms, the organization that attains some predetermined objective, purpose, mission or goal (usually an outcome or end) is operating effectively. The implication is that organizations are goal-seeking entities which can most rationally be evaluated by measuring their degrees of goal attainment (Strasser, 1978:6).

Assumptions. The underlying assumption is that organizations are goal-seeking entities. Thus, goal accomplishment is the measurement of choice for measuring organizational effectiveness. However, the use of goals requires other assumptions to be present if goal accomplishment is to be a useful measurement.

First, an organization needs to be able to define ultimate goals. Second, these goals need to be defined so that all involved can understand them. Third, the number of goals needs to be few enough to be manageable. Fourth, a majority of the organizational leaders need to have a general consensus on the goals. Finally, progress toward achieving these goals needs to be measurable. (Robbins, 1990:54)

Problems. The goal attainment approach has several problems that would deter a manager from using it as the only approach. Many of the problems relate directly to the previously mentioned assumptions.

When the goal attainment approach is put into use, one must ask, "Whose goals? Management's?" If so, what is the

criteria for being included as a goal designed for the organization? Also, often members of an organization who have the most influence on the organization's goals are not part of management. Etzioni, for example, argues that the goal model evaluator often "projects" his own value system into the goal identification process (1960:112). The result is an evaluation of the evaluator's goals and not the organization's.

Katz and Kahn apply the "Whose goal critique" in two different ways. On one level an invalid set of organizational goals might be identified by the evaluator, because his source of information in the organization "may idealize, rationalize, distort, omit or even conceal some essential aspects of the functioning of the organization". On a second level they suggest that the goal model confuses "purposes or goals of organizations with the purposes or goals of individual members" (Katz and Kahn, 1966:15). One implication of this is that the evaluator may focus attention on a non-representative set of goals, that is a set of goals of only the top management, and not that of the organizational members. In the first case the outcome can be an evaluation of false goals; in the second, a very limited scope evaluation may result.

Official goals of an organization are often not the organizations actual goals (Warriner, 1965:140). Official goals of an organization tend to be influenced by what is

socially acceptable to society, or stakeholders. Often, some of the goals stated, such as to hire minorities or protect the environment, do not tell us what the organization is actually trying to accomplish or they exclude measures of organization behavior and processes. Thus, when evaluating an organization's goals, one should evaluate both what the organization says are their goals and what the members of the organization are actually doing (Robbins, 1990:55). Similarly, an organization's short-term goals are often different from its long-term goals. The problem that arises from this, is the dilemma an organization has in choosing which goals to implement, short-term or long-term.

It may just be that for many organizations, goals do not direct behavior (Robbins, 1990:56).

The common assertion that goal consensus must occur prior to action obscures the fact that consensus is impossible unless there is something tangible around which it can occur. And this something tangible may well turn out to be actions already completed. (Weick, 1969:8)

In summary, the goals an organization presents depend on whom they present the goals to. Corporations issue one set of goals to stockholders, another to customers, a third set to employees, a fourth to the public, and still a fifth set for management itself. Formal statements of goals should be treated as fiction produced by an organization to account for, explain, or rationalize its existence to particular

audiences rather than as valid and reliable indications of purpose (Warriner, 1965:143).

Value to Managers. These problems, while certainly required for consideration of instituting the goal attainment approach, they are not intended to condemn the usefulness of the approach. Goal models are more objective than some of the other models. Additionally, their outputs are easy to interpret. Organizations exist to achieve goals--the problems lie in their identification and measurement.

The validity of those goals identified can probably be increased significantly by (1) ensuring that input is received from all those having a major influence on formulating the official goals, even if they are not part of senior management; (2) including actual goals obtained by observing the behavior of organization members' (3) recognizing that organizations pursue both short- and long-term goals; (4) insisting on tangible, verifiable goals rather than relying on vague statements that merely mirror societal expectations; and (5) viewing goals as dynamic entities that change over time rather than as rigid or fixed statements of purpose. (Robbins, 1990:57)

If managers are willing to tackle the inherent problems in the goal attainment approach, they can obtain valuable information in measuring an organizations' effectiveness. However, there is more to organizational effectiveness than establishing goals and measuring specific ends.

The Systems Approach

One method of looking at organizations is as a system, with inputs, processes to transform the inputs, and outputs.

A cooperative system is a complex of physical, biological, personal, and social components which are in a specific systematic relationship by reason of the cooperation of two or more persons for at least one definite end. Such a system is evidently a subordinate unit of larger systems from one point of view; and itself embraces subsidiary systems-physical, biological, etc.-from another point of view. One of the systems comprised within a cooperative system, the one which is implicit in the phrase "cooperative of two or more persons," is called an organization. (Barnard, 1938:65)

A system, by its very nature, is made up of interdependent elements. As such, actions that affect one element must affect others also. Cleland states that actions of one element cause reactions on the part of others (1972). End goals, outputs, are not ignored, but are part of the system as a whole. Thus, the approach focuses more on the means to achieving goals, than the goals themselves. The recognition of such interactions and interdependencies both within and without the organization is the essence of the systems viewpoint (Cleland, 1972:77).

Assumptions. The first assumption is that organizations are made of entities, working together to accomplish a goal. These entities are related, that is if any one of the entity's performance is poor, it will likely have a negative effect on the organization as a whole. The second assumption is that organizations can be measured by effectiveness objectively. The third assumption is that organizations must maintain a working relationship with external entities to survive. That is, if they do not

maintain a working relationship with external entities, then the organization's operational effectiveness will be affected. The fourth assumption is that an organization cannot survive without steady replenishment of resources, including the replacement of personnel, adapting to the environment, and replacement of subpar outputs of the organization. Failure to replenish resources will result in the organizations' decline and, possibly, death (Robbins, 1990:59).

Problems. Critics consider the systems approach abstract and not very practical (Cleland, 1972). Talking about inputs, transformations, and outputs isn't how everyday managers discuss problems, make decisions, and face reality (Ivancevich and others, 1994:57). Two of the more prominent problems of the systems approach are measuring and the point of whether the means really matter. It is argued that the most important measure of an organization is survival, so does it really matter how they survive. The goal is to survive, not to look good while dying. Measuring specific end goals may be easy compared with trying to measure process variables such as "flexibility of response to environmental change" or "clarity of internal communications" (Robbins, 1990:61). Developing measures that are valid and reliable to measure processes as these may be impossible. One example is transportation planning, where success has been achieved by saving time for

passengers. The question is, What is time worth? In fact, more complex considerations arise, are savings of one hour for a single individual equal to sixty-one minute time savings for sixty people? The problem with measuring means is that the concern is with how organizational effectiveness is achieved, rather than whether or not an organization is effective. The focus is still on achieving a single goal of accomplishing certain means. This is sub optimization because it only focuses on part of the organization.

Value to Managers. The existence of clearly defined objectives for an organization has value. First, people know what they should be trying to do, and it is thereby possible for all to work toward a common goal. Second, clear objectives serve as a basis for performance evaluation and control (Cleland, 1972:234). Managers who use this approach tend to optimize the health of the organization for long term survival as opposed to looking good today. Managers tend to be more aware of how one element of the organization relates to another. For instance, if management overlooks raw materials and there is a shortage, then the organization is less likely to achieve its end goals. Another plus for the systems approach is its applicability where end goals either are very vague or defy measurement (Robbins, 1990:62). Managers often use budget increases as a measurement of effectiveness, thus substituting a raw material measurement for an output measurement.

The Strategic Constituencies Approach

The strategic constituencies approach proposes that an effective organization is one that satisfies the demands of those constituencies in its environment from whom it requires support for its continued existence (Pfeffer and Salancik, 1978).

The contingency view of organizations and their management suggests that the organization is a system composed of subsystems and delineated by identifiable boundaries from its environmental suprasystem. The contingency view seeks to understand the interrelationships within and among subsystems, as well as between the organizations of variables. It emphasizes the multivariate nature of organizations and attempts to understand how organizations operate under varying conditions and in specific circumstances. Contingency views are ultimately directed toward suggesting organizational designs and managerial systems most appropriate for specific situations. (Ivancevich and others, 1994:58)

A constituent or stakeholder is defined as any group or individual who can affect or is affected by the achievement of the organizations objectives (Thompson, 1967). The underlying approach is similar to that of the systems approach, with one exception. The strategic constituencies approach is not concerned with all of the organizations' environment, but rather only those constituents that can directly effect the survival of the organization. The issue is pure and simple: survival (Freeman, 1984:33). That is the constituents that need to be kept happy or satisfied in order for the organization to continue to thrive. Some

constituents or stakeholders must be satisfied in order to keep them from disrupting the smooth operations of an organization.

