Best Value Implementation Program For Contractors

by

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A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Approved April 2011 by the
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May 2011

ABSTRACT

The price based marketplace has dominated the construction industry. The majority of owners use price based practices of management (expectation and decision making, control, direction, and inspection.) The price based/management and control paradigm has not worked. Clients have now been moving toward the best value environment (hire contractors who know what they are doing, who preplan, and manage and minimize risk and deviation.) Owners are trying to move from client direction and control to hiring an expert and allowing them to do the quality control/risk management. The movement of environments changes the paradigm for the contractors from a reactive to a proactive, from a bureaucratic/non-accountable to an accountable position, from a relationship based/non-measuring to a measuring entity, and to a contractor who manages and minimizes the risk that they do not control. Years of price based practices have caused poor quality and low performance in the construction industry. This research identifies what is a best value contractor or vendor, what factors make up a best value vendor, and the methodology to transform a vendor to a best value vendor. It will use deductive logic, a case study to confirm the logic and the proposed methodology.

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CHAPTER 1 – Introduction

Rapid industrialization and infrastructural development were the key factors that drove the exponential growth of the construction industry in recent years. A healthy GDP, growth in housing, financial growth and the retail boom also contributed to the historically unmatched demand at a large scale (BezuJK, 2010). However, since the credit crisis and recession that began in December 2007, the construction industry has been strongly affected. According to the U.S. Census Bureau, as of February 2010, approximately $846.2 billion in new construction was put in place at a seasonally-adjusted annual rate, compared to the yearly peak of $1.16 trillion in 2006. As of 2009, the U.S. Bureau of Labor Statistics estimates that 6.0 million Americans were employed in the construction industry, down from 7.2 million in 2008 (Stankard, 2010). "The construction industry has taken some of the steepest losses," AIA says. "Though the construction industry accounts for just over 5 percent of all payroll employment in [U.S.] economy, it has absorbed over 20 percent of job losses since the national economic downturn began"(Fontelera, 2009, paragraph #8).

State of the Construction Industry

During the construction boom, many low-bid contractors made money based on volume. Now, those same companies are struggling to survive in an environment where there is less work available and greater

competition. Many attempted to cut prices by reducing their skilled workforce and buying cheaper products. These types of cost cutting measures do not focus on efficiency or quality; therefore, performance has suffered. The same types of problems observed during the construction boom have continued during the recession. The construction industry has been plagued with poor quality and client dissatisfaction. Major problems include:

1. The inability to finish on time, on budget, and meet the expectations of the building owner and user (Lepatner, 2007; Hormozi, 1999);
2. A shortage of competent entry-level personnel (Kurup, 2010);
3. The diminishing value and profit of high quality construction services;
4. The declining quality of construction (Rosenbaum, 2001; Green, 2001; Post, 1998);
5. The declining production of construction (Whitten, 2009; Buckley, 2008; Teicholz, 2004);
6. The increasing requirement for project management; and
7. The difficulty of the client to do quality assurance (Pheng & Teo, 2003).

Many reasons have been attributed to the underperformance of the industry and multitudes of taskforce have been initiated to improve the status of the construction industry. One study by Tatiana Rina Puspasari (2007) identified the following factors as causes for poor construction

performance: project characteristics, client/developer, contractors, consultants, laborers and materials, contractual relationship related factors, project procedures, and external environment related factors. Of these, the Client/developer has the greatest influence on the performance outcome since they establish the environment of procurement and execution. Factors such as lack of qualified craftsmen, defective work, contractual disputes, poor subcontractor performance, construction mistakes, poor managerial skills, ineffective construction methods and incomplete shop drawings have been found as the most critical causes of project non-performance, which can all be attributed to incompetent contractor selection and hence to the low-bid environment.

The Price-Based Environment

While the low-bid procurement system has a long-standing legal precedence and has promoted open competition and a fair playing field, a long-standing concern expressed by owners and some of their industry partners is that a system based strictly on the lowest price provides contractors with an incentive to concentrate on cutting bid prices to the maximum extent possible (instead of concentrating on quality enhancing measures), even when a higher cost product would be in the owner's best interest. It is less likely that contracts will be awarded to the best-performing contractors who will deliver the highest quality projects. As a result, the low-bid system may not result in the best value for money expended or the best performance during and after construction.

Moreover, the traditional low-bid approach tends to promote more adversarial relationships rather than cooperation or coordination among the contractor, the designer and the owner. The owner generally faces increased exposure to contractor claims over design and constructability issues (Farooqui & Ahmed, 2008).

On a typical construction project, the combined fee from the general contractor and the architect represent about 10% of the total cost of construction. Further, the cost of construction represents about 10% of the total lifetime cost of a building. Therefore, the combined general contractor's and architect's fees represent only about 1% of the total lifetime cost of a building. Therefore, selecting the contractor based upon its fee is very short sighted. Instead, owners should focus on selecting the best contractor for the project because the right contractor will save the owner more than the entire contractor's fee from the other 99% of the project's lifetime costs (Morledge et al, 2002).

Setting up an environment of choosing a contractor based on price only, leads to the idea that all construction companies perform at the same level. Construction is a service, not a commodity and each vendor delivers different performance. Applying specifications and standards forces high performance contractors to lower their performance in order to lower prices and thus compete at the level established by the client. Figure 1 illustrates that lowering of performance to meet standards and specifications.

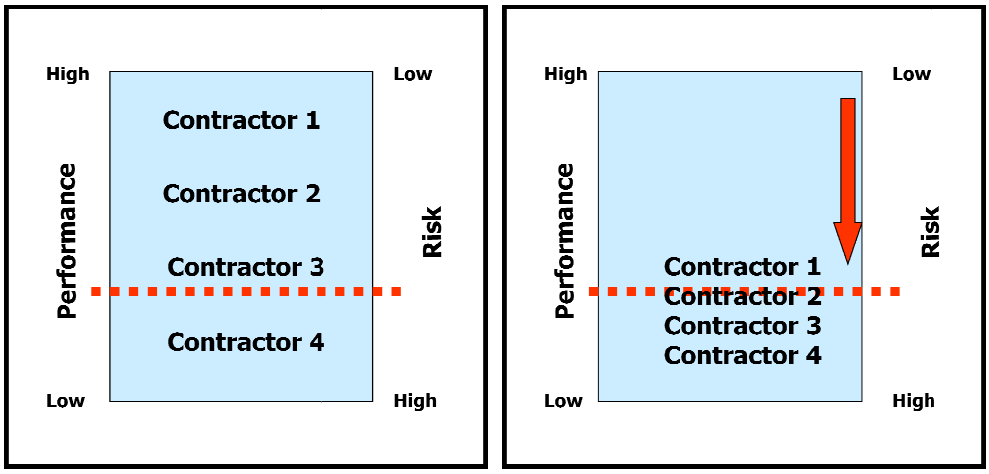


Figure 1. Performance adjustment for specification and standards.

Low-bid award forces vendors to minimize quality and performance. Clients believe that contractors will provide higher quality than what is specified in the minimum standards, while the contractors view the minimum standards as the maximum level of quality to offer the client (See Figure 2). This gap results in the adversarial relationships within the industry.

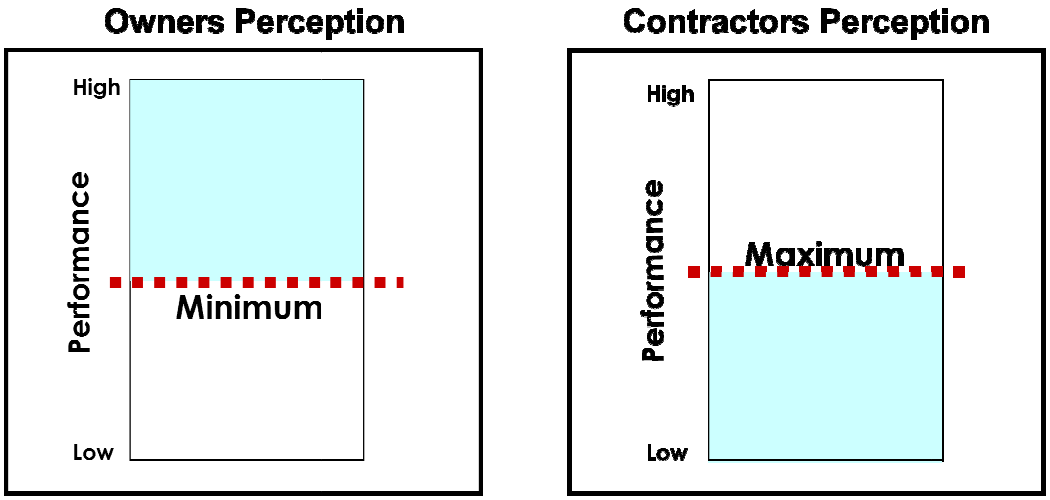


Figure 2. Perception of performance by each stakeholder within the low-bid environment.

Emphasis then is placed on contract compliance instead of results. It is unrealistic to pour the best resources into awarding a contract, walk away from it, and expect an employee or two who may not even have been involved in the crafting of the contract to “pull it off,” but often that is what happens (Schambach & Duke, 2003).

Many owners operate in a price-based commodity environment driven by minimum requirements, which drives high-risk, adversarial relationships and the need for more management (Angelo, 2006). Clients that choose low-bid procurement also do not release control of the project to the contractor, which leads to the client requiring services of a management and inspection staff. Instead of letting the contractors do what they are paid to do, the client tries to solve their own problems. Contractors, in response, hire inexperienced workers since the client’s management team will tell them what to do. The contractor is reacting to what the client wants – a cheap price. This means hiring inexperienced, cheap labor. As figure 3 shows below, a vendor will provide highly trained personnel to an outsourcing owner that transfers the risk; an expert is the only option for the vendor to cover their risk. Medium trained personnel will be sent to the partnering owner that shares the risk; while the new hires or inexperienced workers will be sent to the price-based owner that manages the risk. This is the most efficient way for the vendors to operate and is defined by the type of owner they service.

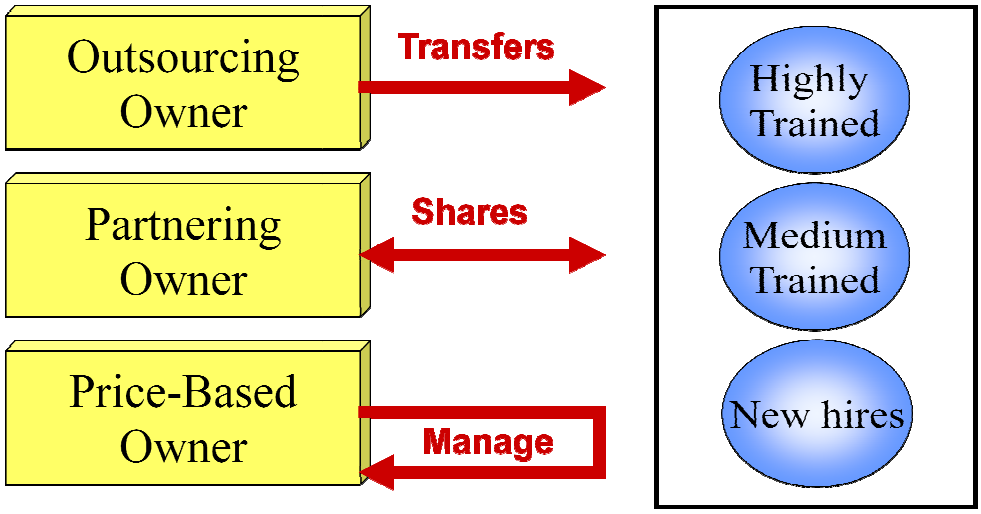


Figure 3. Assignment of vendor personnel based on owner type.

A contractor providing skilled labor within a price based environment cannot be sustained. A skilled laborer does not want to be told what do to by the client's management staff.

Price based procurement is destroying the capability of the construction industry. It is subsequently forcing the industry into the following practices:

1. Using more management, less quality, and inefficient redundancies.
2. Manufacturers, vendors, contractors, and subcontractors are beating each other up on price.
3. The industry is losing the capability to train skilled craftspeople.
4. Poor performance is acceptable (not on-time, not on-budget, and not meeting quality expectation.
5. Difficulty in attracting high quality professional and skilled craftspeople.

6. High turnover rates.
7. High insurance and bonding costs.

Alternatives to the low-bid environment should to be evaluated to determine a better course of action and in order to support a best-value environment the key processes of price and value based performance must be closely analyzed.

Construction Industry Structure

According to research conducted by Kashiwagi (2009), the construction industry can be described by two characteristics: competition and performance (See Figure 4) The Construction Industry Structure (CIS) model divides the industry into four quadrants:

1. Quadrant I – Low-Bid or Price-Based Sector: This sector is described by high competition and marginal performance
2. Quadrant II – Best-Value Sector: This sector is described by high competition and performance.
3. Quadrant III – Negotiated-Bid Sector: This sector is described by high performance and low competition.
4. Quadrant IV – Unstable: This sector is described by low performance and low competition.