For instance, some corporations must count "terrorist groups" as stakeholders. As unsavory as it is to admit that such "illegitimate" groups have a stake in our business, from the standpoint of strategic management, it must be done. Strategies must be put in place to deal with terrorist if they can substantially effect the operations of the business. (Freeman, 1984:53)

Additionally, the military serves to protect the public, but the constituent that controls its existence is Congress, thus the military attempts to satisfy Congress' desires instead of the general public's.

Assumptions. The strategic constituencies approach views organizations as political arenas where different stakeholders compete for control over various resources (Robbins, 1990:63). Thus, the measurement of effectiveness is the level to which an organization satisfies its critical constituents, at least those from which the organization's survival depends upon. It also assumes that the stakeholder environment is static and that there will be no radical shifts in the stakeholders actions (Freeman, 1984:35). Because the stakeholder environment is static, adversarial groups are not considered as stakeholders (Freeman, 1984:35). Additionally the approach assumes that there are different stakeholders, with various levels of influence, each trying to satisfy its own demands. However, each stakeholder has its own demands, usually different from the

organization's. Finally, the strategic constituencies approach assumes that the goals pursued by the organization's managers represent the interest of the stakeholders that control the organizations survival. Regardless of which goals are pursued, some of the constituents will be more satisfied than others.

Problems. As with other approaches, the strategic constituencies approach has its problems. The task of separating the strategic constituencies from the larger environment is easy to say but difficult to do in practice (Robbins, 1990:67). Due to a rapid changing environment, what defines who the strategic stakeholders are today, as opposed to yesterday? More importantly, the managers who are defining the critical stakeholders may have different opinions or interests, as to who the critical stakeholders are, among themselves. If the organization strictly focuses its priorities toward the constituents identified today, then it may not identify new critical constituents until after they have already impacted the organization. The organization may not take into account the impact some of the less critical constituents may have in the future. Additionally, the concerns or goals of the organization may not be in line with its most critical stakeholder, causing the organization to risk its demise. The organization might pursue a direction for the organization that is not in its best interest. The smaller, less critical stakeholders are

often overlooked. However, they may, all of a sudden, become important due to a change in the environment. Finally determining what the stakeholders actually expect the organization to provide them can be difficult at best.

Value to Managers. If the sole interest of management is survival, then it is inherent that management knows who its stakeholders are. If an organization implements the strategic constituencies approach, the possibility of it overlooking a stakeholder on which its survival depends is less likely. While at the same time, the organization can build a knowledge base on particular stakeholders for use in future management decisions. As a result, the approach provides the organization with concrete analytical tools and managerial processes. Additionally, by regularly identifying the stakeholders required for the organization's survival, the organization can manipulate its goals and priorities to meet the demands of the constituent that has the most influence or power over the organization.

The Competing Values Approach

Several studies that address the characteristics of effective organizations have been performed (Quinn, 1988:47). The results vary depending on which study is examined. Thus, Quinn and Rohrbaugh developed the competing values model to analyze what experts think about effective organizations (1981:122).

Instead of asking what effective organizations looked like, we decided to ask how experts think about effective organizations. This would allow us to get to the assumption behind the studies and perhaps make sense of what was causing the confusion. The data from the studies were analyzed using a technique called multidimensional scaling. Results of the analyses suggested that organizational theorists and researchers share an implicit theoretical framework, or cognitive map. (Figure 1) (Quinn, 1988:47)

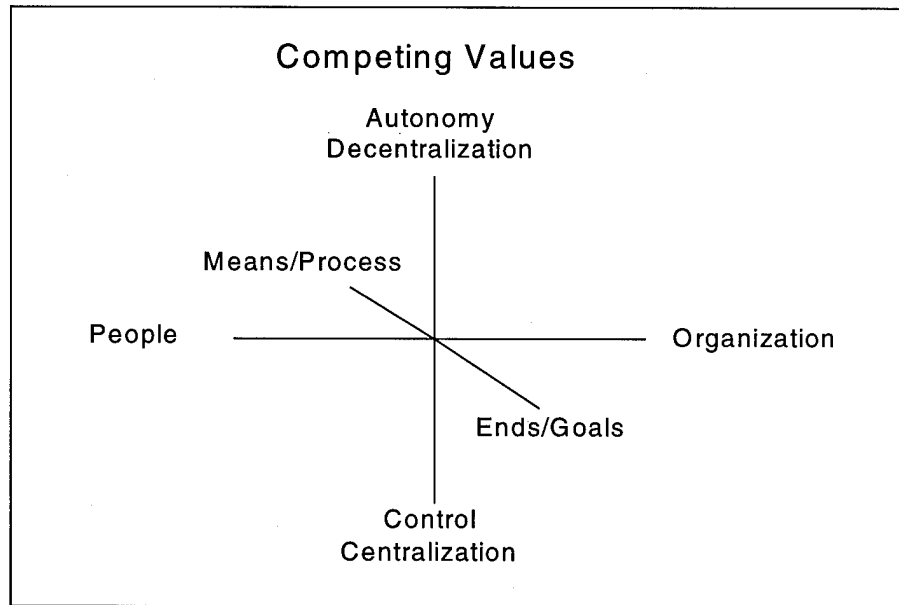


Figure 1. Competing Values Framework.

Figure 1 shows the three "multidimensional scales" Quinn and Rohrbaugh identified as being relevant to organizational effectiveness. The vertical axis represents decentralization on one end and centralization at the other, while the horizontal axis represents people as the basic subelement of the organization on one end and the organization as a whole on the other. The axis between the horizontal and vertical axis represents means or process on

one end and ends or goals on the other. This framework has been expanded (Figure 2) to form a more constructive framework for measuring organizational effectiveness.

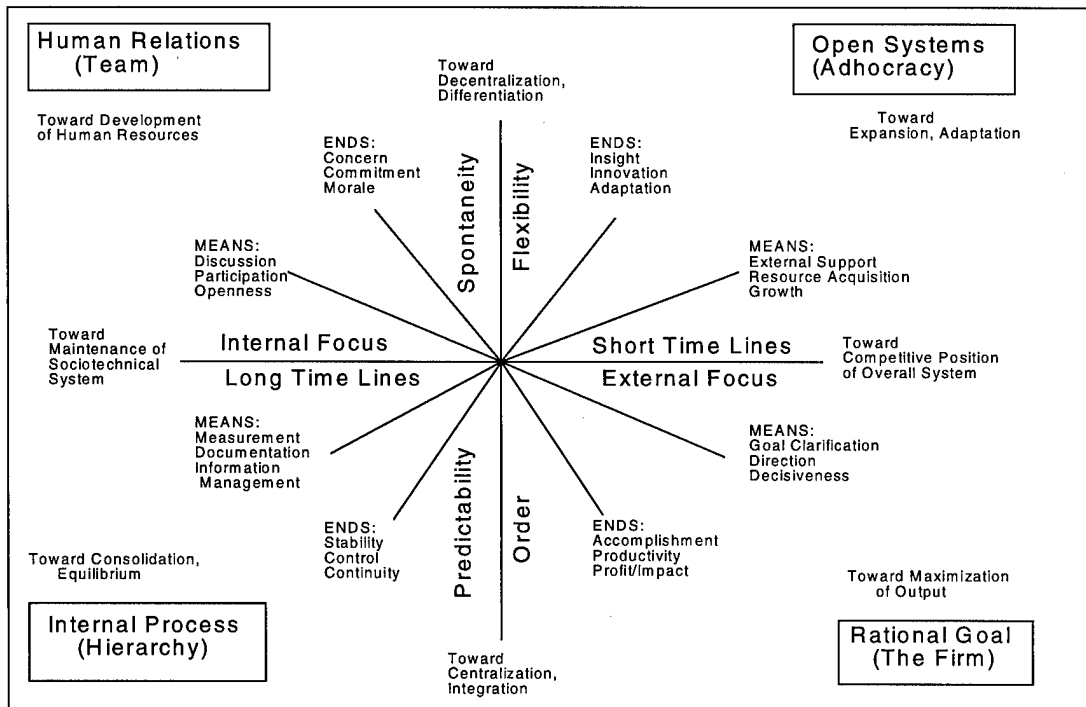


Figure 2. Competing Values Framework: Effectiveness.

The vertical axis represents flexibility and autonomy at one end and stability and control at the other. The horizontal axis represents internal focus on individuals on one end and a more external focus on the whole organization on the other. The intersection of these two axis forms four quadrants, with each quadrant representing one of the four major models in organization theory. The upper left quadrant identifies with the humans relations model and emphasizes morale and human resource development. The upper

right quadrant identifies with the open systems model and emphasizes flexibility, readiness, growth and external support. The lower left quadrant identifies with the internal process model and emphasizes information management, communication, and bureaucratization. The lower right quadrant identifies with the rational goal model and emphasizes planning, goal setting and productivity.

Each model has a polar opposite (Quinn, 1988:47). For instance, the open systems model, which emphasizes flexibility and external support, stands opposite the internal process model, which emphasizes control and internal focus. Additionally, there are parallels among the models. Human relations and open systems models both place an emphasis on flexibility. There are other similarities among the other models. Each of the models has a means to achieve an end. For instance, "in the internal process model is the hierarchy, where information management and communication are viewed as a means of arriving at stability and control" (Quinn, 1988:47).

The scheme is called the competing values framework because the criteria seem to initially carry a conflictual message. We want our organizations to be adaptable and flexible, but we also want them to be stable and controlled. We want growth, resource acquisition, and external support, but we also want tight information management and formal communication. We want an emphasis on value of human resources, but we also want an emphasis on planning and goal setting. The model does not suggest that these oppositions cannot mutually exist in a real system. It suggests, rather, that these criteria, values, and assumptions

are oppositions in our minds. We tend to think that they are very different from one another, and we sometimes assume them to be mutually exclusive. (Quinn, 1988:47-49)

Quinn has applied the competing values model to many different problems in the past (Quinn, 1988:49). This model provides us with a comprehensive understanding and an integrated framework for examining organizational effectiveness.

The main theme underlying the competing values approach is the criteria you value and use in assessing an organization's effectiveness- return on investment, market share, new product innovation - depend on who you are and the interests you represent (Robbins, 1990:68). It is not surprising that different groups of people, within or outside the organization, have different expectations of how an organization will be effective in meeting their needs. This means the perspective of the evaluator can determine what the values are most important to be effective. The rating, therefore, probably tells us more about the values of the evaluator (what he or she prefers in terms of an organization) than it tells us about the organization's effectiveness (Robbins, 1990:68).

Assumptions. It begins with the assumption that there is no "best" criterion for evaluating an organization's effectiveness (Robbins, 1990:68). The organization cannot decide on a single goal or come to an agreement on the priority of the goals. That is, because the managers each

have their own interests and values, their beliefs in what makes the organization effective differ.

The competing values model recognizes these differences and attempts to consolidate and organize them. The competing values approach argues that there are common elements underlying any comprehensive list of organizational effectiveness criteria and that these elements can be combined in such a way as to create basic sets of competing values (Robbins, 1990:69). The collection of these elements then forms a unique effectiveness model for the organization.

Problems. Since the competing values model integrates all or parts of the other models, it should be more effective than using one of the others alone. However, although it includes the constituencies approach it does little to alleviate the problems addressed with that approach (Robbins, 1990:76). Additionally, the approach does more for identifying management's perception on how well the organization is doing on the eight different criteria than which criteria the organization is emphasizing in its management practices.

Value to Managers. Competing values recognizes that managers have different criteria and interest when they define or assess their organization's effectiveness. Additionally, by reducing a large number of effectiveness criteria into a conceptually clear organizational model, the

competing values approach can guide the manager in identifying the appropriateness of different criteria to different constituencies (Robbins, 1990:76).

Comparing the Four Approaches

Four different approaches for assessing organizational effectiveness has been presented. Each of the models is useful in its own way. Table 2 illustrates what each approach uses to define effectiveness and suggests when it might be most effective at measuring organizational effectiveness.

It is important to note that an organization is not "located" in any specific quadrant of the model. Rather, an organization is "mapped" onto the Framework to show the organizations relative emphasis on each of the four effectiveness quadrants.

Table 2. Comparing the Four Organizational Effectiveness Approaches

<u>APPROACHES</u>	<u>DEFINITION</u>	<u>WHEN USEFUL</u>
	An organization is effective to the extent that . . .	The approach is preferred when . . .
Goal Attainment	it accomplishes its stated goals.	goals are clear, time bound, and measurable.
Systems	it acquires needed resources.	a clear connection exists between inputs and outputs.
Strategic Constituencies	all strategic constituencies are at least minimally satisfied.	constituencies have powerful influence on the organization, and the organization must respond to demands.
Competing Values	the emphasis of the organization in the four major areas matches constituent preferences.	the organization is unclear about its own emphasis, or changes in criteria over time are of interest.

(Cameron, 1984:276)

Summary

Organizational effectiveness is difficult, some experts say impossible, to define. Yet, it is the core focus of most organizations' management in understanding their organization. Four approaches have been examined from the organizational effectiveness model "swamp."

While the goal attainment approach defines organizational effectiveness as the attainment of ends, the systems approach focuses on means. The strategic constituencies approach provides an additional perspective by defining organizational effectiveness as satisfying the demands of the constituents that the organization must satisfy to remain in existence. The final approach was

competing values, which focuses on both means and ends, while recognizing its constituents.

Although I was not able to define organizational effectiveness more precisely than has been done in the past, I was able to find a model of organizational effectiveness that covers a wide range of effectiveness concepts and parameters. I have chosen the Competing Values Model as a basis for my instrument. The Competing Values Approach seems to encompass more of the indicators of effectiveness and the dimensions that are required to truly measure effectiveness.

III. Methodology

Chapter Overview

The goal of this research was to develop an instrument capable of evaluating an organization's metrics. This chapter describes and explains the methodology used to construct, test, and interpret the results of the questionnaire.

This Chapter begins by describing the rationale for each of the author's objectives:

1. Is there an adequate model available on which metric evaluation can be based?
2. Can an instrument be developed to evaluate metrics against such a model?

Restatement of Research Objectives

The first objective was to select an adequate model or models on which metric evaluation could be based. Chapter II accomplished this by outlining some of the more prominent models available. The chapter then analyzed each model for its value at evaluating an organization's effectiveness. The model that was selected from the four models that were examined was the Competing Values Model. A complete explanation of that model is included in Chapter II.

The second objective was to create an instrument to evaluate metrics that measure an organization's

effectiveness using the Competing Values Model. The reader will find a discussion of the methods used and conclusions of this portion of the research in this chapter and Chapter IV, Data Analysis.

Research Approach

The most appropriate method for conducting this study was determined to be an instrument validation methodology using a survey. As reflected by the research objectives and the literature review, the evaluation of metrics within an organization for their effectiveness in measuring organizational effectiveness is in its infancy. Thus, the instrument was based on an existing model, using questions based on Competing Values Model parameters to validate the ability to differentiate among metrics. The primary goal was to provide a useful instrument. This instrument should help an organization's management to better understand how their metrics measure their organization's effectiveness in terms of the parameters of the model.

Research Design

In keeping with the purpose of this research, The project was designed to "collect detailed factual information that describes existing phenomena" (1971:18). The first step in the collection process was to develop an instrument based on the Competing Values Model. The second was to validate the developed instrument by testing it with

a set of metrics on a sample of people able to judge the utility of the metrics. First I will give an overview of the instrument.

Instrument. The Competing Values approach to analyzing an organization's effectiveness was used as a starting point. The questions were then designed to reflect the ends and means goals of each of the quadrants of the Competing Values Model. A five-point Likert scale was used to elicit responses from subjects. Each of the 24 questions (six per quadrant) attempted to either identify an end or a mean within one of the four quadrants. Additionally, standard semantic differential scales (Osgood and Others, 1957) were used to give a comparative measure of peoples' value judgments about the metrics.

The five Likert response points were; 1 = Of slight use, 2 = Of some use, 3 = Of moderate use, 4 = Of significant use, and 5 = Extremely useful.

The questions associated with the Human Relations (HR) quadrant ends and means were:

Of how much use is the metric in determining...

HR Ends

1. The level of concern members have for the organization?
2. The level of commitment members feel toward the organization?

3. The level of morale within the organization?

HR Means

1. The degree to which the organization uses discussion among members to set goals and/or solve problems?

2. The degree to which all members have an opportunity to participate in organizational decision making?

3. The degree of openness of management within the organization?

The questions associated with the Open Systems (OS) quadrant ends and means were:

Of how much use is the metric in determining...