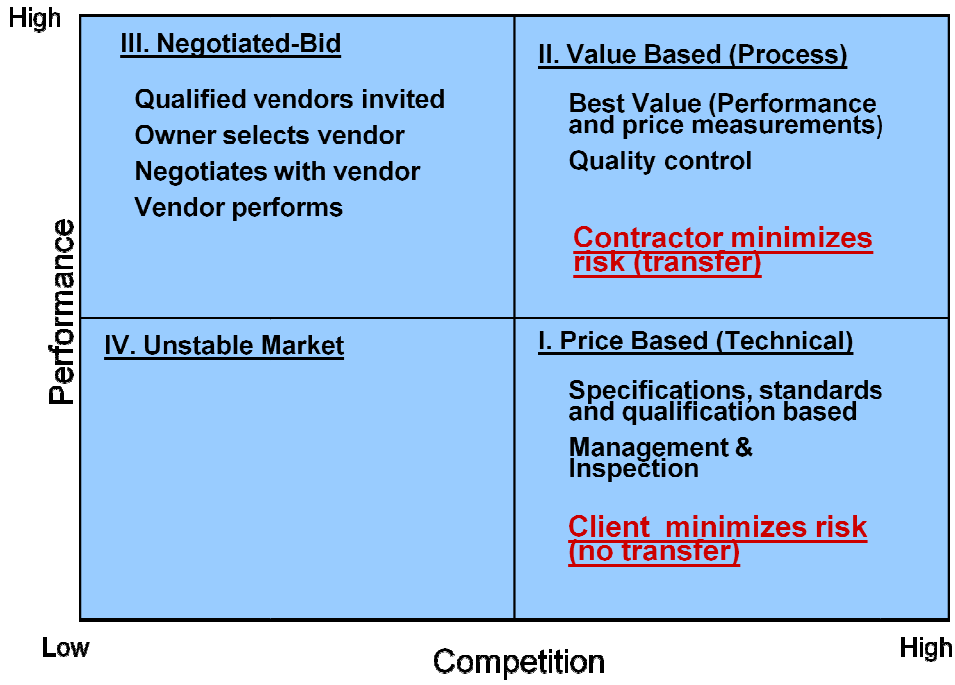


Figure 4. The Construction Industry Structure (CIS) model.

Viable alternatives to the low-bid environment are identified as negotiated-bid and performance-based, as quadrant IV is an unstable market. In the negotiated-bid environment, a contract is awarded on the basis of a direct agreement with a contractor, without going through the competitive bidding process. As shown in Figure 4, the negotiated-bid provides high performance with low competition. Without competition it becomes difficult to justify the price of the contractors bid. Although providing higher performance to low-bid, the negotiated-bid environment doesn't control cost.

Movement toward the Best Value Environment

In today's construction climate, owners are finding themselves under increasing pressure to improve project performance, complete

projects faster, and reduce the cost of administering their construction programs. As owners search for ways to improve the outcome of their construction projects, Pheng and Teo (2004) indicate that they are moving away from the usual practice of awarding projects to the lowest price and instead rewarding the best designers and suppliers who provide the best service .The best value environment rewards the organizations and the people who can anticipate success and who can demonstrate proactive behavior. It elevates construction to a service profession and recognizes that construction is not a commodity – it is knowledge and service. It reinforces the fact that construction teams bring a unique and valued service to the client. The best value environment attracts high quality designers and contractors not only to the project but also the industry (Qualifications Based Selection of Contractors).

The best value environment is different than the price based market in that contractors are measured, allowing contractors to differentiate themselves and for clients to “see” the difference in performance, not just in price. In the best value environment, contractors practice best value processes such as risk management and quality control. Best value vendors not only manage the risks that they control, but also the ones they don’t control. This proactive approach leads to efficiency – when risks do occur, a plan to minimize that risk has already been determined, so it can be immediately conducted without delay as in a price-based environment where they have to take time to figure out what to do next.

Pheng and Teo (2004) state that clients should move away from the usual practice of awarding tenders to the lowest price and advocate rewarding the best designers and suppliers who could provide the best service. Tests conducted by Performance Based Studies Research Group (PBSRG) have shown that best value construction provides the following results:

1. 98% performance (on-time, on-budget, meets quality expectations of clients
2. Minimized construction management requirements by 80-90%
3. The use of performance information in the selection, allows the clients to identify contractors who can perform and transfer the risk to those who can minimize risk.
4. Best value construction motivates training, performance, continuous improvement, and the maximization of profit in delivering the best value (lowest cost).

The question then becomes, if the client builds a different environment, will contractors be able to respond? Best value contractors thrive in an environment where they are allowed to express their expertise and value. Low-bid contractors, continuing to operate as they always have will not be able to survive within the new best value environment because many do not know how to measure their performance or practice best value procedures. They do not have the tools to be efficient and control risk, since it was not required within the low-bid environment. If a contractor

has a low bid mentality within a best value environment, the project will not succeed. Low bid contractor mentality does not preplan and does not manage risks that they do not control. They seek the management and inspection of the client to make up for the fact that they are not the expert. A low bid contractor can become more like a best value contractor by understanding what a best value contractor is and working to become more like one. However, the problem often lies within the period of transition from that of a low bid contractor to one whom is also a proponent of a best value environment.

Problem Statement

The construction industry is suffering from poor performance. Clients are moving to best value procurement as a solution. Contractors that have operated in a low-bid environment do not know how to transition into a best value environment. These contractors do not understand the best value structure or how to function efficiently within it. Currently, there are management and quality control tools, but no implementation program to assist contractors with transforming from reactive to proactive, from a bureaucratic/non-accountable to an accountable position, from a relationship based/non-measuring to a measuring entity, and to a contractor who manages and minimizes the risk that they do not control.

Hypothesis

The hypothesis of this study asserts that contractors are having difficulty transitioning from a price based structure to a best value

structure. Tools exist within the best value environment that assist clients and contractors with the management and quality control of projects. Utilizing these existing tools as the basis for an implementation program, along with a better understanding of the best value environment and the characteristics of an organization that thrives within it will improve performance.

This can be demonstrated through the attainment of the following objectives:

1. Define the best value environment
2. Identify the attributes that make up a best value contractor
3. Develop a measurement tool to assess an organization's attributes
4. Develop a process that can transform a contractor into a best value contractor utilizing existing tools

Methodology

This research hypothesized that a low-bid contractor that moves from reactive to proactive, from a bureaucratic/non-accountable to an accountable organization, from a relationship based/non-measuring to a measuring entity, and to a contractor who manages and minimizes the risk that they do not control will perform better within the best value environment. The hypothesis was tested through the following actions:

1. Perform a literature search to define the best value environment.
2. Correlate attributes with high performance in the best value environment.

3. Develop a measurement tool that measures those attributes within an organization.
4. Determine through a case study if results of the measurement tool correlate with greater project performance.
5. Create a process that assists contractors with implementing best value attributes within their organization
6. Test created process by measuring the contractor using the measurement tool.

Summary

This thesis documents the testing of the research hypothesis through identifying the best value environment, the attributes of a best value vendor, and developing tools that will transform a contractor operating in the low-bid environment to a contractor that understands the best value environment and how to be successful within that environment. Not only must the contractor understand the importance of an effective transition from a low bid contractor to a best value environment, but the contractor must also address the key components of differentiation and performance. Within these two sectors, it is also necessary to correlate these practices with outstanding quality, reputation, stable pricing structure, and an environment that produces the best monetary and quality value for both contractor vendor, and client.

In order to understand the concept of a best value environment, we will look at the definitions of a best value environment and its relation to

peer reviewed literature. Within this analysis we will review performance measurement of contractors and find out exactly why something is better than another and what are the dimensions of this success. For example, why is x better than y?

It is necessary to understand the importance of the definition of performance within the construction industry: being on time, on budget, and delivering high client satisfaction. In order for a contractor and construction company to be truly successful it is crucial to differentiate ones organization from others through measure of performance.

Through a unique understanding of key determinants of performance, companies and organizations can then modify or implement certain processes or practices; delete ineffective protocol, and thus use this acquired knowledge to make improvements and positively affect their overall organizational outcomes.

Lastly, it is cumulatively necessary to understand the attributes of a best value contractor and the subsequent factors that make one successful. There are varying degrees of differentiation and things that contractors due to distinguish themselves from their competition, Thus, it is necessary to better understand these factors by reviewing the transitional components that contractors utilize to effectively migrate from practices that emphasize a price-based strategy to that of a best-value environment.

The development of a survey to support the effectiveness of the tools and the significance of the attributes are presented. A summary of this thesis includes:

- Chapter 2 presents an extensive literature review of the best value environment, the attributes of a contractor that succeeds within that structure, and best practices that will assist a price-based vendor with transitioning to a best value vendor.
- Chapter 3 establishes the best value organization measurement survey and includes verifying that the survey outcome correlates with vendor performance.
- Chapter 4 details the development of the implementation tools organizations can utilize to assist them with transitioning in the best value environment.
- Chapter 5 captures the establishment of a case study for the implementation tools and the outcome of the impact to an organization.
- Chapter 6 presents the research results, lessons learned, benefits, future actions, and conclusion.

CHAPTER 2 - Literature Review

Defining the best value environment along with the attributes that produce success within that structure establishes the foundation of this thesis. Identifying the attributes will determine what will be measured by the measurement tool. Much research has been performed on what it takes to succeed in business; this thesis focuses that information within a specific environment – best value. Correlating the best practices of business improvement will logically substantiate the processes utilized to transform a contractor into a best value contractor. Low-bid contractors must alter the way in which they operate in order to become successful within the best value structure. The purposes of this literature review are to:

1. Describe, in detail, the best value environment.
2. Identify the attributes of a contractor that succeeds within the best value environment.
3. Identify best practices from various business improvement initiatives that support creating processes that will transition a contractor into a best value contractor.

The Best Value Environment

Best Value was introduced to improve services in terms of both cost and quality. Conducting research utilizing the following key words: best value environment, performance based and competiveness in

construction provided insight into the description of the best value environment.

The literature research concluded that the best value environment is:

1. Defined by the CIS as high competition and high performance (Kashiwagi, 2004)
2. Contractors must differentiate themselves from the competition by factors other than only price (Kale & Arditi, 2002)
3. Performance in the construction industry is defined as on-time, on-budget, and high client satisfaction (El-Mashela, Minchin, & O-Brien; 2007)
4. Differentiate by not only achieving high performance (evidence through measurement), but by identifying the ways in which they achieve success.
    a. Plan to minimize risk and be efficient (*Managing Project Risk*, 2008)
    b. Deliver quality and continuously improve (Deming, 1986)
    c. Hire experts that know how to do a. and b. above while leveraging technology (Yates, 1994)
5. Clients can differentiate using dominant information and release control of the project. (Kashiwagi, 2004)

The best value environment is not simply a vendor selection process, but it comprises the entire project life-cycle of award, execution, and close-out. Upon close analysis of literature reviews within the subject

of a best value environment, the following key components are consistently re-iterated.

High competition and high performance.

Referencing the earlier CIS, the Best Value quadrant has high competition and high performance. High competition does not just mean that there are many companies that can perform the service, but also that they are allowed to participate. There are no pre-qualifications or ways of limiting participation within the best value environment. The process of selecting the best value vendor will filter out the vendors that are not the best value. If a service provider or institution is better, then something makes it better. Performance measurement is the process of finding out what that something is (why is X better than Y?). The first step involves identifying performance indicators (what underlies performance?), "operationally defining" each criterion, then quantifying the criteria through measurement (Fisher, 1994).

Differentiate by other than Price by measuring performance.

The contractors in this environment compete with other contractors based on performance and price. The difficulties in differentiating between the offerings of construction firms coupled with other unique features of the construction industry, particularly, the method of price determination, the nature of the final product, the forms of the demand for the construction industry's final output, and the fragmented nature of the organization of construction processes, fuel the intensity of the

competition, particularly on the basis of price. It is clear that the conditions in the construction industry favor competing on the basis of price, but this is not a sufficient condition for a construction company to achieve competitive advantage (Kale & Arditi, 2002). Simply measuring performance can provide insight into the operation of a vendor. A firm that commits fewer resources to arrive at high performance is a better value. Therefore, price remains a factor within the best value environment. **Performance in the construction industry is defined as on-time, on-budget, and high client satisfaction**.

Construction industry clients want their projects delivered on time, on budget, safely, efficiently, free from defects, and by profitable companies (El-Mashela, Minchin, & O-Brien; 2007). Performance within the construction industry can then be defined as being on time, on budget, and meeting the performance expectations of the client. Performance measures are enablers of innovation and of corrective actions throughout a project's life cycle. They can help companies and organizations understand how processes or practices led to success or failure, improvements or inefficiencies, and how to use that knowledge to improve products, processes, and the outcomes of active projects. In a best value procurement environment, it is essential for contractors to be able to differentiate themselves through measurement of construction performance to be competitive.

Differentiate by processes.

The differentiation approach implies that a firm offers something unique and unmatched by its competitors, and valued by the industry. Such an approach calls for differentiation of aspects of the business such as the products or services offered, the technology used, the delivery system offered, or the marketing approach adopted. (Kale & Arditi, 2002) Factors that affect competitiveness include management, organization, and structure including techniques to attract expert personnel. Strategies to identify differentiation then include providing the highest quality services; determining methods of lowering and managing risk and looking for outstanding people (Yates, 1994).

Plan to avoid risk and be efficient.

Risk Management is an important process within the best value environment because risk can affect productivity, performance, quality, and budget of a construction project (Kangari, 1995) Risk Analysis is the study of the likelihood that an action will produce an unwelcome outcome or “adverse effect” and the severity of that adverse effect. Risk management develops or evaluates strategies for dealing with hazards. It uses risk assessments and values to provide better ways for individuals and groups to reduce hazards or cope with their effects (Swaney, 1996)

In the best value environment, managing risk is looking beyond risks within the control of the contractor or technical risk. Strategic management also includes managing those that are outside of their

control. Managing and minimizing technical risk is what most companies control, it's the risk that they don't control (more often it's the risk the client brings) that truly differentiates the better performing contractors. Understanding that pre-planning and identifying initial conditions can assist with determining an outcome of any event, the more experienced individuals will be able to simplify the project and develop mitigation plans to the most likely risk scenarios. Inexperienced personnel will be surprised by risk issues as they arise, seeing them as unforeseen and requiring direction and/or assistance from the client to determine solutions. The efficiency of the project is affected when risks arise as a surprise, as work must stop while solutions are determined and applied.

The best value environment maintains the highest level of efficiency. Job site efficiency through more effective interfacing of people, processes, materials, equipment and information is one aspect of providing efficient construction services. Efficient contractors also determine plans of action for risk (both technical and non-technical) so risk mitigation measures can be engaged to avoid the risks altogether. Risk mitigation is not enough; risk management includes developing solutions when risk mitigation techniques are not successful. This supports efficiency because even if a risk does occur, plans were pre-approved by the client and work can continue.

Another aspect of efficiency is providing quality. Time and costs are saved when things are done right the first time instead of reworking mistakes. A system of quality improvement is helpful to anyone that is engaged in service and wishes to improve the quality of work, and at the same time increase output, all with less labor and at reduced cost (Deming, 1986).

Provide Quality and continuous improvement.

All American organizations today are faced with a new paradigm characterized by global competition and rapidly escalating customer expectations. Fortunately, many organizations are meeting these challenges through total quality management. “Quality” is for real and will definitely provide the competitive edge and improve customer satisfaction (Luthans & Kessler, 1993). A contractor uses quality control to minimize the risk of nonperformance. Researchers are suggesting that superior quality is the means by which construction companies can differentiate themselves from competitors and win more projects (Sammuelson & Grans, 2004). To achieve quality, it is essential to know what customers want and provide products or services that meet their requirement (Hackman & Wageman, 1995). Those unwilling or unable to make the commitment to achieving contract objectives rather than simply complying with contract terms have no place in the performance-based environment (Shambach & Duke, 2003).

Contractor must be the expert and offer value.

Owners are trying to move from client direction and control to outsourcing by hiring an expert. Organizations that employ the best value practices to acquire their personnel and subcontractors experience higher quality. The reason is simple: when contractors realize they are being measured on quality, they tend to focus on it. In the low price arena, the contractors focus on doing the work cheaper, since that is the only criteria measured. Low price is about meeting minimum specifications, instead of focusing on delivering the best possible results. In order to provide best value, those that perform work within the organization must also be committed to best value performance. If you want owners to believe that you provide the best value, it certainly helps when your company demonstrates that same philosophy in selecting subcontractors. Vendors should only select subcontractors who have demonstrated quality attitude and work performance on previous jobs (Pheng & Teo, 2004)

Experts look for ways to continuously improve; leveraging technology is a means to that end. Information technology clearly has the capability to improve construction productivity through improved communication, logistics, planning, and resource allocation. Certainly, one aspect that helps improve the impact of any new technology, including information technology, as indicated by the Construction Industry Institute (2008) are innovations that decrease the investment and maintenance costs along with a comprehensive understanding of how the technology

can be most effectively utilized to improve productivity.

Client can differentiate and release control to the expert.

As Garrison (2009) clearly illustrates, the definition of a client can be defined as “someone under the protection of” (para 3). Owners continuously complain about poor quality, the excessive number and the excessive costs of change orders, delays in schedules, litigation, and a general dissatisfaction with the construction process. How can a vendor claim to be protecting the client if any of those complaints occurs on their projects? This protection often includes protecting the client from himself and pre-planning to assist the client with understanding that they have hired an expert and have little risk in transferring control to the vendor. Owners will release control if they feel the vendor can protect them from problems. Clients within the best value environment hire contractors, who know what they are doing, who preplan, and manage and minimize risk and deviation. Owner’s are demanding more and taking the lead in seeking better performance.

Upon close inspection of peer reviewed literature and research, we are able to define the qualities of success in a best value environment: minimization of risk and increased efficiency, delivering a quality product and continuously improving, and the hiring of experts when needed to leverage technology.

In summary, the best value environment maximizes competition, measures performance to drive accountability, uses performance and

price in procurement, manages risk through preplanning and risk mitigation, controls quality and continuously improves, allows experts to leverage technology and control the project.

Attributes of Best Value Contractor

Attributes of a best value contractor must sustain a vendor's success within the best value environment. It is essential for vendors to differentiate. If all the options in a choice set are perceived to have the same level of benefits, then the answer is simply to select the lowest priced alternative as stated by Creyer and Ross (1997). When price becomes the only differentiator, we digress back to the low-bid environment.

Construction companies that place strong emphasis on the quality of the facilities they construct and the contracting services they provide, by completing projects on or ahead of schedule, by exploiting all sources of cost reduction, and by introducing innovative approaches to their offerings outperform their competition. (Kale & Arditi, 2002) Factors that affect competitiveness include management, organization, and structure including techniques to attract personnel. Future strategies include providing the highest quality services; determining methods of lowering and managing risk and looking for outstanding people (Yates, 1994). In order to differentiate and provide dominate information a vendor must:

1. Measure Performance (Eckerson, 2006)
2. Manage risk and be efficient (*Managing Project Risk*, 2008)

3. Deliver quality and continuously improve (Deming, 1986)
4. Hire experts while leveraging technology (Yates, 1994)

Measures Performance

All high-performance organizations are, and must be, interested in developing and deploying effective performance measurement and performance management systems, since it is only through such systems that they can remain high-performance organizations. Best-in-class organizations decide on what indicators they will use to measure their progress in meeting strategic goals and objectives, gather and analyze performance data, and then use these data to drive improvements in their organization and successfully translate strategy into action.

Background

Performance measurement techniques among organizations have been growing in popularity since the 1970's. These various measurement correlating factors allow organizations to measure not only the industry or company itself but also the individual worker. In the measurement of individual performance it is important to observe and analyze various variables and its relation to performance.

Individual Personnel Performance

Vroom (1964) suggested on the basis of a number of experiments that the effects of motivation on performance are dependent on the level of ability of the worker, and the relationship of ability to performance is dependent on the motivation of the worker. He suggested a multiplicative

relationship: performance = *f* (ability x motivation). Porter and Lawler (1968), in their study of the relationships between motivation and performance, presented a conceptual model. Their model suggested that there are two factors determining the effort people put into their jobs: the value of the rewards to the individual insofar as they are likely to satisfy their needs, and the probability that rewards depend on effort, as perceived by the individual. They suggested two additional variables to effort that affect task achievement ability and role perceptions. They formulated the relationship: performance = *f* (effort x ability x role perception). Ability comprises individual characteristics such as intelligence, manual skills, and know-how. Role perception is what the individual wants to do or thinks one is required to do. The Porter-Lawler model was further developed by Schwab and Cummings (1970).

Two refinements were introduced into this model. The first was that performance results in intrinsic or extrinsic rewards that, through a feedback loop, affect perceptions about the relationships between effort and reward and, hence, the amount of effort. The second was that satisfaction is affected not only by the existence of reward but also by perceptions about the extent to which the reward is fair and equitable. By a feedback process this determines the value of the reward, which also influences the amount of effort. Their model shows the interactive nature of performance and satisfaction. Satisfaction is contingent upon the receipt of equitable rewards following performance as stated by Abdel-

Razek (1997) but it influences perceptions about the value of rewards and, therefore, effort and performance.

In construction-related studies, Laufer and Borcherding (1981) focused on the effects of financial incentives on productivity, using the performance determinants: performance = *f*(ability x motivation x role perception x facilitating and inhibiting conditions not under the control of the individual). They suggested that the last two variables in the equation depend, to a large degree, on the quality of management and concluded that there are three main factors influencing construction workers' performance: ability, motivation, and quality of management (Laufer and Borcherding, 1981). Maloney and McFillen (1983, 1986) presented a model of worker performance and reported research that validates the model within a construction context. The model identifies four variables that influence the level of worker performance:

(1) the worker's motivation as evidenced by the worker's effort;

(2) the degree to which the worker possesses the requisite job-specific knowledge and skills;

(3) the degree to which the worker possesses the requisite innate mental and physical abilities; and

(4) the effectiveness of management in organizing the work and providing the necessary resources.

The first three variables combine in a multiplicative fashion, whereas organizational constraints are an intervening variable (Abdel-

Razek, 1997). Maloney, using his model, presented a framework for the rationalization of the analysis of construction performance that will improve the effectiveness and efficiency of the analysis. The framework provides a decision tree that will guide construction managers as they analyze and, hence, improve performance (Maloney, 1990).

Organizational Performance

Theoretical approaches to organizational performance and effectiveness include concepts such as the goal approach and the system resource approach. The goal approach measures progress toward attainment of organizational goals. The system resource approach assesses the ability of the organization to obtain resources to maintain the organizational system. It focuses on the quality of internal communication and other complex organizational processes (Yuchtman & Seashore, 1967). Both focus solely on a single dimension: attainment of goals or resources. In contrast to those mentioned already, the stakeholder approach and the competitive value approach offer a more integrative and complex view of the organization's performance, assessing it from various aspects such as those of customers, suppliers, competitors, and internal stake-holders that may have their own goals and perspectives (Daft, 1995). The stakeholders approach deals with issues such as priority of various stakeholders in setting organizational goals (Zammuto, 1984; Pfeffer & Salancik, 1978). Similarly, the competitive values approach focuses on issues such as flexibility of organizational structure or internal

versus external focus, as well as the blurring distinctions between means and goals and efficiency versus effectiveness. Among the suggested approaches, the goal approach is most widely used because the output goals can be readily measured. (Haber & Reichel, 2005)

Benefits

Performance measures quantitatively tell us something important about our products, services, and the processes that produce them. They are a tool to help us understand, manage, and improve what our organizations do. (Artley & Stroh, 2001) Performance measurement yields many benefits for an organization. One benefit is that it provides a structured approach for focusing on a program's strategic plan, goals, and performance. Another benefit is that measurement provides a mechanism for reporting on program performance to upper management. Measurement identifies areas needing attention and enables positive influence in that area. Also, employees "perform to the measurement," an example of how measurement influences employee performance.

The effects of a program must be measured and not solely from a quantifiable perspective. Pursuing measurable outcomes assure sustainable success. There must be a strong commitment from leaders to move toward measuring performance and not just collecting data on effort. A performance measurement system is a communication tool for the organization to report on its progress toward the community's vision, as

well as a tool for managers to establish priorities and to describe their expectations of employees (Theurer, 1998).

Measurement System

Performance measurement is the ongoing monitoring and reporting of program accomplishments, particularly progress towards pre-established goals (Artley & Stroh, 2001). A conceptual framework is needed for the performance measurement and management system – High-performance organizations clearly identify what it takes to determine success and make sure that all managers and employees understand what they were responsible for in achieving organizational goals. Performance measurement systems must provide intelligence for decision makers, not just compile data. Performance measures should be limited to those that relate to strategic organizational goals and objectives, and that provide timely, relevant, and concise information for use by decision-makers at all levels to assess progress toward achieving predetermined goals.

Results and progress toward program commitments should be openly shared with employees, customers, and stakeholders. The measures and goals an organization sets should be narrowly focused to a critical few. It is neither possible nor desirable to measure everything. In addition, mature performance measurement systems are linked to strategic and operational planning. Attention to, and establishment of

measures in customer satisfaction and internal business operations is a significant part of a successful performance measurement system.

The performance measurement cycle (see Figure 5) periodically supplies information to the organization. The information may be reviewed to determine if improvement efforts are having their desired effect and to plan the focus of future improvement efforts. Planning is accomplished when the measurement system, including attitudinal surveys, is devised. Doing is accomplished when the measurements are taken. Checking occurs when the results of the measurements are reviewed and plans are made to improve the measurement methods. Acting occurs when new measurements are taken on a regular basis in the future (Jahren & Federle, 1999) Planning for process improvement activities can be accomplished with much more confidence when decisions are based on information obtained from the performance measurements.

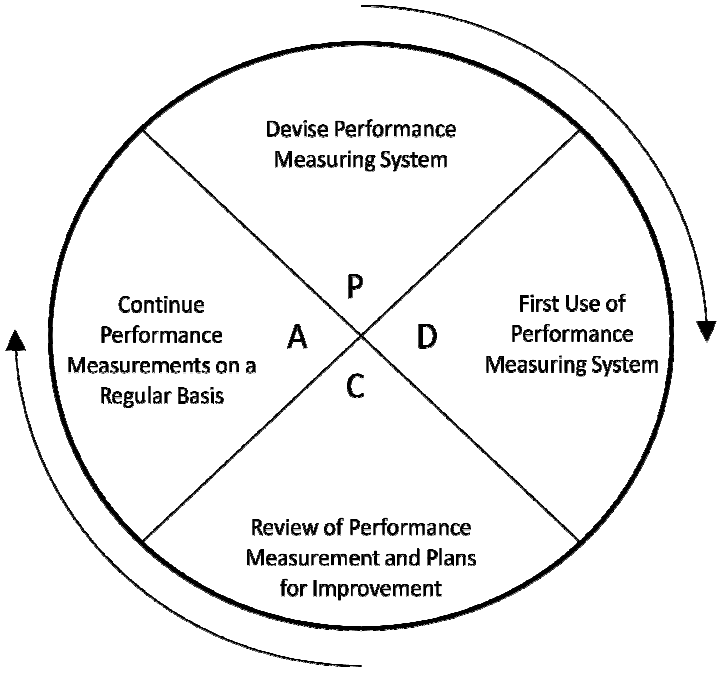


Figure 5. Plan-Do-Check-Act Cycle for Performance Measurement.

As illustrated by Henders, Chase, and Woodson (2002) there are four basic steps to follow in creating a performance measurement system that focuses on outputs and outcomes:

1. Clearly identify the organization's mission
2. Develop qualitative requirements for indicator and measurements
3. Develop primary indicators and measurements
4. Implement the new performance measurement system

These factors should create the framework for the performance measurement system and should subsequently be results oriented.

Measurement Data

The results of performance measurements should explain how the resources committed to specific initiatives for achieving performance

objectives did or did not achieve the specified results. A set of performance measures will likely be required to provide a coherent performance storyline traced by Why, Who, What, and How (Artley & Stroh, 2001). The measuring system should be: simple to operate, simple to understand, simple to action. As stated by Young (2007) for a system to operate, data collection must be easy, distribution must be timely, and the information should be easy to manipulate. The most common mistake organizations make is measuring too many variables (Artley & Stroh, 2001)

There are three levels of uses for performance measurement data. The first level, accountability reporting is an important use of such data. Recent literature, however, recognizes the fact that merely collecting and reporting data is not enough, and that a system's value over time will be defined in terms of management and improvement of operations, the second level. Level three, using measurement data for budgetary decision making and allocation of resources, is especially difficult (Grifel, 1994).