OS Ends

1. The organization's ability to gain support from other organizations' to expand the organization's capabilities?

2. The organization's ability to expand its resources to grow?

3. The organization's ability to expand or increase maximum output?

OS Means

1. The level of innovation within the organization?

2. The ability of the organization to adapt to change?
3. The degree of insight the organization has of its environment?

The questions associated with the Internal Process (IP) quadrant ends and means were:

Of how much use is the metric in determining...

IP Ends

1. The effectiveness of the information provided by the organization's information structure?
2. The utility of the organization's rules, regulations, policies, or procedures?
3. The quality of process measurement within the organization?

IP Means

1. The stability of operational processes within the organization?
2. The level of control by management over processes within the organization?
3. The ability of the organization to sustain a smooth work flow?

The questions associated with the Rational Goal (RG) quadrant ends and means were:

Of how much use is the metric in determining...

RG Ends

1. The impact the organization's products/services have on customers?
2. How well the organization uses its resources?
3. How effective the organization accomplishes its goals?

RG Means

1. How decisive leaders have been in responding to employees' production-related concerns?
2. How clear leaders have been in defining operational goals?
3. How directive leaders have been in managing the organization?

Semantic Differential. The semantic differential was used to measure perceived meaning of a word or concept across three major parameters (Activity, Evaluative, and Potency). Standard items for each scale developed by Osgood, Suci and Tannebaum were used (1957). The standard items for each parameter are in displayed Table 3.

Table 3. Semantic Differential Parameters

Activity	Evaluative	Potency
Active - Passive	Good - Bad	Small - Large
Slow - Fast	Low - High	Weak - Strong
Dull - Sharp	Bitter - Sweet	Delicate - Rugged
Calm - Excitable	Worthless - Valuable	Light - Heavy

Initially, the dimensions used to evaluate a concept by subjects must be determined. The complete range of meaning for a concept was considered the semantic space of a concept (Osgood and others, 1957:31). The relationships among the scores on the three scales represents a measurement of the meaning. In this research, peoples' semantic space for each metric was being sought as a correlate.

The pairs of polar opposites are combined in an instrument which uses Likert-like scaling. This gives the subject the ability to agree or disagree to varying degrees with the polar extremes. "The purpose of...factoring work was to discover the 'natural' dimensionality of the semantic space, the system of factors which together account for the variances in meaningful judgments..." (Osgood and others, 1957:31). "Both the Likert and semantic differential formats have a greater rigor and structure than other question formats. These formats produce data suitable to both indexing and scaling" (Babbie, 1986:376-77).

The order of the scale items was randomized as were the positive and negative ends of the scale. Isaac and Michael

point to the importance of this random placement in constructing semantic differentials by stating, "arrange the polar adjective pairs so that the favorable, potent, or active end of the scale was randomly placed in a right or left position to avoid position habits in the response pattern" (Isaac and Michael, 1981:146). Although I do not use semantic differentials as they are strictly defined by Isaac and Michael, it was still important to avoid the "position habits" of subject responses by random placement of the positively connotated word in the instrument (1981:146).

Metrics. I developed a hypothetical metric for each quadrant of the Competing Values Model. There were eight metrics created in all, one each for means and ends. These metrics were created to reflect effectiveness of an academic institution. Each metric consisted of a title and a brief description of how the metric could be calculated. These metrics will be used to determine if the instrument can predict the appropriate quadrant for which they were created. The metrics and their descriptions follow:

Metric 1 - Faculty Departure Rate.

It is calculated by using the percent of total civilian faculty who leave each year for positions with other institutes.

Metric 2 - Commander Contact Rate.

It is calculated by the number of meetings per year by commandant/dean with students.

Metric 3 - Program Manager Effectiveness.

It is calculated by the percent of students satisfied with their academic program management.

Metric 4 - Course Criteria Satisfaction.

It is calculated by the degree to which the instructor adhered to the stated course grading criteria.

Metric 5 - Program Application Rate.

It is calculated by the number of student applications per available slot for each program.

Metric 6 - Course Innovation.

It is calculated by the percent of faculty time spent on course development/improvement.

Metric 7 - Faculty Publication Rate.

It is calculated by the number of publications per faculty member per year.

Metric 8 - Thesis Topics Generated by Faculty.

It is calculated by the number of thesis ideas suggested by faculty as percent of total thesis topics.

Selection of Subjects. I limited the selection of subjects to faculty and students within the Air Force Institute of Technology. I assumed this would give the subject an adequate base of experience from which to evaluate the educational metrics used in this research. I also made no attempt to make this a multi-cultural instrument. This limits the subjects to English speaking "Western or American" members of society. These members must have also used metrics within an organization.

Sample. The sample consists of members of the faculty and student body of the Air Force Institute of Technology. This sample represents college graduates with a minimum of a bachelors degree. All are English-speaking although for some English was a second language. Other organizations' should be measured in the future to establish a more comprehensive data base.

Data Collection and Analysis

Each person recorded their responses to three different metrics directly on the surveys. Thirty six item (24 end/means scale and 12 semantic differential) responses to each metric constituted a record.

The scale scores were calculated in the following manner. The competing values scale scores were calculated as the mean of the item scores for each scale. The semantic

differential was calculated as the mean of items associated with each semantic differential parameter.

The analysis method was a statistical based approach that analyzed the relationship of the metrics to the competing values scales and semantic differential scales. The analysis provided information on mean and significant correlations.

Methodological Assumptions and Limitations

There are limitations to this methodology in spite of efforts to use highly appropriate tools. The first was inherent in the task. This instrument deals essentially with meaning and interpretation. Regardless of the rigor in the instrument and its administration, scales and factors are open to the interpretation of each reader (Isaac and Michael, 1971:103).

My sampling method was subject to criticism on at least three fronts. First, the entire sample was voluntary. And so, there was no way to know if the responses of respondents (volunteers) would differ significantly from non-respondents (non-volunteers). Second, the convenience method of sampling drew a very high percentage of subjects from military backgrounds. This was reported in the findings of the next chapter. Third, the number of respondents permits only about an 80-85% level of significance in interpreting the findings.

An additional threat to internal validity was the maturation process (Campbell and Stanley, 1963:5). Subjects could conceivably lose interest, tire, or learn during the course of completing the instrument. I countered this threat by designing the instrument to be as short as possible. The average estimated time to complete it was 15 minutes.

The first threat to external validity was "interaction effects of selection biases and the experimental variable" (Campbell and Stanley, 1963:6). The particular nuance of this threat that was applicable here concerns the representativeness of the sample. The predominance of subjects with a military background jeopardizes any attempt to generalize the findings.

The last threat was also one to external validity. Campbell and Stanley call it the threat of "reactive effects of experimental arrangements" (1963:6). While I have not introduced a treatment, per se, to the subjects, this threat should be addressed. There was a danger in assuming the instrument developed here will exhaustively describe the concept, metric evaluation. Such a generalization was not appropriate. I have attempted to construct an instrument that would test the parameters. Subjects are limited in the ability to respond by the scales I have used to represent each parameter. If there are additional factors to metric

evaluation, the subjects will find no way to include these in the responses provided.

Summary

This measure should help an organization better understand how their metrics are measuring their organization. It might help them identify areas that may not be being measured, and possibly areas where they are over measuring. Additionally, it might indicate if they are measuring what they believe they are measuring. That was, are they operating the way they claim to be.

The development and validation of the survey in itself was the primary objective here. The testing and analysis of the measure being administered to one organization was only the first step in validating the measure a useful and valuable instrument.

IV. Data Analysis

Chapter Overview

This chapter presents findings of the research effort as described in Chapter III, Methodology. The findings are presented in the same order as the research objectives.

Research Objective One: Is there an adequate model available on which metric evaluation can be based?

Research objective one was introduced in Chapter II, Literature Review. As expected, there was an adequate model available on which to base a metric evaluation instrument.

The Competing Values Model was chosen because it is more encompassing at measuring organization effectiveness than the Goal Attainment, Systems, or Strategic Constituencies approaches. The Competing Values Approach considered thirty indicators of organization effectiveness within its framework. Additionally, the framework proposed by the Competing Values Model lent itself to be used as a foundation for an instrument that could evaluate metrics.

It is appropriate to recap the Competing Values Model at this point. It is summarized in Figure 3. A more complete description can be found beginning on page 24 of Chapter II. The vertical axis represents decentralization on one end and centralization at the other, while the

horizontal axis represents people on one end and the organization on the other. The axis between the horizontal and vertical axis represents means/process on one end and ends/goals on the other. This framework has been expanded (Figure 3) to form a more constructive framework for illustrating organization effectiveness.

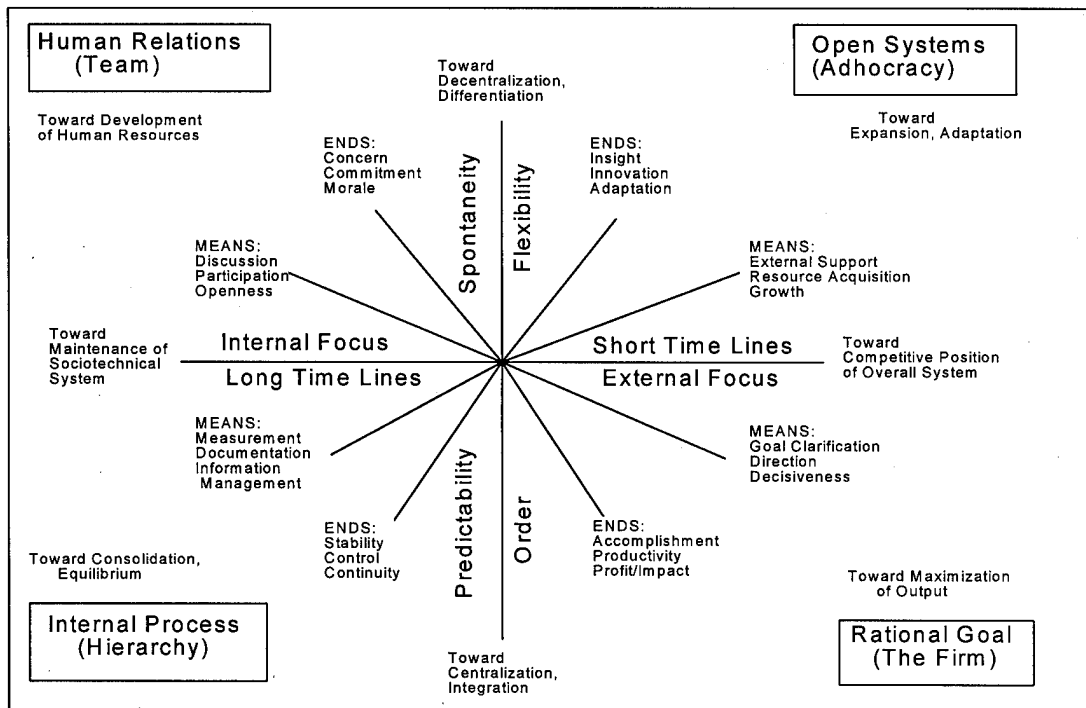


Figure 3. Competing Values Framework: Effectiveness.

The vertical and horizontal axes cross to form four quadrants. Each quadrant represents a different aspect of organizational effectiveness. The upper left quadrant identifies with the humans relations model and emphasizes morale and human resource development. The upper right quadrant identifies with the open systems model and

emphasizes flexibility, readiness, growth and external support. The lower left quadrant identifies with the internal process model and emphasizes information management and communication. The lower right quadrant identifies with the rational goal model and emphasizes planning, goal setting and productivity.

Each model has a polar opposite (Quinn, 1988:47). For instance, the open systems model, which emphasizes flexibility and external support, stands opposite to the internal process model, which emphasizes control and internal focus. Additionally, there are parallels among the models. Human relations and open systems model both place an emphasis on flexibility. There are other similarities among the other models. Each of the models has a means to achieve an end. For instance, "in the internal process model...information management and communication are viewed as a means of arriving at stability and control" (Quinn, 1988:47). This model provides us with a comprehensive understanding and an integrated framework for examining organization effectiveness.

Research Objective Two: Can an instrument be developed to evaluate metrics against such a model?

Instrument. It is appropriate to recap the scales used in the instrument at this time. The questions were designed to fall into the four effectiveness quadrants of the Competing Values Model. Each of the 24 questions attempted to either identify an end or a mean within one of the four quadrants. Additionally, standard semantic differential scales were used to give a comparative measure of peoples' reactions to the metrics.

The five Likert response points were; 1 = Of slight use, 2 = Of some use, 3 = Of moderate use, 4 = Of significant use, and 5 = Extremely useful.

The questions associated with the Human Relations (HR) quadrant ends and means were:

Of how much use is the metric in determining...

HR Ends

1. The level of concern members have for the organization?
2. The level of commitment members feel toward the organization?
3. The level of morale within the organization?

HR Means

1. The degree to which the organization uses discussion among members to set goals and/or solve problems?
2. The degree to which all members have an opportunity to participate in organizational decision making?
3. The degree of openness of management within the organization?

The questions associated with the Open Systems (OS) quadrant ends and means were:

Of how much use is the metric in determining...**OS Ends**

1. The organization's ability to gain support from other organizations to expand the organizations capabilities?
2. The organization's ability to expand its resources to grow?
3. The organization's ability to expand or increase maximum output?

OS Means

1. The level of innovation within the organization?
2. The ability of the organization to adapt to change?

3. The degree of insight the organization has of its environment?

The questions associated with the Internal Process (IP) quadrant ends and means were:

Of how much use is the metric in determining...

IP Ends

1. The effectiveness of the information provided by the organizations information structure?
2. The utility of the organization's rules, regulations, policies, or procedures?
3. The quality of process measurement within the organization?

IP Means

1. The stability of operational processes within the organization?
2. The level of control by management over processes within the organization?
3. The ability of the organization to sustain a smooth work flow?

The questions associated with the Rational Goal (RG) quadrant ends and means were:

Of how much use is the metric in determining...

RG Ends

1. The impact the organization's products/services have on customers?
2. How well the organization uses its resources?
3. How effective the organization accomplishes its goals?

RG Means

1. How decisive leaders have been in responding to employees' production-related concerns?
2. How clear leaders have been in defining operational goals?
3. How directive leaders have been in managing the organization?

Response Rates. Table 4 summarizes the response rates from the group we administered the survey to. Of the 105 surveys returned, 3 were incomplete.

Table 4. Response Rates

Group	Sent Out	Returned	Percent	Cum. %
AFIT Faculty	120	75	62.5	62.5
AFIT Students	30	30	100	70
Totals	150	105	70	70

Demographic Data. As in Hicks (1991), my goal was to poll subjects of college age or older. Since all of the subjects that were surveyed were either professors or master degree students at AFIT, this criteria was met.

Reliability Procedures. I measured the reliability of each ends/means scale as constructed to reflect the eight areas of the Competing Values Model. I used Cronbach's alpha. Cronbach's alpha calculation produces a number between 0 and 1 which reflects the internal consistency reliability of the items in a scale. The higher the Cronbach's alpha, the more reliable the scale. Items were only to be removed from a scale if their removal would have created a significant alpha improvement. In this manner, I hoped to improve each area.

Findings For Scales. I will present tables containing Cronbach's alpha for each set of questions associated with each competing values scale and each Semantic Differential Scale. The first set of statistics will contain the Cronbach's alpha for the scale, the correlation of each question with the total and the Cronbach alpha for each scale if the separate item were removed. I will show the final alpha and the scale retained to describe each area.

Scale 1 - Human Relations Ends. The reliability for the area in Table 5 is 0.906823 which indicates this is a strong scale for the measurement of the Human Relations Ends

Scale. There are no questions which could be deleted to improve the reliability of the scale.

Table 5. Cronbach Alpha - Human Relations Ends Scale

Alpha for RAW variables: 0.906823		
Deleted	Correlation	
Variable	with Total	Alpha
Question 19	0.822404	0.860399
Question 20	0.833668	0.849565
Question 21	0.787582	0.888993

Scale 2 - Human Relations Means. The reliability of the area in Table 6 is 0.931779 which indicates this is a strong scale for the measurement of the Human Relations Means Scale. There are no questions which could be deleted to improve the reliability of the scale.

Table 6. Cronbach Alpha - Human Relations Means Scale

Alpha for RAW variables: 0.931779		
Deleted	Correlation	
Variable	with Total	Alpha
Question 22	0.820571	0.931373
Question 23	0.904662	0.865199
Question 24	0.857677	0.904039

Scale 3 - Internal Process Ends. The reliability of the area in Table 7 is 0.792610 which indicates this is a strong scale for the measurement of the Internal process Ends Scale. While deleting question 15 would improve the reliability, it is not a significant improvement.