A set of performance measures should support a broader explanation of performance results—a performance story—for managers and executives and for internal and external stakeholders (Artley & Stroh, 2001). The Challenge to develop performance measures that identify "how we are doing" answer the question "what's going on here?", and assess whether we are working effectively on the right things. Performance

measures are also intended to demonstrate results (Erbeck & Pozzebon, 2006).

The *Metrics Handbook* is published by the United States Air Force (1995); it characterizes a good metric as one that conforms to the following attributes (El-Mashela, Minchin, & O-Brien; 2007):

- It is meaningful in terms of customer requirements;
- It tells how well organizational goals and objectives are being met through processes and tasks;
- It shows a trend, i.e., measures over time;
- It is unambiguously defined;
- Its data are economical to collect; and
- It is timely.

The best goals typically have at least one performance outcome related to the effort put in and at least one outcome related to the benefits produced by that effort. Working smarter starts with setting goals based on specific performance outcomes that matter. SMART = Specific, Measurable, Achievable, Relevant, Time-bound (Smith, 1999). Service efforts and accomplishment measures fall into four categories: input measures, output measures, outcome measures and efficiency measures. They quantify the effort expended on a program (inputs); the level of services provided (outputs), the effect a service has on the program's stated objectives (outcomes) and a comparison of the level of inputs with

outputs or outcomes (efficiency) as illustrated by Henderson, Chase, and Woodson (2002).

Strategic/Mission Focus

In establishing performance measure attributes, it is imperative to understand how the establishment of the vision strategically aligns the organization. The strategic plan provides a purpose and it gives employees goals and objectives toward which they can work.

A mission is the reason why the provider exists, while goals are the results that support the mission. Objectives are what must be accomplished to achieve a goal as stated by Fischer (1994). A well-developed strategic plan should contain the basic information necessary to begin the formulation of an integrated performance measurement system as shown in Table 1 below (Artley & Stroh, 2001).

Table 1

Strategic Plan Element and Performance Measurement Attributes

	PERFORMANCE MEASUREMENT ATTRIBUTES
Strategic Goal	Articulates the enduring mission or “end state” desired
Objective	Describes (in verb/noun format) the strategic activities that are required to accomplish the goal
Strategy	Defines strategic (long-term) requirements in verb/noun format that link to objectives. Typically contain dates, basis of measurement, and performance aspirations (targets)
Tactical Plans	Identifies the short term requirements that link to strategy. Typically contain cost, time, milestone, quality, or safety attributes as well as performance targets

Performance-measurement systems provide a means to align strategic objectives and market requirements, coordinate the effective use of organizational resources, and monitor progress toward predefined strategic objectives as stated by Stewart (2001). Once the organizational mission and the strategic planning process is established, it provides the data that will be collected, analyzed, reported, and, ultimately, used to make sound business decisions. An integrated performance-measurement

model for organizations can help to blend the organization's strategy with the demands of the environment. Performance-measurement systems encourage organizations to focus on their mission and vision by aligning their strategic objectives and resource-allocation decisions with customer requirements.

In today's competitive construction industry, there is a critical need for managers to continuously improve their firm's efficiency and effectiveness. More specifically, managers need to know which performance measures are most critical in determining their firm's overall success. The industry has become more aware of its need to identify, implement, and sustain performance improvements more systematically (El-Mashela, Minchin, & O-Brien; 2007). It is important to ensure that departmental decisions are complementary across functional boundaries and linkages should be established between localized performance-measurement systems. Without such linkages, performance in one area may be optimized at the expense of performance in other areas of the organization.

Organizations are different; determining what to measure depends on the organization's mission. Xerox uses the following questions to determine what is worth measuring as stated by El-Mashela, Minchin, & O-Brien (2007):

- What is the most critical factor to business success?
- What factors are causing the most trouble?

- What products or services are provided to customers?
- What factors account for customer satisfaction?
- What specific problems have been identified in the organization?
- Where are the competitive pressures being felt in the organization?
- What are the major costs in the organization?
- Which functions represent the highest percentage of cost?
- Which functions have the greatest room for improvement?
- Which functions have the greatest effect for differentiating the organization from competitors in the market place?

Another method of formulating specific measures is to evaluate the organization based on the following categories (Artley & Stroh, 2001):

1. Effectiveness: A process characteristic indicating the degree to which the process output (work product) conforms to requirements. (Are we doing the right things?)

2. Efficiency: A process characteristic indicating the degree to which the process produces the required output at minimum resource cost. (Are we doing things right?)

3. Quality: The degree to which a product or service meets customer requirements and expectations.

4. Timeliness: Measures whether a unit of work was done correctly and on time. Criteria must be established to define what constitutes

timeliness for a given unit of work. The criterion is usually based on customer requirements.

5. Productivity: The value added by the process divided by the value of the labor and capital consumed.

6. Safety: Measures the overall health of the organization and the working environment of its employees.

Emphasis of determining specific measures should be mission driven and outcome oriented. They should emphasize the customer perspective, measures performance against goals and targets, and incorporates performance measurement meaningfully in other management processes. Within the construction industry, schedule adherence, cost performance, customer satisfaction, safety performance, and profit are the performance metrics most critical to overall success as indicated by El-Mashela, Minchin, and O-Brien (2007). Several measures must also be used in combination to gauge organizational performance. For example, only looking at customer satisfaction is not enough information to determine the overall success of the organization. If they are satisfying the customer, but not producing a profit, they will not remain in business for long. Therefore, although the needs of the customer are important it is also detrimental to the success of the organization to ensure that the performance goals of the organization are strategically aligned with the company goals and directives.

Customer Satisfaction Focus

The organization mission statement should serve the purpose of providing a concise vision of the organization's long-term objectives and direction. As emphasized by Stewart, leadership should then provide a solid basis for compilation and assessment of customer requirements (2001). Once an organization understands the needs and expectations of its customers, organizational goals and performance standards must be defined and shared with employees (Cavaness & Manoocheri; 1993). The goal of satisfying customers is fundamental to high performance and is expressed by the organization's attempt to design and deliver services that fulfill the customers' needs.

Measures which will help improve value from both the customer's perspective and the shareholder's perspective add the most value. Without measuring customer satisfaction, the organization cannot truly see the total picture of their performance.

Employee Performance

Organizations are not organized if people in them pursue divergent, conflicting, and unrelated goals states Smith (1999). Consequently, organizations must focus scarce resources and attention on their most important opportunities and challenges. By coordinating goals, organizations ensure focus because everyone works together to achieve the same overall objectives. Performance appraisals can be a useful

method of identifying the goals of the organization and thereby the individual, while improving performance and developing potential.

Organizations have learned that asking each individual jobholder to become faster is not the way for the organization as a whole to become faster. Rather, overall organization speed depends far more on improving the speed of processes that cut across jobs, departments, and functions than on increasing the speed of task completion within jobs, departments, and functions (Smith, 1999). Regrettably, activity-based goals too often produce dispiriting experiences and mediocrity in organizational life. When people lack the most basic understanding of why their efforts matter and how to recognize success, the self-confident spirit of a high-performance organization evaporates. Smith (1999) states that people who assume that their activity-based goals somehow contribute to performance outcomes being set by other people, and yet remain unclear about those outcomes or the connection, are people who are flying blind.

Performance can best be defined as the process by which organizations establish measure and evaluate individual employees' behavior and accomplishment for a finite period of time (Abdel-Razek, 1997). According to Young (2007), the ideal performance management system is one that energized the people in an organization to focus effort on improving things that really matter – one that gives people the information and freedom they need to realize their potential within their own roles and that aligns their contributions with the success of the

enterprise. Poister & Streib (1999) state that employees are more focused on organizational goals as a result of performance measures. It is reasonable to postulate that the application of a proper performance appraisal system will improve managers' effort, knowledge, and skill, as well as reduce organizational constraints, which in turn will improve performance (Abdel-Razek, 1997).

The notion that job performance is more than just the execution of specific tasks and that it involves a wide variety of organizational activities has important implications for the understanding and measurement of job performance (Arvey & Murphy, 1998). The factors that performance appraisals should include are, among other things, the full participation of employees, goal clarity, role clarity, and developing continuous communication programs and feedback loops (Abdel-Razek, 1997). Performance standards should have a primary objective for the particular position that agrees with the structure and goals for the total organization. Bates (1995) indicates that the performance standards include a listing of "key results areas" under each vital activity. The identification and recognition of differences of ability in managers will assist in making job assignments that suit these differences (Abdel-Razek, 1997). In order to remain efficient, the goal is always to get the right people, with the right skills, in the right place, at the right time.

Measurement Summary

Artley & Stroh (2001) demonstrate that performance measurement systems succeed when the organization's strategy and performance measures are in alignment and when senior managers convey the organization's mission, vision, values and strategic direction to employees and external stakeholders. The performance measures give life to the mission, vision, and strategy by providing a focus that lets each employee know how they contribute to the success of the company and its stakeholders' measurable expectations. Identifying the critical aspects of performance that clients care about, ensuring that the measures represent those aspects of performance, and ensuring that they can be measured reliably and validly, offers vendors the ability to know what is important to the client and how well they are servicing their clients.

Kingsbury, Divorski, and Shipman (2001) further illustrate that performance improvements occur when leaders use information resulting from measures to help inform decisions and improve accountability. It can support resource allocation and policy decision to improve service delivery and program effectiveness. It can also provide a vehicle for improved accountability. To the extent that it becomes part of how an organization conducts business, it can also serve as an early warning system that identifies growing problems before they become critical. Adoption of a performance plan does improve firm performance (Lobingier, 2000). A strategic orientation driven by actual customer needs and expectations,

focused on the organization's mission, and supported by an integrated performance-measurement system, can greatly assist organizations in meeting the competitive challenges of the best value environment.

Risk Management

Construction is a low-margin industry. The 2007 Construction Industry Annual Financial Survey, conducted by the Construction Financial Management Assn. (www.cfma.org), included responses from 756 companies. The net margin before income taxes in the latest fiscal year averaged 2.7%. The median return on assets was 8.8%. Internal Revenue Service figures for 2004 show that the 722,000 corporations in construction had net income (less deficit) of $47 billion, or 3.7% of total receipts of $1.3 trillion. That was considerably below the all-industry average margin of 4.9% according to Simonson (2008). Kangari (1995) further states that the construction industry is one of the most dynamic, risky, challenging, and rewarding fields. By identifying the various risks and making proper management decisions to accommodate the risk will allow construction firms to be more competitive and will increase their preparedness for future challenges.

Risk Management as Industry Challenge

Most of the world’s largest international construction firms believe properly managing and pricing risk is their biggest challenge, according to a new survey of 25 megafirm CEOs and top officials by management consulting firm KPMG International (see figure 6). KPMG says risk

management topped the list of company challenges, with 63% of respondents citing it as one of their top three. The survey was conducted earlier this year among construction megafirms, with 64% of respondents having revenue of more than $1 billion and 59% working multinational. Firms' identities were not disclosed, but their base countries include the U.S., U.K., Australia, China, Japan, France, Germany, Malaysia and Sweden. Executives cite poor forecasting, risk identification and cost escalation as the three top reasons for reduced project margins over the last 12 months as illustrated by Rubin (2005).

Figure 6. Risk Challenges of Mega-Firms.

Project owners worry about the shrinking contractor pool, rising construction costs and their ability to manage and execute jobs, says a

survey by management consultant KPMG International (see figure 7). The poll is based on interviews with top executives from 30 global firms with major capital programs planned. About 35% of owners queried were in the public sector, with utilities, developers, universities and health-care providers also included. They will spend a total of $70 billion over the next five years. Two-thirds had revenue over $1 billion. Rubin (2007) states that half of interviewee operations were based in the U.S. Identities were not disclosed.

Figure 7. Owner Project Challenges.

Managing risk was cited by both vendors and clients as one of the top challenges within the construction industry. And yet, the vast majority of construction projects do not have a formal risk management plan in place. The more prevalent approach is, instead of managing and mitigating risk in the project, that the construction project team's time is

spent in managing the issues, which is the realization of risk itself (Bolyard, 2009).

Risk Management Defined

According to Project Management Institute's "Project Management Body of Knowledge" (PMBOK) risk management "includes the processes concerned with identifying, analyzing, and responding to project risk. It includes maximizing the results of positive events and minimizing the consequences of adverse events." The major processes are:

1. Risk Identification – determine which risks are likely to affect the project and documenting the characteristics of each
2. Risk Quantification – evaluate risks and risk interactions to assess the range of possible project outcomes.
3. Risk Response Development – defining enhancement steps for opportunities and responses to threats
4. Risk Response Control – responding to changes in risk over the course of the project.

When managing risks, there are several risk strategy options to be considered. Risks may be avoided entirely (usually by eliminating their cause or root), transferred to another party (through contracts or insurance), or exposure to the risk can be reduced (through planned action measures). Acceptance of the risk should be considered only as a last resort, and should only be applied for items that cannot be addressed by any other strategy (PMBOK)

Good risk management involves the entire project team, including design, engineering, business, contracts, finance, purchasing, estimating, and project controls. Risk management should cut across an organization's silos to identify and manage a spectrum of risks. Resolve to proactively manage risks, rather than react to them. Since risk relates to the events or actions that jeopardize achieving the organization's objectives, Walker and Shenkir (2008) state that effective risk management depends on an understanding of the organization's strategy and goals. A best value vendor seeks to support the goal of the customer as well. Quality of service is a major factor of all customers.

Quality is defined by the customer, not the organization or the manager or the quality control department. The service must meet or exceed what the customer wants or expects. These customer expectations are highly individualized by age, gender, personality, occupation, location, socio-economic class, past experience with the organization and many other variables. In other words, what is quality for one customer may not be quality for another customer. It is for this reason that a risk assessment plan must be conducted before starting the project to determine the customers' expectations (Luthans & Kessler, 2007).