Table 7. Cronbach Alpha - Internal Process Ends Scale

Alpha for RAW variables: 0.792610		
Deleted Variable	Correlation with Total	Alpha
Question 13	0.649221	0.702968
Question 14	0.708555	0.639439
Question 15	0.552988	0.800786

Scale 4 - Internal Process Means. The reliability of the area in Table 8 is 0.797796 which indicates this is a strong scale for the measurement of the Internal Process Means Scale. While deleting question 17 would improve the reliability, it is not a significant improvement.

Table 8. Cronbach Alpha - Internal Process Means Scale

Alpha for RAW variables: 0.797796		
Deleted Variable	Correlation with Total	Alpha
Question 16	0.759344	0.594409
Question 17	0.530929	0.833016
Question 18	0.648127	0.718563

Scale 5 - Open Systems Ends. The reliability of the area in Table 9 is 0.771575 which indicates this is a strong scale for the measurement of the Open Systems Ends Scale. There are no questions which could be deleted to improve the reliability of the scale.

Table 9. Cronbach Alpha - Open Systems Ends Scale

Alpha for RAW variables: 0.771575		
Deleted Variable	Correlation with Total	Alpha
Question 4	0.592362	0.708491
Question 5	0.692111	0.597053
Question 6	0.539515	0.763661

Scale 6 - Open Systems Means. The reliability of the area in Table 10 is 0.861873 which indicates this is a strong scale for the measurement of the Open Systems Means Scale. There are no questions which could be deleted to improve the reliability of the scale.

Table 10. Cronbach Alpha - Open Systems Means Scale

Alpha for RAW variables: 0.861673		
Deleted Variable	Correlation with Total	Alpha
Question 1	0.748349	0.797383
Question 2	0.747397	0.796958
Question 3	0.720512	0.824402

Scale 7 - Rational Goal Ends. The reliability of the area in Table 11 is 0.820508 which indicates this is a strong scale for the measurement of the Rational Goal Ends Scale. There are no questions which could be deleted to improve the reliability of the scale.

Table 11. Cronbach Alpha - Rational Goal Ends Scale

Alpha for RAW variables: 0.820508		
Deleted Variable	Correlation with Total	Alpha
Question 7	0.625506	0.806649
Question 8	0.652728	0.775183
Question 9	0.752936	0.671806

Scale 8 - Rational Goal Means. The reliability of the area in Table 12 is 0.829987 which indicates this is a strong scale for the measurement of the Rational Goal Means Scale. There are no questions which could be deleted to improve the reliability of the scale.

Table 12. Cronbach Alpha - Rational Goal Means Scale

Alpha for RAW variables: 0.829987		
Deleted Variable	Correlation with Total	Alpha
Question 10	0.633778	0.820733
Question 11	0.668255	0.784569
Question 12	0.769077	0.685726

Scale Means by Metric. Table 13 shows the research metrics across the top and the designed scales down the side. Looking down each metrics column, two of the scales, HRE and HRM, means are the highest for the metric that it purports to measure, while one other, OSM, mean is the highest for OSE, which is in the same quadrant.

The probability that one of the metrics would randomly fall in the right scale is .125. So, the probability that two would fall on the right scale is .015625. Additionally,

the probability that a metric would randomly fall in the correct quadrant is .25. So, the probability that three of the metrics would fall in the correct quadrant, as predicted, is .015625.

Table 13. Means for Competing Values Scales by Metric

	HRE Metric	HRM Metric	IPE Metric	IPM Metric	OSE Metric	OSM Metric	RGE Metric	RGM Metric
	N = 14	N = 13	N = 13	N = 13	N = 13	N = 13	N = 13	N = 13
HRE	3.8095	2.6923	3.2821	2.3846	2.2821	2.3333	2.3590	2.3077
HRM	2.5476	3.3077	2.5897	1.8974	1.8205	1.5385	1.5897	2.0256
IPE	2.0238	1.8462	2.4872	2.4103	2.3077	2.0256	1.7949	1.8462
IPM	2.5714	1.7436	2.4103	2.2308	2.1026	1.7692	1.9744	1.7436
OSE	2.9048	2.5897	3.0000	1.9231	2.4103	2.7436	2.6154	2.8205
OSM	2.5714	1.9487	2.6667	1.7692	2.6923	2.3590	2.6923	2.2308
RGE	2.5238	2.1539	3.3846	2.7436	2.7949	2.4615	2.4615	2.0513
RGM	2.8333	2.5897	2.8974	2.1282	2.3077	2.1795	1.7436	1.6923

Table 14 was derived by adding the two scale means within a particular quadrant and dividing it by 2. The table indicates that four of the metrics, HRE, HRM, OSE, and OSM, fall into the predicted quadrants. The probability of this happening randomly is 0.003906.

Table 14. Means for Competing Values Quadrants by Metric

	HRE Metric	HRM Metric	IPE Metric	IPM Metric	OSE Metric	OSM Metric	RGE Metric	RGM Metric
HR	3.17855	3	2.9359	2.141	2.0513	1.9359	1.97435	2.16665
IP	2.2976	1.7949	2.44875	2.32055	2.20515	1.8974	1.88465	1.7949
OS	2.7381	2.2692	2.83335	1.84615	2.5513	2.5513	2.65385	2.52565
RG	2.67855	2.3718	3.141	2.4359	2.5513	2.3205	2.10255	1.8718

Alpha for Activity Semantic Differential. The reliability of the area in Table 15 is 0.811975 which indicates this is a strong scale for the measurement of the Activity Semantic Differential Scale and validates Osgood and others (1957) delineation of the scale items for this research.

Table 15. Cronbach Alpha - Activity Semantic Differential Scale

Alpha for RAW variables: 0.811975		
Deleted Variable	Correlation with Total	Alpha
Question 1	0.670136	0.774579
Question 2	0.713020	0.724934
Question 3	0.688402	0.741529
Question 8	0.554325	0.806900

Alpha for Evaluative Semantic Differential. The reliability of the area in Table 16 is 0.834337 which indicates this is a strong scale for the measurement of the Evaluative Semantic Differential Scale and validates Osgood and others (1957) delineation of the scale items for this research. While deleting question 10 would improve the reliability of the scale, it is not a significant improvement.

Table 16. Cronbach Alpha - Evaluative Semantic Differential Scale

Alpha for RAW variables: 0.834337		
Deleted Variable	Correlation with Total	Alpha
Question 4	0.799507	0.724091
Question 6	0.628784	0.805927
Question 10	0.531604	0.857238
Question 12	0.804600	0.726893

Alpha for Potency Semantic Differential. The reliability of the area in Table 17 is 0.844066 which indicates this is a strong scale for the measurement of the Potency Semantic Differential Scale and validates Osgood and others (1957) delineation of the scale items for this research.

Table 17. Cronbach Alpha - Potency Semantic Differential Scale

Alpha for Raw variables: 0.844066		
Deleted Variable	Correlation with Total	Alpha
Question 5	0.752187	0.770428
Question 7	0.609659	0.838247
Question 9	0.741175	0.775781
Question 11	0.680289	0.817875

Means for Semantic Differential Scales by Metric Table 18 informs us of the value judgments of the subjects for the scales in terms of activity, evaluative, and potency Semantic differentials. The Internal Process Ends metric has the highest mean for all three Semantic Differential Scales, while the Rational Goal metrics rank second and third overall. All of the metrics except HRE had their highest score on the Evaluative Semantic Differential Scale.

Table 18. Means for Semantic Differential Scales by Metric

Var	HRE Metric	HRM Metric	IPE Metric	IPM Metric	OSE Metric	OSM Metric	RGE Metric	RGM Metric
	N = 13	N = 13	N = 13	N = 12	N = 12	N = 13	N = 13	N = 13
Act	4.0385	4.1731	4.6154	3.3958	3.5833	3.9808	3.9615	4.4231
Eval	3.6923	4.6538	4.8077	3.7917	3.9792	4.1154	4.4231	4.4231
Pot	4.0192	3.7500	4.3462	3.4583	3.7500	3.9423	4.3077	4.0385

Correlations. In Table 19, we find that all of the scales are highly correlated with the Rational Goal Scales.

Table 19. Correlation for Competing Values Scales by Competing Values Scales

	HRE	HRM	IPE	IPM	OSE	OSM	RGE
HRM	0.67						
IPE	0.59	0.54					
IPM	0.61	0.53	0.71				
OSE	0.55	0.50	0.41	0.46			
OSM	0.45	0.35	0.50	0.59	0.61		
RGE	0.65	0.48	0.71	0.72	0.61	0.65	
RGM	0.75	0.73	0.68	0.69	0.57	0.55	0.71

p < .0001 significance

Table 20 demonstrates the OSE scale has the highest overall average correlation with the Semantic Differential Scales. On average the Competing Values Scales correlate higher with the Evaluative Semantic Differential Scale.

Table 20. Correlation Competing Values Scales by Semantic Differential Scales

	HRE	HRM	IPE	IPM	OSE	OSM	RGE	RGM
Act	0.3927	0.3236	0.3006	0.1994	0.5183	0.3717	0.3306	0.2955
Eval	0.3530	0.3131	0.3491	0.2750	0.4859	0.3901	0.3770	0.3114
Pot	0.3884	0.2224	0.3045	0.2099	0.3298	0.3764	0.2945	0.2497

p < .05 significance

In view of the information in table 20, two regression analyses were performed to determine which scales and scale quadrants were most predictive of the ratings on the semantic differential scales. A composite semantic differential score based on the mean of all 12 items was used as the dependent variable. As can be seen in Table 21 only the OSE scale attains significance at the < .01. However, the HRE, OSM, and IPE scales are approaching the .05 level.

Table 21. Regression for Semantic Differentials by Scale

Analysis of Variance					
		Sum of	Mean		
Source	DF	Squares	Square	F Value	Prob>F
Model	8	39.90362	4.98795	5.530	0.0001
Error	93	83.89166	0.90206		
C Total	101	123.79528			
Root MSE	0.94977	R-square	0.3223		
Dep Mean	4.07761	Adj R-sq	0.2640		
C.V.	23.29227				

Parameter Estimates					
Variable	DF	Estimate	Parameter Error	Standard Parameter=0	T for H0: Prob > T
INTERCEP	1	2.419851	0.29530983	8.194	0.0001
HRE	1	0.236090	0.12237136	1.929	0.0567
HRM	1	0.076467	0.12555843	0.609	0.5440
IPE	1	0.267462	0.15222105	1.757	0.0822
IPM	1	-0.244283	0.17456968	-1.399	0.1650
OSE	1	0.353919	0.13402862	2.641	0.0097
OSM	1	0.231302	0.12932470	1.789	0.0769
RGE	1	-0.043945	0.15359483	-0.286	0.7754
RGM	1	-0.247668	0.16838742	-1.471	0.1447

Table 22 shows the combined scales in the OS quadrant attain significance at the .002 level and the scales in the HR quadrant are at the .0437 level of significance.

Table 22. Regression for Semantic Differentials by Quadrants.

Analysis of Variance					
		Sum of	Mean		
Source	DF	Squares	Square	F Value	Prob>F
Model	4	34.64343	8.66086	9.423	0.0001
Error	97	89.15184	0.91909		
C Total	101	123.79528			
Root MSE	0.95869	R-square	0.2798		
Dep Mean	4.07761	Adj R-sq	0.2501		
C.V.	23.51111				

Parameter Estimates						
			Parameter	Standard	T for H0:	
Variable	DF	Estimate	Error	Parameter=0	Prob >	T
INTERCEP	1	2.445134	0.29345307	8.332	0.0001	
HR	1	0.276335	0.13523810	2.043	0.0437	
IP	1	0.069017	0.19003477	0.363	0.7173	
OS	1	0.583621	0.14813481	3.940	0.0002	
RG	1	-0.265442	0.20862964	-1.272	0.2063	

Summary

This chapter began with the information concerning the administration of the initial instrument. Recall that the sample size used for data analysis was 105. The demographic statistics show the sample to be college educated.

The bulk of this chapter was spent relating information concerning the eight areas. I presented Cronbach's coefficient of reliability alpha for each of the areas. These alphas ranged from a low of 77 percent to a high of 93 percent. Five reliability coefficients exceeded 0.800 and eight exceeded 0.700. Next, I examined the correlations of the scales and metrics among each other.

Conclusions and recommendations based on these findings are included in Chapter V.

V. Conclusion

Chapter Overview

In this chapter are the conclusions reached during the research. The conclusions presented will follow the order of the preceding chapters. I will first address conclusions derived from the literature review, followed by conclusions from the methodology. Finally, I will present conclusions related to the data I obtained.

Furthermore in this chapter I will outline some recommendations for future research concerning the scales that were developed. Also, I will present recommendations concerning future uses of like instruments developed during my research.

Lastly, I will discuss my successes or deficiencies in obtaining my research objectives. I address each objective and provide my reasoning concerning my research completion.

Conclusions

Conclusions From the Literature Review. After examining four popular approaches to measuring organization effectiveness, I selected the approach to model my instrument after. I chose the Competing-Values Model because it encompassed far more aspects of organization effectiveness than the other approaches did.

Conclusions From the Methodology. The decision to use the 5 point Likert scale in the development of the instrument proved to be valuable. The scale provided the user with an easy to use scale and it provided me with precise data.

Conclusions From the Data. The instrument type can be completed without difficulty by most subjects. Less than 10 percent of the subjects returned the instrument without successfully completing it.

All of the scales had a Cronbach's Alpha of .70 or higher. This indicates that the scales are useful. What is important now, is determining how they can best be used.

The HRM and HRE metric's correlated highest with the HRM and HRE scales, respectively. This indicates that the metric's I developed may in fact be true HRM and HRE metric's, and people are able to recognize them as an HRM or HRE metric.

The OSM metric I developed correlated highest with the OSE scale. This is at least in the correct quadrant. This may indicate that people are unable to distinguish between the subtle differences in OSE and OSM. This may also indicate that the metric was incorrectly conceptualized upon creation.

The IPE metric correlated highly with several of the scales. This may indicate that the metric could be comprised of several aspects of the different quadrants. One of the assumptions was that each metric would only be

identified in one quadrant. However, the data may indicate that several of the metrics are overlapping into one or more of the quadrants. This could possibly mean that managers may design metrics for a specific quadrant but actually get the benefit of measurement in more than one quadrant. This could be compared to shooting a shotgun at a bird in a flock, and getting several birds instead of the one you were aiming at.

The research shows that although the RG scales are not significant in any regression on the Semantic Differentials, they do highly correlate with all the other metric measurement scales. This might mean that by setting meaningful goals in the OS, HR, and IP quadrants, managers may derive gains in the RG quadrant. In other words, it might mean that it is more beneficial to achievement of the goals in the RG quadrant by setting better goals in the other three.

The Semantic Differentials all had a Cronbach's Alpha of 0.80 or better. This also indicates that the scales are useful. All, except HRE, of the metric's correlated the highest with the Evaluative Semantic Differential scale. Additionally, 5 out of the 8 scales correlated highest with the Evaluative Semantic Differential scale. This may indicate that the scales and metrics used were viewed as being good evaluators of what they were purport to measure.

Recommendations

Recommendations Concerning the Instrument. The instrument in Appendix A is designed to test specific scales. My first recommendation is that the instrument should be retested to verify the alpha's. This retest should be administered to a larger sample size. The sample size would ideally allow conclusions to be drawn at the 0.01 level of significance.

If low coefficients of reliability are discovered for any of the scales, I recommend a reconstruction of those sets of items. Then the improved scales should be substituted into the existing instrument.

The metrics could have been submitted to a wider panel of experts for evaluation before the distribution of the survey was accomplished. In that way I might have been able to develop more accurately targeted metrics and the "splashover" effect into several quadrants might have been minimized.

Recommendations Concerning Methodology. The instruments can be used in at least three different ways. First, the instrument can be used to determine which quadrant or quadrants a particular metric may lie. Second, the instrument might be used to validate where other instruments have identified a particular metric to lie. Finally, it can be used with an organization's entire "constellation" of metrics to determine if managers are targeting the areas of importance for an organization.

Recommendations For Future Research. Future research areas might include further development of the instrument to improve the effectiveness of the instrument at identifying the quadrant(s) for a particular metric. This might be better accomplished, if the metrics being evaluated can be pinpointed to one and only one quadrant. Additionally, the regression analysis presented at the end of Chapter IV provides some tantalizing possibilities in terms of goal-setting. Areas of research might address the question of whether or not organizational members respond more positively to goals represented by various scales (OSE, IPE, HRE) which elicit positive ratings on the Semantic Differential Scales.