Developing A Risk Management Plan.

Risk management should be started as early as possible in the life of the project. The risk management plan should be conducted to establish the expectations and pre-plan the project. Risk management is

an ongoing and iterative process, which should be conducted throughout the lifecycle of the project (Edwards & Bowen, 2005). As the project risk is being monitored, the data and trends can be collected and compared against the baseline risk assessment. From these trends, progress can be measured and "lessons learned" can be documented. Risk status communication and awareness must occur regularly as a normal part of project meetings, so as to note changes to existing risks.

Controlled and Non-controlled Risk.

For construction, the industry is, and has been in the past, mostly interested in the technical risks. However, owners, planners, and decision makers must have knowledge on how much a facility will cost and how long it will take to construct which are often dominated by non-technical issues. So, in addition to technical risk, owners must also consider a broad range of non-technical risk (Kangari, 1995). Controlled or technical risk is why projects are outsourced to vendors that have experience and the technical skill to provide the services deemed outside the owner's area of expertise. What sets contractors apart is their ability to not only manage the technical risk but also are able to manage the risks they don't control as stated by Kashiwagi (2004).

Kashiwagi identifies factors that the contractor does not control, as:

1. Over-expectation.
2. The budget is not adequate to deliver expectation/requirement
3. Coordination between parties

4. Unforeseen events
5. Inaccurate or incomplete design
6. Conditions that are not addressed in the specifications.

These are non-technical risks but ones that can have huge impacts on the performance of the contractor.

Risk Management Summary

Risk Management is considered a major challenge within the construction industry, by both clients and vendors alike. High performing vendors not only develop risk management plans for their projects, they do so early and with the input of the client. They treat the risk management plan as a living document and continue to update and communicate the issue with the stakeholders. Best value contractors look beyond technical risk, they also conduct risk mitigation or avoidance strategies for risk they do not control, since those risks may have an impact on completing the project on-time, on-budget, and satisfying the client. The more risks can be controlled, the more successful the outcome will be.

Quality Management

Hackman and Wageman (1995) indicate that a fundamental premise of quality management is that the costs of poor quality (such as inspection, rework, lost customers, and so on) are far greater than the costs of developing processes that produce high-quality products and services. Much research has been done with regard to the

implementation of quality management and it is believed that the benefits of higher customer satisfaction, better quality products, and higher market share are often obtained following the adoption of quality management by construction companies (Pheng & Teo, 2004)

Overview

Quality management implementation in either large or small firms represents a good strategy to execute quality practices in an integrated manner. Also, Ahire and Galhar (1996) indicate that the quality management firms, both large and small, reported better product quality than the non-quality management firms.

Idris et al. (1996) illustrated how the electrical and electronic engineering industry in Malaysia has widely adopted quality management and the main benefits that resulted were improved customer satisfaction, teamwork, productivity, communication, and efficiency. Mc-Cabe (1996) reported a study of UK companies from different industries which have already implemented quality management. The results showed that a majority had achieved greater success against performance indicators than was the average for their respective industries. Culp (1993) cited an example of HDR Inc., Omaha, Nebraska, a large engineering firm that has implemented quality management.

The experience of applying quality management concepts provided the organization with improvements, information, and learning that occurred only because of the quality management process. This is in

addition to positive customer responses and client referrals that the organization received as a result of implementing quality management (Pheng & Teo, 2004).

The management of quality took a great leap forward when we abandoned our old paradigm of inspecting for quality and replaced it with an effort to build quality in through total quality management (TQM) and other such schemes as stated by Saucer & Saucer (2002). Quality assurance should consequently be a conglomerate effort so that everyone is working towards a common goal. It is also necessary however for management to supervise strategically and maintain a sense of operational control. Lastly, Quality assurance management must not only recognize the needs of its customers but must learn from mistakes and avoid them in future operations and processes.

Quality Management Definition.

Quality management is a business strategy for harnessing company's resources to achieve world-class quality at minimum costs. The PMBOK defines Quality Management as the processes required to ensure that the project will satisfy the needs for which it was undertaken. It must address both the management of the project and the product of the project. Quality management recognizes the importance of:

- Customer satisfaction – understanding, managing, and influencing needs so that customer expectations are met or exceeded.

- Prevention over inspection – the cost of avoiding mistakes is always much less than the cost of correcting them.
- Management responsibility – success requires the participation of all members of the team, but it remains the responsibility of the management to provide the resources needed to success.

Pheng and Teo (2003) state that a quality system has elements for establishing the objective for quality, for implementing operational controls to achieve the objectives and for measuring the results. Continual improvement must be used to manage the quality system.

Continuous Improvement

Cavaness and Manoocheri (1993) emphasize that to achieve a true culture of quality it is necessary to obtain top management commitment and adopt continuous improvement as a normal way of doing business. Thus, quality management calls for constant examination of technical and administrative processes in search of better methods as indicated by Pheng and Teo (2003).

A project-oriented business that produces unique products is one of the main characteristics differentiating construction from manufacturing (Ortega and Bisgaard, 2000). As projects produce unique artifacts that are hard to compare and measure, the principle of continuous improvement may at first appear to be in conflict with project management ~by definition, continuous improvement of a singular effort is impossible! Still, if project management is considered an ongoing process in an organization,

it becomes obvious that continuous improvement of the practices of project management is possible (Orwig & Brennan, 2000). So, as unique artifacts are produced by nonunique practices in building projects, assessment and review aiming at continuous improvement should be applied to practices rather than products (Samuelsson, 2003)! Hence, instead of the products, it is the actual work procedures that constitute the backbone of operations

Jahren and Federle (1999) state that a performance measurement system is required in order to successfully implement a quality improvement system. Organizations that produce quality goods will eventually do better even on traditional measures such as profitability than will organizations that attempt to keep costs low by comprising quality. The long-term health of an enterprise depends on treating quality improvement as a never-ending quest (Hackman & Wageman, 1995).

Customer Input

The goal of satisfying customers is fundamental to quality management and is expressed by the organization's attempt to design and deliver products and services that fulfill the customers' needs. In order to meet customer requirements, they should consider the needs and expectations of their clients, consultants, sub-contractors or supplier, when they are planning quality management (Pheng & Teo, 2003).

Quality management suggests that an organization must satisfy its customers in order to remain competitive and these customer

requirements should be met at the lowest cost possible (Pheng & Teo, 2003). Cavaness and Manoocheri (1993) further state that customer involvement provides an opportunity for service companies to get direct and immediate feedback on quality.

Quality Management Summary

Quality improvement helps organizations meet expectations in a rapidly changing world by emphasizing the quality of the organization's products and services in an effort to meet customer needs. Companies need to adopt management practices that assess and review their operations and processes, and thereby enable improvement of product and service quality. Moreover, well-functioning improvement processes are vital for creating and realizing an image of a ‘‘best practice company’’ as indicated by Samuelsson and Grans (2001). Therefore, a full implementation of quality management appears to increase competitiveness and customer satisfaction, reduces waste and improves the working condition of employees (Pheng & Teo, 2003).

Changing Organizations

The most successful organization in the long run are those that continuously adapt to changes in the competitive environment. The need for organizations to adapt to their competitive environment in order to succeed in the longer term is now a recognized principle in theories of both organization design (Nystrom & Starbuck, 1981) and strategic management (Guth, 1985). In fact, as Drucker (1954) pointed out years

ago, one of the key factors in effective management is the ability to sense environmental change and take steps to position the organization to capitalize on the change (Sauser, 2002). As clients move to the best value environment, the low bid contractors must change to survive. Change is difficult. Although the need to improve performance and work processes in a company may seem obvious, concrete approaches for this are rare in the construction industry. Smith (1999) illustrates that study after studies indicate that up to four out of five change efforts either fail or seriously suboptimize. In order to obtain improvement, the persons driving the project will have to put effort into improvement activities. Inevitably, the time required for this will have to be taken from ‘‘production time,’’ which is why an approach must be quick and simple in order to be accepted. (Samuelsson, 2004). The goal of an implementation program should provide simple processes to implement each key attribute.

Implement Using Simple Tools

Significant organizational change occurs when an organization changes its overall strategy for success, adds or removes a major section or practice, and/or wants to change the very nature by which it operates. Action plans can provide a clear and realistic vision for change. They provide a “roadmap” for managing the transition from the present state to the desired future state. Creating a climate of change will require that the organization first build an awareness that change is needed and then gain

the support of the people who must implement and cooperate with the change.

Implementation tools provide guidelines for how the organization will work toward realizing change. These tools are the rules that are intended to shape the organization's actions toward the delivery of the goals to customers. Implementation tools should help an organization if the following ways:

1. Provide understanding for change
2. Clarify goals
3. Provide framework for new processes
4. Promote Improvement
5. Track Performance
6. Encourage Accountability

The implementation tools should be easy to understand and simple to implement. The intent is to bring about change as efficiently as possible.

Efficiency

Operational efficiency deals with minimization of waste and maximization of resource capabilities, in order to deliver quality services. Eckerson (2006) states that operational efficiency is concerned with identifying wasteful processes and resources that drain the organization's profits. Keeping the implementation tools simple is the first step to minimizing wasted effort and time to train personnel.

Another step to gaining efficiencies is to leverage technology. Technology can assist with implementation, tracking and overall assistance with process improvements. For organizations to begin the process of turning technology into business leverage, they must first understand that information systems and technology are not solutions in themselves, but are tools to support quality operations and service delivery through more efficient data entry; data storage; data access, display, and integration—real-time and retrospective access; data manipulation and analysis; and data distribution and reporting (Eckerson, 2006). Technology can help in achieving the benefits more efficiently and sustaining them by accelerating project cycle times with collaboration and embedded best-practice processes. Technology should be used to further increase leverage, in a conscious, directed way, rather than rushing to embrace it for the sake of its newness. Technology won't light a fire where there is none, but where there is already good momentum, judicious use of technology can help accelerate it (Collins, 2001). Technology is an enabler of change, not the cause of it. The Construction Industry Institute (2008) has illustrated that technology has an enduring impact on gaining customer insights, sourcing optimization and supporting process enhancements, which thereby have a direct impact on efficiencies and thus the bottom line.

Use Best Value to Select Subcontractors and Employees

The attributes that vendors work toward implementing to change into a best value organization will assist with day-to-day operations. The next level of change includes acquiring subcontractors and employees that have these same attributes. It is not enough to implement the attributes; the contractors must seek to work with others like them. Seeking out others that measure performance, manage risk and quality and continuously improve will support the understanding of the best value environment and what it takes to succeed within it. Good-to-great companies build a consistent system with clear constraints, but they also gave people freedom and responsibility within the framework of that system. They hired self-disciplined people who didn't need to be managed, and then managed the system, not the people (Collins, 2001). Great people want to be associated with great organizations as Kashiwagi (2009) states.

Changing Organizations Summary

No longer is it appropriate to consider organizational change as a project or event – with a beginning and an end – to be managed. Rather, it must consider change management as an ongoing aspect of the leader's job. It is not enough simply to react to change; instead, the effective manager must anticipate change, even better, be the creator of change. The role as change manager has shifted from guiding leadership team through a successful change to building into the leadership team the

capacity to guide organization change as a continuous process (Saucer & Saucer, 2002). The tools to implement change should be simple and efficient. Garnering subcontractors and employees with the same attributes will assist with implementing change and truly squiring the best value attributes.

Literature Review Conclusions

Through the utilization of literature research and peer reviewed articles, we have been able to examine the best value quadrants of competition and performance. Although written mission statements and projected business strategies are important, it is also imperative to understand and perform accurate measurements in order to validate our hypothesis and findings. Most importantly, we have noted the differentiating factors related to overall influence on the outcome of the final product. Performance within the construction industry is indicative of being on-time, within budget, and simultaneously delivering high client satisfaction ratings. The attributes of the contractor are of utmost importance and in the obtainment of differentiation it is necessary to measure performance, manage risk assessment, increase operational efficiency, deliver a quality product and service, and hire experts when leveraging technology.

Through a better understanding of the attributes of a best value contractor, we can now examine the components of an attribute measurement survey. The utilization of methodology will allow us to

specifically analyze the key attributes within a contractor's organization. The use of an attribute survey will also allow us to make a statistical correlation between the attributes and the project's performance. Lastly, this survey will allow us to make an accurate determination of the transition implementation program.

While we have emphasized the benefits of performance measurements and distinguished the difference between individual and organization performance; it is now necessary to understand the applicability of contractor attributes and methods to measure current operations with that of a best value contractor.

Chapter 3 will allow us to examine the utilization of the Attribute Measure Survey. This survey encompasses twenty questions and covers such areas as performance measurement, risk assessment, and quality control. These measurements will then allow the contractor to view certain weaknesses as well as strengths and then make the necessary improvements to improve performance.

Within Chapter 3 we will also examine a case study involving five contractors who participated within the Attribute Measurement Survey. These results will be tabulated and statistically correlated with that of the best value structure.

CHAPTER 3 - Attribute Measurement Survey

Researchers have clearly stated according to Gumbus (2006) that companies of all sizes are good at developing mission statements and strategies but poor at implementing operational strategies to achieve them. Gumbus (2006) also emphasizes that many organizations are also lacking the proper tools to effectively measure whether they are achieving their mission and target strategy.

However, it is important to recognize that the identification of the attributes that support the success of a contractor within the best value organization is only the first step in providing an implementation program to transform a contractor into a best value contractor. The second step is to understand how the attributes are applied within an organization. Additionally, it is also important to implement a method in which to measure how effective their current operations compare to those of a best value contractor. The Attribute Measurement Survey provides the resources needed and the tools to measure where an organization is, where to focus efforts, and validate that improvement is realized. Thus, recognizing areas of potential weakness and external threats, and then making improvements to increase effectiveness in those areas and decrease any operational inefficiency must be at the forefront of every best value organization.