Revisiting the Research Objectives

I was successful, at least on a limited basis, in identifying a model of organization effectiveness in which an instrument can be developed to evaluate metrics. The Competing Values Model at this point in time appears to be the most encompassing model of organization effectiveness and the model of choice.

I developed an instrument to evaluate organization effectiveness against the Competing Values Model. As to how effective the instrument is or how useful it might become, is left for further researchers to determine.

However, I may have conceptualized the problem incorrectly. I perceived that a particular metric would fall within one and only one quadrant of the competing values model. The data collected from this research may indicate otherwise.

Summary

Each of the research objectives established for this thesis were met. The results provide a rich basis for future research in instrument development for evaluation of metrics that measure organization effectiveness.

Appendix A. Metric Evaluation Instrument

Metric Evaluation Instrument [*V.1]

Metrics are used to tell us about characteristics of the processes within our organizations. This instrument was developed to indicate to us how well a specific metric is accomplishing that goal.

There are three sections in this evaluation. The first section provides you with the description of a metric used within your organization. The second section asks you to analyze the metric as to how important it is in terms of evaluating certain processes and outcomes related to organizational effectiveness. The third section asks you to relate the metric in terms of some word pairs. There are no right or wrong answers. We are simply trying to determine what the metric(s) mean(s) to you.

Section 1 - Metric Description

The metric you are going to evaluate is called _____.
It is calculated by _____.

Section 2 - Process and Outcome Evaluations

In responding to the following group of items you may use:

- a. The information provided about the metric in Section 1
- b. What you know about how managers use the metric to evaluate your organization

Your task is to decide how useful the metric is in evaluating each of the processes or outcomes described. Circle your response on the scale to the right of each item. Use the following responses to make your judgments:

1	2	3	4	5
Of slight use	Of some use	Of moderate use	Of significant use	Extremely useful

PLEASE GO ON TO THE NEXT PAGE

The metric you are going to evaluate is called _____.
 It is calculated by _____.

1	2	3	4	5
Of slight use	Of some use	Of moderate use	Of significant use	Extremely useful

Of how much use is the metric in determining...

- | | |
|---|-----------|
| 1. ...the organization's ability to gain support from other organizations to expand the organizations capabilities? | 1 2 3 4 5 |
| 2. ...the organization's ability to expand its resources to grow? | 1 2 3 4 5 |
| 3. ...the organization's ability to expand or increase maximum output? | 1 2 3 4 5 |
| 4. ...the level of innovation within the organization? | 1 2 3 4 5 |
| 5. ...the ability of the organization to adapt to change? | 1 2 3 4 5 |
| 6. ...the degree of insight the organization has of its environment? | 1 2 3 4 5 |
| 7. ...the impact the organization's products/services have on customers? | 1 2 3 4 5 |
| 8. ...how well the organization uses its resources? | 1 2 3 4 5 |
| 9. ...how effective the organization accomplishes its goals? | 1 2 3 4 5 |
| 10. ...how decisive leaders have been in responding to employees' production-related concerns? | 1 2 3 4 5 |
| 11. ...how clear leaders have been in defining operational goals? | 1 2 3 4 5 |
| 12. ...how directive leaders have been in managing the organization? | 1 2 3 4 5 |
| 13. ...the effectiveness of the information provided by the organization's information structure? | 1 2 3 4 5 |
| 14. ...the utility of the organization's rules, regulations, policies, or procedures? | 1 2 3 4 5 |
| 15. ...the quality of process measurement within the organization? | 1 2 3 4 5 |

PLEASE GO ON TO THE NEXT PAGE

The metric you are going to evaluate is called _____.
It is calculated by _____.

1	2	3	4	5
Of slight use	Of some use	Of moderate use	Of significant use	Extremely useful

Of how much use is the metric in determining...

- | | | | | | |
|---|---|---|---|---|---|
| 16. ...the stability of operational processes within the organization? | 1 | 2 | 3 | 4 | 5 |
| 17. ...the level of control by management over processes within the organization? | 1 | 2 | 3 | 4 | 5 |
| 18. ...the ability of the organization to sustain a smooth work flow? | 1 | 2 | 3 | 4 | 5 |
| 19. ...the level of concern members have for the organization? | 1 | 2 | 3 | 4 | 5 |
| 20. ...the level of commitment members feel toward the organization? | 1 | 2 | 3 | 4 | 5 |
| 21. ...the level of morale within the organization? | 1 | 2 | 3 | 4 | 5 |
| 22. ...the degree to which the organization uses discussion among members to set goals and/or solve problems? | 1 | 2 | 3 | 4 | 5 |
| 23. ...the degree to which all members have an opportunity to participate in organizational decision making? | 1 | 2 | 3 | 4 | 5 |
| 24. ...the degree of openness of management within the organization? | 1 | 2 | 3 | 4 | 5 |

PLEASE GO ON TO THE NEXT PAGE

Section 3 - Metric Word Relations

In this section you will be presented with sets of word pairs. Your task is to decide which word you feel most accurately describes the metric and place an "X" in the space nearer that word. The more strongly you feel a word describes the metric the closer to it you would put the "X." If you felt that neither word described the metric, or that they both described it equally well, you would place your "X" on the center blank.

[_____]

- active ___: ___: ___: ___: ___: ___: ___: ___: passive
- dull ___: ___: ___: ___: ___: ___: ___: ___: sharp
- excitable ___: ___: ___: ___: ___: ___: ___: ___: calm
- good ___: ___: ___: ___: ___: ___: ___: ___: bad
- heavy ___: ___: ___: ___: ___: ___: ___: ___: light
- high ___: ___: ___: ___: ___: ___: ___: ___: low
- rugged ___: ___: ___: ___: ___: ___: ___: ___: delicate
- slow ___: ___: ___: ___: ___: ___: ___: ___: fast
- small ___: ___: ___: ___: ___: ___: ___: ___: large
- sweet ___: ___: ___: ___: ___: ___: ___: ___: bitter
- weak ___: ___: ___: ___: ___: ___: ___: ___: strong
- worthless ___: ___: ___: ___: ___: ___: ___: ___: valuable

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Vita

Captain John J. Dunks is From Lufkin, Texas. He graduated from Texas A&M University in 1990 with a Bachelor of Business Administration degree in Business Analysis, minoring in Management Information Systems. After receiving his commission into the United States Air Force through the Reserve Officers Training Corps, and completing the Basic Information Management Officers Course at Keesler AFB, Captain Dunks was assigned to the 28 Bombardment Wing (BMW) at Ellsworth AFB, South Dakota.

During his tour at Ellsworth AFB, Captain Dunks filled a variety of information positions in support of the B-1B mission. These positions included squadron section commander of the 28 Munitions Maintenance Squadron, executive officer of the 77 Bomb Squadron, deputy base information manager, and executive officer of the 28th Support Group. Captain Dunks deployed, as the executive officer of the 4404th Composite Wing, to Dhahran Air Base, Saudi Arabia, in support of Operation Desert Shield/Desert Storm.

In 1992, he was assigned to Rockville, Iceland, where he served as the executive officer, postal officer, chief of information management and squadron section commander of the 932nd Air Control Squadron. While in Iceland, Captain Dunks

also served as the executive officer of the 35th Wing and Air Forces Iceland.

In 1994, Captain Dunks entered the Air Force Institute of Technology at Wright-Patterson AFB, Ohio, and graduated in 1995 with a Masters degree in Information Resource Management. He was subsequently assigned to the Air Force Systems Center, Gunter AFB, Alabama.

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December 1995 Master's Thesis

*DEVELOPMENT OF A METRIC EVALUATION INSTRUMENT FOR
USE IN MEASURING ORGANIZATIONAL EFFECTIVENESS*

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Previous research has resulted in the development of instruments to measure organizational effectiveness. This thesis attempts to develop an instrument to measure how effective the organization's metrics are in relation to their organization effectiveness model, specifically, to the Competing Values Model of organization effectiveness developed by Quinn and Rohrbaugh. This should aid managers in determining whether or not they are measuring what they think they are measuring and how effective they are at measuring organizational effectiveness. The instrument developed can help determine the specific aspects of organizational effectiveness which metrics are measuring according to the Competing Values Model.

Competing Values, Metrics,

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