The Purpose of the Attribute Measurement Survey

As more organizations are realizing the importance of attribute measurement, specifically in regards to construction and the best value environment, it is imperative to understand the validation behind the purpose. Although attribute measurement might be assumed to be an implementation needed to make a decision it might also be utilized as a process to reveal operational inefficiencies. Thus, the utilization of the survey might be incorporated as a tool to make any necessary changes. Through the prior examination of literature research related to the best value contractor, it is necessary to incorporate an attribute measurement survey for the following purposes:

1. To measure the key attributes within a contractor's organization.
2. To affirm that the attributes correlate with project performance.
3. To determine the impact of the transition implementation program.

If the survey accurately identifies the measures of key attributes within a best value environment, it will also prove that those attributes correlate with best value project measures of on-time, on-budget, and client satisfaction. Once the survey has been proven to correlate with best value performance, it can then be used to measure the best value attributes within an organization. The survey can also be utilized to monitor the progress of the organization and its operational improvement of the transition into a best value organization. The organization will then

have facilitated a change from low-bid operations to succeeding in the best value environment.

Overview of Survey

The Attribute Measurement Survey was developed by examining the key attributes to determine how best value contractors utilize them. Since best value contractors prosper within an environment where owners procure services based on best value, the survey needed to focus on certain characteristics. For example, not just whether or not an organization possessed the characteristics, but the way in which they were implemented in their operations and how they are utilized. In order to effectively analyze and understand these correlations, each attribute was examined to provide an explanation of a best value contractor's usage of each attribute.

Measuring Performance

Full implementation of performance measures includes understanding the organization's mission and strategic goals in order to establish what is important and disseminate that message to all the employees. It is also the performance of the individuals within the organization as well as the organization itself. Effective leadership is critical in designing and deploying effective performance measurement and management systems. Their employee measurement system must motivate performance and establish continuous improvement. Best value contractors not only set up performance measures based on their

strategy, they know how they are doing and communicate that over the entire organization. They understand that their measures must take into account client satisfaction. This client satisfaction and the ability to exceed the client's expectations will, in turn, result in increased performance as well as overall project performance.

Minimizing Risk

Since best value contractors are experts in their field, they are able to control technical risk without much surprise. They, therefore, understand that the risks it does not control are the risks that need mitigation plans. Risks identified before the event takes place reduces surprises and assists the clients with understanding the importance of information/items needed by the contractor to remain on-time and on-budget. Client expectations are identified prior to beginning work and managed throughout the life-cycle of the project.

Managing Quality

An organization can control quality by identifying the client's expectations before beginning work. Once the quality expectations are identified, measures to confirm that the quality criterion is being met must be implemented. Finally, the implementation of tracking the measurements and developing an improvement program assists the contractor with achieving the quality goals and provides the client with the knowledge that the contractor is providing what the client has requested. Quality measures and results are to be appraised and reported on a

weekly basis, so if there is a deviation from the expectations, they can be addressed in a timely manner.

The Attribute Measurement Survey consists of twenty (20) questions relating to the key attributes of a best value contractor. These characteristics include: performance measures, risk assessments and quality management characteristics. Participants answered questions about their organization's operations on a scale of 1 to 10 with 1 representing that they "never" carry out the operation, 5 representing that they conduct the task "half the time" and 10 representing they "always" complete the process. The total possible score is 200 points if a participant's organization always conducts all the attribute procedures. A copy of the survey can be found in Appendix A.

Measurement Survey Correlation to Performance

In order to validate that the key attributes of performance measurement, managing risk, and controlling quality correlate with project success (on-time, on-budget, and satisfied client) within the best value environment, a case study was conducted. The objective is to compare the results of the attribute measurement survey to the performance information of contractors currently servicing best value customers. The case study utilized existing performance information on five construction contractors serving a best value client, the U.S. Army Medical Command's (MEDCOM) Major Repair and Renewal (MRR) program. This information was identified through research conducted by Performance Based Studies

Research Group (PBSRG). Each contractor was requested to complete the attribute measurement survey. These results were then compared to their performance information.

Case Study Results

Five contractors participated in the Attribute Measurement Survey. Surveys were completed by top management within each company. Table 2 shows the survey scores of the five contractors. Contractor A scored the highest with 190 out of 200 possible points, while Contractor D scored the lowest at 145.

Table 2

BVO Measurement Survey Scores of Five Contractors

Contractor	Measurement Score (110)	Risk Assessment Score (60)	Quality Score (30)	Total Score	Rank
A	104	58	28	190	1
B	94	55	26	175	2
C	92	47	27	166	3
D	84	41	20	145	5
E	91	50	24	165	4

The results show that Contractor A's scored the highest, with contractor D being the lowest; therefore, Contract A operates most closely

to a best value organization and, based on the survey's objective, should outperform the other contractors. The performance information of the contractors is shown below in table 3. Table 3 shows the Performance Information related to on-time and on-budget gathered from PBSRG on the research conducted for the MEDCOM MRR Program. The performance data was analyzed to look at only the impact of the contractor, excluding the impact due to client change requests. Each contractor's data analysis can be found in Appendix B.

Table 3

MEDCOM MRR Contractor Performance Information

	A	B	C	D	E
Total Number of Projects	54	149	57	25	77
% Projects On Time	81.5%	91.9%	87.7%	76.0%	88.3%
% Projects On Budget	77.8%	69.9%	78.9%	56.0%	67.5%
Client Satisfaction (10=satisfied)	9.5	9.1	8.5	9.2	9.4
Ave of on-time, on-budget, satisfaction	84.8%	84.2%	83.9%	74.7%	83.3%
RANK	1	2	3	5	4

This performance information, when on-time, on-budget, and satisfaction is averaged, identifies that Contractor A has the best overall performance since their percent of projects on-time, on-budget and owner satisfaction are the greatest in the group. Conversely, Contractor D has

the lowest performance of the five contractors in respect to time, budget, and client satisfaction. This substantiates that the attribute measurement survey score correlates with high performance within the best value structure.

Looking closer at the results of the survey scores and specifically at the questions that produced the lowest scores across the five contractors, revealed an interesting pattern. The four questions that produced the lowest scores were:

- Question 3: Does your Company measure performance of your subcontractor in terms of quality, risk management, on-time and on-budget?
- Question 5: Do employees know where they stand on their performance measures?
- Question 10: Does your Company use your performance measures to market your products and/or services?
- Question 17: How often are your projects free from “surprises” during execution?

These questions revealed that the contractors believe that they are applying the best value attributes within their management group, but it has not yet trickled down to the subcontractors, employees, or clients. The highest ranked contractor, which is the most proactive in regards to improving within the best value environment shows higher score on the questions that address processes/personnel outside of the management

team. It can also be concluded that higher performance contractors within the best value environment have a better understanding of the reasons for the tools and strive to promote better understanding to those around them, either by training or working with stakeholders that already have an understanding of the attributes that lead to greater performance.

Question 17, “How often are your projects free from “surprises” during execution?”, is different than the other 3 questions. It reveals that contractors are still being “surprised” on their projects, even when conducting a risk assessment plan (as shown by high survey scores on question 12 – does your company conduct Risk Assessment before every project?). This question illustrates that if a Project Manager conducts a Risk Management Plan (RMP), but fails to address the non-controlled risk, he or she misses the purpose of conducting the RMP in the first place. True experts “see” a project from start to finish and understand the risk they don’t control has the most bearing on the success of the project.

Even when companies don’t understand the reasons why the tools support the best value attributes, they can still realize performance improvement. The ones that logically “see” the link and the validity of the tools gain greater performance and can differentiate themselves from the competition.

Measurement Survey Conclusion

The results of the preceding case study in correlation with the Attribute Measurement Survey and an analysis of performance do indicate

that the Attribute Measurement Survey does in fact correlate an organization's operations with performance outcomes. The solution to operational inefficiency thus appears to rely on an efficient operational structure consisting of client satisfaction and remaining within budget. The attributes of measuring performance, managing risk, and controlling quality results in an organization that provides better products/services than its competition within the best value environment. In addition these organizations most often increase client value, decrease overhead costs, and promote sound and logical best practices

This positive correlation of the impact of performance and attribute measurement influences the ability of an organization to remain competitive as well as maintain an atmosphere of organizational flexibility. One of the key factors as we will see in the next chapter is an organizations ability to change and modify its strategic management directives in order to maintain competitiveness and increase peak performance. Through the implementation of quality assurance techniques, minimizing risk, and utilizing adequate measurement of performance, organizations can strategically align themselves within the best value environment and succeed within it.

As we will review within Chapter 5, management and organization will however have to allocate time and effort into the promotion of improvement measures. Consequently, so must the utilization of

implementation tools be consistently implemented in order to maintain the key attributes of an organization and a contractor’s performance.

CHAPTER 4 - Implementation Tools

An implementation tool for each attribute was established. A Performance Measurement System, a Risk Management Plan, and a Weekly Report are the three tools that will assist contractors with transitioning from reactive to proactive, from a bureaucratic/non-accountable to an accountable position, from a relationship based/non-measuring to a measuring entity, and to a contractor who manages and minimizes the risk that they do not control. A firm needs to have tools to exploit and appropriate new knowledge embedded in new organizational innovations (Abdelkader, 2004). This new attained knowledge should be properly aligned with the organizations missions, goals, and objectives and should also encompass the directives needed to increase organization performance and efficiency.

Performance Measurement System

Over the last couple of years, much has been written about Executive Dashboards, 'Balanced' Scorecards, the Baldrige Award, Intellectual Capital, and other approaches to Performance Measurement. All of these approaches have one thing in common – an emphasis on the importance of measuring your organizational performance in ways that go beyond the limitations of traditional financial reporting systems (Ferguson, 2007). Establishing viable performance measures is critical for organizations; making those measures work is even more important. Once the performance measurement system is created, then, the next

step is to implement it within the organization. Leadership is critical in designing and deploying effective performance measurement and management systems. An organization's performance measurement system is integral to the overall management process and directly supports the achievement of the organization's fundamental goals. The performance measurement system can also directly correlate with the management process and its strategic goals.

To support measurement of performance, a performance measurement system must be developed. This tool consists of the measurement of three important components:

1. Important performance indicators to the contractor (on-time and on-budget)
2. Client satisfaction
3. Employee development

A Performance Measurement System should support the goals of the organization and be simple to implement and administer. The purpose of the Performance Measurement System is to identify to employees what is important to the organization and improve services by assisting employees with their own professional development. Thus, as previously stated, the performance measurement system is an indicative evaluation of the attributes of the individuals as well as the organization as a whole. Thus, in order to remain most competitive it is imperative to validate an

environment that produces results, both for the customer as well as the company.

Performance Indicators

Results-type measures generally gauge how successful a company has been in reaching its objectives, while process-type measures monitor the status of functional areas critical to a given result. In the past, most companies used results-type measures that tended to be relevant only to specific functional departments. Today, however, the focus is on including process-type measures that integrate key business activities and the corporation's organizational structure. As these activities and structures change, the measurement system used to gauge project performance should also change. Meyer (1994) indicates companies that rearrange their organization structure while continuing to rely on traditional measurement systems may undercut their project teams.

Process-type measures concentrate on eliminating tasks that have no value and improving the efficiency of overall processes within the organization. Processes are inherent within an organization and must be understood, managed, and improved to deliver value added services to clients. Process management provides a way to identify and apply best practices for improvement to organizational operations. When starting a measurement system, only a few measures of high value that track the health of the process and/or signal early detection of success should be implemented. If the measure does not track what you want or has an

unintended behavioral effect, implement modifications and track another. Examples include measuring the timeliness of filling job vacancies or costs of employee on-boarding.

Results-type measures in the construction industry are predominantly focused on success is terms of time, cost and quality.

Time and cost measures are a relatively simple measure to obtain and verify. Focusing on meeting schedules and budgets provides positive reinforcement of what the project goals are from both the clients' and the vendor's perspective. Results-type measures should filter down and be incorporated into employee performance measures. This reinforces what is important to the organization and how the employee affects those measures. Quality can be measured by both objective and subjective measures. Quality can be measured objectively by how often a built system requires un-scheduled maintenance or how often a roof leaks within the warranty period. Quality can be measured subjectively through performance surveys. Thus, these modes of measurement also allow for increased communication between client and contractor and individual contractor and management. Thereby alleviating any miscommunication or misguided performance goals.

The overall intent is to set goals that achieve positive outcomes, measure performance, and continuously improve quality of service while exceeding the expectations of client.

Client Satisfaction

It's a well known fact that no business can exist without customers. If clients are not satisfied with the services that are being provided, they will seek another alternative. The successful companies today are those that are engaging with their customers in order to provide services that their customers want. A strong understanding of customer needs dictate expectations. Delivering a product or service in alignment with a clients expectations are critical to maintaining client satisfaction. When businesses are focused on understanding client needs and creating a positive experience with every client interaction, project success will be achieved.

Conducting a customer service survey will provide you with a true understanding of client expectations. Managing expectations up front sets the stage to exceed customer satisfaction. Customer satisfaction surveys allow companies to determine how well the organization delivers based on the service the customer experiences. This data provides important information that is integral to improving services. Survey results also give companies the opportunity to gain a better understanding of the customers and their changing needs and perceptions. Initial customer satisfaction inquiries will provide a baseline against which to measure future improvement initiatives. Regularly conducting a service satisfaction survey helps to identify specifically what attributes of the service are of greatest importance to customers and how the company performs against those

attributes. Track changes in customer expectations over time. Any successful company must learn to identify and adjust to changing trends, many of which will be reflected in customer expectations.

Focus on providing services in the client's best interest and ensure delivery of service. There exists an interaction between the desired results and customer satisfaction. Customer satisfaction levels will greatly improve when customers are given what they want.

Employee Development

An organization is only as good as its employees. When employees are given the opportunity to develop their knowledge and skills it also increases job satisfaction, morale, and employee motivation. Employee development programs make positive contributions to organizational performance (Washington 2003). A more highly-skilled workforce can accomplish more and increase the performance of the organization. Employee development encourages employee engagement which is essential to a high performance workplace.

An individual development plan is established by working with the employee to translate goals into concrete action steps. First, the employee along with their supervisor must determine which skills need improving or if new skills should be initiated. Questions that will assist in the creation of an employee's development plan may include:

- What are your skills and how do they apply to your current job?

- What can the organization do to help you do a better job?
- What are your job goals?
- What do you want to be doing in 5 years?
- What can you do to prepare yourself to move ahead in your career?
- What activities would help you develop yourself?

Once the skills are identified, training and development activities are selected that match employee career development objectives and job needs. Formal training is not the only option, other activities that provide skill development include: job rotation, cross-training, mentoring, internships, coaching, and career strategy groups.

The management and leadership development process is flexible and continuous, linking an individual's development to the goals of the job and the organization. Employee development programs should include:

- Annual review of the employee's individual development plan and career discussion with supervisor
- Hold supervisors accountable for supporting employee development efforts and ensure personnel development remains a key performance objective.
- Create a culture of learning within the organization that promotes opportunities for formal and informal learning to all members of the organization.

- Follow up with employees after a learning activity to integrate new skills and knowledge into their responsibilities

In the best value environment, clients are looking for experts in their respective field to provide experience and performance to the client's project. Organizations that support increasing skills and knowledge promote a best value environment. Not only will they create experts, the organization will increase efficiencies in processes, resulting in financial gain.

Risk Management Plan

Risk is the probability or threat of negative occurrence caused by vulnerabilities and which may be neutralized through pre-mediated action. Realization of risk can negatively impact performance indicators of on-time, on-budget, and satisfying the client. Pre-planning in the form of a risk management plan (RMP) identifies potential risks, establishes plans to mitigate or eliminate the risk, and/or pre-determines courses of action if the risk is realized. There is a positive correlation between a project with a well prepared plan that identifies, prioritizes, and minimizes risk and a successful construction project. The theory behind the importance of planning can be explained using the "event theory" as identified by Dr. Dean Kashiwagi (Kashiwagi 2007). An event only happens one way; it is constrained by its initial conditions. The only way to impact the outcome is to affect the initial conditions before the event begins. Those that perceive

more information can more accurately predict its outcome. There is a correlation between a well planned project and project success.

The purpose of the RMP is to identify client expectation, identify action items with owner and due date, and identify potential pitfalls that are outside the contractor's control. The RMP should be used by the contractor as a tool to communicate the expectation of the project with the client. It sets a baseline of what can be expected and if schedules are not met or information is not obtained in a timely manner, how it will affect the project in terms of the performance indicators. A RMP should include the following items:

1. Milestone schedule, include any issues that may impact the client's satisfaction (i.e .comment period for client, excessive noise, utility outages, etc) An example of what a milestone schedule might look like is shown below in Table 4. It identifies the activity, the date that is initially set as the contract dates, the actual or planned date for completion and percent complete. This schedule will be updated on a weekly basis as part of the quality management implementation.

Table 4

Example of a milestone schedule within the RMP

Activity	% Complete	Actual/Planned Date	Initial/Contract Date
Notice to Proceed	100%	09/26/08	09/26/08
Abbreviated Accident Prevention Plan Submitted	100%	10/15/08	10/01/08
Site Investigation/Design Charrette	100%	10/20/08	10/15/08
Site Investigation Report Submitted	100%	12/03/08	11/16/08
SIR comments by Gov't and Facility	100%	12/18/08	12/18/08
Interim 65% Work Plan Submitted	100%	02/09/09	12/31/08
Government Review Period	100%	02/23/09	01/14/09
100% Work Plan Submitted	100%	03/30/09	02/28/09
Government Review Period	100%	04/14/09	03/14/09
Corrected for Renewal Work Plan Issued	100%	05/27/09	03/16/09

2. List of action items and/or information required by the client along with the person responsible for the action and a due date. This assists the contractor with communicating with the client on what remains outstanding in regards to information or action items. Below in Table 5 is an example of an action item listing.

Table 5

Action Item Listing

Action Items/Information Needed	Person Assigned	Due Date
Client Construction Policies	Quality Assurance Representative	10/30/11
Weekly Progress Meeting date/time	Facility Manager	10/30/11
Temporary X-ray shielding requirements	Radiation Protection Officer	11/13/11
Identification of stakeholder changes	Facility Manager	01/03/11
Move plan and duration between phases 1 and 2	Clinic Operations Manager	04/02/11

3. Any risks that the contractor does not control should be identified by the contractor and the client, subcontractor and suppliers should provide any issues that they are concerned about. This should include impact to the project of action items that are not completed by the due date.
4. Mitigation and/or elimination plans for each risk.
5. Course of action (COA) plans if, even with mitigation/elimination plans, the risk comes to fruition.
6. Checklist of how and how often the risks will be assessed to determine if they no longer pose a threat to the success of the project or if the action plans must be executed.

Items 3-6 can be combined and be displayed as shown in Figure 8.

☐	**RISK** to schedule: Timely transition of Staff from upcoming construction area (14 days) **MITIGATION**: Keep Staff informed on any change in schedule. Meet by 1 Apr 07 with Transition Officer on when move is scheduled, to include phones and computers, and how dental casework will be moved to reuse in transition building. By 15 Apr 07, schedule the training of facility components such as nurse call, fire alarm system, mechanical systems, etc before move takes place. **COA PLAN**: If move begins and will not be complete in 14 days, contractor will develop a plan to work in areas that have been cleared and impact to schedule will be identified. **CHECK**: Upon conclusion of ***each workday*** – has completion date been impacted? If so, discuss with Transition Officer at weekly progress meeting.
☐	**RISK** to client satisfaction: Infection, dust, and noise control during demo **MITIGATION**: Develop infection control plan (Infection Control Risk Assessment - ICRA) in coordination with infection control practitioner. Monitor barriers and exhaust daily. Identify all HVAC intakes and keep demo activities clear. Demo of noisiest areas where walls are lead lined will be accomplish before the facility opens for staff and patients and jack-hammering will be coordinated with staff. **COA PLAN**: If noise disruption occurs, contractor will stop demo and alternate work schedules will be vetted through the client. **CHECK**: ***Once daily***, barriers and exhaust system in-place and operating correctly. All AHU intakes and returns clear of demo activities. Discuss schedule to demo lead lined walls at the weekly progress meeting

☐	**RISK** to schedule and budget: Complete site work before ground freezes. Freeze normally occurs by mid-Dec 06 **MITIGATION**: Begin work tomorrow and work Saturdays that weather permits. If schedule slips, all stakeholders will be notified. **COA PLAN**: if ground freezes before mid-Dec, site work may need to wait until spring for completion. Impact will be 90 days to schedule and $25,000 to cost. **CHECK**: Upon conclusion of ***each workday*** – impact due to weather will be reviewed and schedule adjusted if required.

Figure 8. Risk Items and Checklist.

7. Contractor operations overview identifying key policies and procedures that may affect the client (ie parking area for crew member, designated smoking areas, etc) Site maps and walking-through procedures can be used to explain issues that may be of concern to the client.

The best time to identify issues is before they become a problem. A good way to launch the risk management plan is to conduct a meeting immediately after contract award to outline to all the stakeholders involved the understanding of the scope of work and the risk management strategy. According to Schambach and Duke (2003), conducting RMPs forces planning and reduces the number of “surprises” that are encountered during the project. Although the RMP is conducted at the beginning of the project, it is a living document that should be reviewed weekly. As

potential risk items are identified, they are added the RMP and mitigation techniques provided.

Weekly Reports

Because exposures to risk are constantly changing, a continual review to identify changes in exposures or appropriate management techniques is necessary (Barrese & Scordis, 2003). The Weekly Report is both a quality control and risk management tool. Its purpose is to identify issues that require resolution as they affect time, budget and client satisfaction. The client manages the contractor through a weekly report that identifies upcoming risks (Angelo, 2006). Any risk that was listed on the RMP that the contractor could not minimize or that was unforeseen, is listed on the weekly report. This weekly reporting tool assists with coordinating what the problem is and who has the responsibility for the next action to solve the problem.

The weekly report brings clear accountability. It controls the quality of the project in terms of risk. It provides the data needed to prove whether or not a company is performing and addressing risks in a timely manner. Quality is controlled when risks are minimized.

A weekly risk report should include the following items:

1. The date the risk is identified
2. A description of the risk
3. The plan to minimize the risk
4. Person responsible for the risk

5. Impact of the risk in terms of schedule, budget, and client satisfaction
6. Planned resolution and actual resolution dates.

A weekly risk report was develop by PBSRG to document, allocate accountability, and provide status of current project risks. This weekly report shown in figure 9 below will be utilized as the third implementation tool.

Week Ending:	11/12/2010								
Sr. #	Date Entered	Risk Items	Plan to Minimize Risk	Planned Resolution Date	Actual Date Resolved	Impact to days	Impact to Cost	Owner/ Contractor/ Unforeseen /Designer	Risk Rating (1-10)
0	3/17/2006	Select the Risk Item (Area of Risk) from the Dropdown Menu or enter your own.	1) Problem background - Why is this a risk for the project? If this was due to Owner/ COE/ Facility/ Project Manager? 2) What will be done to minimize this? 3) Who is responsible for the plan? 4) What kind of impact will this have?	3/17/2006	3/18/2006	53	$ 10,000	D	5

Figure 9. Weekly Risk Report.

Conclusion

Grifel (1994) illustrates that the process of implementing a change within an organization requires a climate that the organization must first build an awareness that change is needed and then gain the support of the people who must implement and cooperate with the change. Using the attribute survey to identify which attribute(s) are lacking pinpoints to the leadership where improvements can be made. The survey results can be easily distributed to all members of the team to assist with understanding where to focus efforts to improve. The implementation tool

for the attributes identified during the literature research can be applied to the processes of an organization.

CHAPTER 5 - Implementation Tools Case Study

The Implementation Tools case study examines the validity of the hypothesis statement that the utilization of the Implementation Tools will subsequently result in an organization improving their performance within the performance based environment. This case study tests the developed tools implementation within an organization's operations and assists them in transforming into a best value contractor. Within this part of the research, the Attribute Measurement Survey is utilized to determine an organization's characteristics as they relate to measuring performance, managing risk and controlling quality. Once the baseline is determined, the developmental tools of a Performance Measurement System, a Risk Management Plan and Weekly Reports are implemented into the organizations operation. After the implementation of these tools, the Attribute Measurement Survey will measure the organization again to determine if the tools have an impact in improving best value attributes and thus their performance within the best value structure.

Health Facility Solutions Company (HFS) agreed to be the case study organization for this part of the research. HFS Company is a construction services organization that provides Project Management and Quality Assurance services. HFS employs fifty employees and has been conducting business for the last seven years. HFS Company's largest client is the U.S. Army MEDCOM. Within the last few years, the MEDCOM has been working to move to a performance-based environment. HFS

saw this opportunity to participate in the study as a way to continue to support their largest client.

Three HFS management staff personnel completed the Attribute Measurement Survey in November 2008. The management staff consisted of the Program Manager, responsible for the overall performance of the task orders; the Human Resource Director, responsible for recruiting, training, and employee performance; and the Contracts Manager, responsible for adherence to the contract, pricing and invoicing. The initial attribute survey outcome is shown in Table 6.

Table 6

Initial Survey Scores

Management Staff	Measurement Score (110)	Risk Assessment Score (60)	Quality Score (30)	Total Score
A	77	35	25	137
B	67	30	27	124
C	58	34	19	111
Average	67	33	24	124

These results show that all three attributes have room for improvement. HFS decided to implement all three of the implementation tools, beginning with Performance Measurement.

Performance Measurement System

HFS immediately began a strategic session to clarify and confirm the mission and organizational goals of HFS and determine what was important to the key leaders. In determining these key determinants it was necessary for HFS to determine what specifically they wanted to accomplish, how they were planning on achieving these goals, when these various steps would be accomplished, and how they would ultimately determine if they were on track.

The results are as shown below.

Mission: Assist our clients to bring construction projects in on-time, on-budget and with a satisfied client
Vision: To become the company that employees want to work for and clients come to for the best Project Managers, Facility Planners, and Quality Assurance Representatives.
Goals: Implement system for tracking performance, gather data to support performance system
Important: obtaining and maintaining quality employees while exceeding the client's expectations in regard to quality and cost of services

HFS key leaders then implemented the Performance Measurement System on both the company and employee levels. As indicated previously, to provide validity to performance measurement, it is necessary to monitor both the performance of the organization as well as the individual contractor. This not only provides a baseline for future

measurements but also allows the organization to view the progress of both the organization and the individual worker.

The implementation of a successful performance measurement system must provide accountability within several factors. Therefore, the company barcode consisted of turnover rate, timely reporting, and client satisfaction.

Table 7

Sample Organization Barcode

% of projects on-time	% of projects on-budget	Current Customer Satisfaction Rating	% of reports on-time	Turnover Rate (Ave % per year)
85%	95%	9.2	96%	2

The employee barcode consisted of timely reporting, client satisfaction, and achieving a personal goal. (The HFS Performance Measurement System can be reviewed in Appendix B)

Table 8

Sample Employee Barcode

% of reports on-time	Current Customer Satisfaction Rating	Current year goal rating	Ave goal completion rating
96%	8.5	2	3

Risk Management Plans

HFS already conducted risk assessments for some of their larger, riskier task orders; however, the organization supplemented their process with developing RMPs before beginning work on every task order

awarded. Training personnel on the purpose and how to develop a RMP was integrated into monthly staff meetings and followed up with on-site sessions. (Example training outline in Appendix C) Management staff was responsible for completing the RMPs, but the on-site staff assisted with site-specific issues and also with following up with unforeseen risks to management. Understanding the RMPs and how the weekly reports supplemented the information also assisted our Project Managers and Quality Assurance Evaluators to assist the construction contractors with their own RMP and the value of the weekly report.

Weekly Reports

Finally, HFS began submitting weekly reports to the contracting office that identified any risks on the RMP that was not mitigated as planned, as well as any "surprise" risks that developed.

Table 9

Sample Weekly Report

Sr. #	Date Entered	Risk Items	Plan to Minimize Risk	Planned Resolution Date	Actual Date Resolved	Impact to days	Impact to cost
0	3/17/2006	Select the Risk Item (Area of Risk) from the Dropdown Menu or enter your own.	1) Problem background - Why is this a risk for the project? If this was due to Owner/ COE/ Facility/ Project Manager? 2) What will be done to minimize this? 3) Who is responsible for the plan? 4) What kind of impact will this have?	3/17/2006	3/18/2006	53	$ 100.00
1	2/26/2010	Renewal of Ft Lewis QA services (Erich Demorest)	1) The current Ft Lewis TO for QA services ends 25 Mar 2010. 2)RFP for renewal task order should be provided by 1 Mar 2010. 3) Mobile COE 4) There will be a gap in QA services at Ft Lewis 3/5/10 - RFP has not yet been received. It is our understanding that client wants to continue services 3/12/10 - RFP recieved. Due 14 Mar 3/19/10 - Proposal submitted 3/26/10 - Award has not yet been recieved, delay for each day not awarded. Have been told we would recieve today 3/26/10. 4/2/10 - Award 3/29/10 total impact 2 days laps in service	3/24/2010	3/29/2010	2	$ -
2	7/30/2010	Additional Travel on 98-12 for PM at Riley	1) The current Ft Riley TO for PM services requires additional funding for travel 2)RFP for additional funding should be provided by 1 Mar 2010. 3) Mobile COE 4) A trip that the PM is to attend will not be supported. 8/6/10 - RFP received and proposal submitted 8/13/10 - Mod not yet awarded 8/20/10 - Award mod 1 on 8/16/10	8/16/2010	8/16/2010	0	$ 12,000.00

The result was less, more concise communication between HFS and the contracting office that lead to more productive support to the client.

Implementation Tools Results

The management staff at HFS completed the Attribute Measurement Survey for the second consecutive time in October 2010. The results are shown in the table below:

Table 10

Survey Scores before and after tool implementation

Management Staff	Measurement Score (110)	Risk Assessment Score (60)	Quality Score (30)	Total Score	Initial Total Score
A	107	55	30	192	137
B	97	52	28	177	124
C	90	50	27	167	111
Average	98	52	28	178	124

It appears at first review that improvements were realized, but comparing the performance information before and after the implementation program supports that improvements were in fact realized. Table 11, HFS Performance Information, shows an improvement of 5% on the average performance scores of on-time, on-budget, and client satisfaction.

Table 11

HFS Performance Information

Performance Information			
	Survey Score Before Tools	**Survey Score After Tools**	**% Increase**
Number of Projects	38	40	
% on-time	87%	95%	8%
% on- budget	100%	100%	0%
Client Satisfaction	9.3	9.8	5%
Ave of on-time, on-budget, satisfaction	93.3	97.6	5%

The largest improvement on the attribute survey for HFS included:

Question 1 – Does your Company measure your organization's performance in terms of meeting strategic goals and objectives?

Question 2 – Do you know how the organization is doing on those goals

Question 10 – Does your Company use your performance measures to market your products and/or services?

Question 14 – Does your Company require your subcontractors to conduct Risk Assessments?

These results are logical since these are the operations that HFS was not doing at all before implementing the attribute tools.

Implementation Tools Conclusion

The results of the t-test were influential in determining the difference between scores on the Attribute Measurement Survey before HFS implemented the integration tools and after they incorporated the

tools. This quantifiable research demonstrated that the tools do in fact assist organizations with improving best value contractor attributes. Upon conclusion of the case study, HFS leadership stated “We always believed that we were a Best Value Contractor, but had no way of showing it to our clients and potential customers, now we utilized our quantitative measures of turnover, timeliness, and client satisfaction to articulate our ability to not only perform on a task order, but provide quality services.”

CHAPTER 6 - Results and Conclusion

The hypothesis of this thesis asserted that contractors are having difficulty transitioning from a price based to a best value structure. It also proposed that developing tools to assist contractors with identifying who they are and implementing best value attributes within their organization will prepare contractors to successfully operate in a performance-based environment. These tools comprised a Best Value Implementation Program that measured the contractors utilization of best value attributes along with implementation tools that focused on:

1. A performance measurement system that incorporates organizational strategy and objectives as well as personnel performance.
2. A Risk Management Plan which forces planning and concentrates on risks that are outside the control of the contractor.
3. A weekly risk report that ensures quality by assigning accountability to unmitigated or unforeseen risks to quickly resolve issues.

Results

In order to alleviate the possibility of bias and increase the reliability and validity of data, the utilization of both peer reviewed literature research and case studies were utilized. The results of this data were included as follows:

1. The Best Value Environment was defined as:

a. Defined by the CIS as high competition and high performance (Kashiwagi, 2004)
b. Contractors must differentiate themselves from the competition by factors other than only price (Kale & Arditi, 2002)
c. Performance in the construction industry is defined as on-time, on-budget, and high client satisfaction (El-Mashela, Minchin, & O-Brien; 2007)
d. Differentiate by not only achieving high performance (evidence through measurement), but by identifying the ways in which they achieve success.
    i. Plan to minimize risk and be efficient (Atkins & Simpson, 2008)
    ii. Deliver quality and continuously improve (Deming, 1986)
    iii. Hire experts that know how to do a. and b. above while leveraging technology (Yates, 1994)
e. Clients can differentiate using dominant information and release control of the project. (Kashiwagi, 2004)

2. Attributes of a best value contractor were identified as:
    a. Measure Performance
    b. Manage risk and be efficient (Atkins & Simpson, 2008)
    c. Deliver quality and continuously improve (Deming, 1986)

    d. Hire experts while leveraging technology (Yates, 1994)
3. An Attribute Measurement Survey was created and proven to correlate with construction performance information.
4. Tools for each of the attribute topics were identified which included:
    a. A Performance Measurement System for both the organization and its employees.
    b. A Risk Management Plan that assists the contractor with planning and managing owner expectations and risk.
    c. A Weekly Risk Report to maintain quality and continuous improvement.
5. The Implementation tools were tested and determined to assist contractors with improving their score on the Attribute Measurement Survey.

These results support that best value attributes contribute to high performance within the construction industry as it relates to projects being on-time, on-budget, and meeting client expectations. This research also reveals that the implementation tools increase those attributes within a contractor's operations.

Conclusion

Many contractors within the construction industry have heard of best value, but most do not understand the concepts or how to implement processes to improve their organizations efficiencies and value. With more owners moving toward a performance-based industry structure,

contractors must be prepared to understand and operate within that environment. Staying competitive within a new structure requires the understanding of that structure and what it takes to succeed within it.

The utilization of performance based measurements for both organizational and individual performance will allow organization to implement a baseline for future comparisons and to implement further best practices. In support of the best value environment this thesis has allowed us to analyze the attributes that make an organization truly successful.

This thesis proposed a hypothesis to assist contractors with transitioning from operating within the low-bid environment to the best value environment. This hypothesis provided low-bid contractors with a better understanding of the best value environment and the characteristic of an organization that thrives within it. The implementation program and measurement system will allow organizations to monitor their transition and improve performance within the best value environment and subsequently increase their validity. The tools utilized by this research are available to any organization that wants to incorporate organizational success within the best value environment. This research provides tools to assist organizations with measuring their current operations and prescribes a method to improve and mature their operations into a best value contractor. The tests performed on the Attribute Measurement Survey and the Implementation Program have produced strong evidence that contractors can transition into a best value environment, but further

research is required to determine the impact of how much better or faster the implementation and measurement system work to improve performance.

REFERENCES

Abdel-Razek, R.H. (1997). How Construction Managers Would Like Their Performance to be Evaluated. *Journal of Construction Engineering and Management*, 123, 208-213.

Ahire, S, L. & Golhar, D.Y. (1996). Quality Management in Large Versus Small Firms. *Journal of Small Business Management*, 34 (2), 1+.

Angelo, W. T. (2006, April 3). Best Value: University's System Boosts Value Added. *Engineering News Record*.

Artley, W. & Stroh, S. (2001). The Performance-Based Management Handbook: Establishing an Integrated Performance Measurement System, Vol 2. Retrieved July 29, 2007 from http://www.orau.gov/pbm/documents/documents.html.

Arvey, R.D. & Murphy K.R. (1998). Performance evaluation in work settings. *Annual Review of Psychology*, 49, 141+.

Atkins, J. B. & Simpson, G. A, (2008, May). *Managing Project Risk. Best Practices for Architects and Related Professionals.* Hoboken, NJ: John Wiley & Sons, Inc.

Austin, R. D. (1996). *Measuring and Managing Performance in Organizations*. New York, NY: Dorset House Publishing Company, Incorporated.

Barrese, J. & Scordis, N. (2003). Corporate Risk Management. *Review of Business*, 24 (3), 26+.

Bates, G. (1995). Employee Performance Standards: What Works Best? *Journal of Management in Engineering*, 11 (4), 24-26.

Bezu, J.K (2010, July 13). *Booming Construction Industry and the Changing Trends in Architecture.* Retrieved from http://www.architecture-student.com/architecture/booming-construction-industry-and -the-changing-trends-in-architecture/

Black, J. S. & Gregersen, H. B. (2008). *It Starts with One: Changing Individuals Changes Organizations*. Upper Saddle River, NJ: Wharton School Publishing.

Bolyard, C. E., Jr & Khadka, S. B. (2009). *Applying Risk Management to Project Performance.* Retrieved from http://www.mbpce.com/kcenter_Applying-Risk-Management-to-Project-Performance.html

Business Wire Staff Writer (2008 May 8). Discover the Benefits of Effective Risk Management Practices With Managing Project Risk. *Business Wire.*

Butler, J. (2002). Construction Quality Stinks. *Engineering News Record*, 248 (10), 99.

Cable, D. M. (2007). *Change to Strange: Create a Great Organization by Building a Strange Workforce.* Upper Saddle River, NJ: Pearson Education, Inc.

Cavaness, J. P. and Manoochehri, G.H., (1993). Building Quality into Services. *SAM Advanced Management Journal,* 53 (1), 4+.

Charan, R. (2007). *Know-How: The 8 Skills That Separate People Who Perform from Those Who Don't.* New York, NY :Crown Business.

Collins, J. (2001). *Good to Great: Why Some Companies Make the Leap...and Others Don't*. New York, NY: Collins.

Construction Industry Institute (October 2008). *Leveraging Technology to Improve Construction Productivity.*

Creyer, E. H. & Ross, W. T. Jr. (1997). Tradeoffs between price and quality: how a value index affects preference formation. *Journal of Consumer Affairs*, 31 (2), 80+.

Daghfous, A. (2004). Absorptive Capacity and the Implementation of Knowledge – Intensive Best Practices. *SAM Advanced Management Journal*, 69 (2), 21+.

Dainty, A. R. J., Cheng, M., and Moore, D. R. (2005). Competency-Based Model for Predicting Construction Project Managers' Performance. *Journal of Management in Engineering*, 21, 2-9.

Dallas, M. F. (2006). *Value and Risk Management: A Guide to Best Practice*. Oxford, England: Blackwell Science Ltd.

Deming, W. E. (1982, 1986). *Out of Crisis.* Cambridge, MA: Massachusetts Institute of Technology, Center for Advanced Engineering Study.

Duncan, W.R. (1996). *A Guide to the Project Management Body of Knowledge by PMI Standards Committee.* PMI Publishing Division, Sylva, NC.

Eckerson, W. W. (2006). *Performance Dashboards: Measuring, Monitoring, and Managing Your Business.* Hoboken, NJ: John Wiley & Sons, Inc .

Edwards, P.J. & Bowen, P. (2005). Assessing Risk in Construction Projects. *Architectural Science Review*. 48 (1), 111

El-Mashaleh, M. S., Minchin, R. E. Jr., and O'Brien, W. J. (2007). Management of Construction Firm Performance Using Benchmarking. *Journal of Management in Engineering*, 23, 10-17.

Erbeck, G. W. & Pozzebon, L. (2006). San Diego County Team Excellence Performance Measurement System. *Journal of Environmental Health*, 68 (6), 65+.

Farooqui, R. U & Ahmed, S. M. (2008) *Assessing Impacts of Low-Bid Environment on Performance of Public Work Projects: A Case Study of Pakistan*. Department of Construction Management, College of Engineering and Computing, Florida International University.

Ferguson, I. (2002). Taking Performance Measurement to the Next Level. Retrieved July 29, 2007 from http://www.managementhelp.org/perf_mng/measure.htm

Fischer, R. J. (1994). An overview of performance measurement. *Public Management*, 76 (9), 2+.

Flanagan, R. & Norman, G. (1993). *Risk Management and Construction*. Oxford, England: Blackwell Science Ltd.

Fontelera, J. (2009, July 21). *Construction 2009.* Retrieved from http://news.thomasnet.com/IMT/archives/2009/07/2009-construction-outlook-sector-still-weak-due-to-downturn.html

Garrison, T. (2009). The Garrison Report #2009-5, Client Relationships – To be or not to be? Retrieved from http://www.tedgarrison.com/resources/garrison-report/2009-reports/client-relationships-to-be-or-not-to-be/

Gawron, V. J. (2000). *Human Performance Measures Handbook*. New York, NY: CRC.

Grifel, S. S. (1994). Organizational culture: its importance in performance measurement. *Public Management*, 76 (9), 19+.

Gumbus, A. & Lussier, R.N. (2006). Entrepreneurs Use a Balanced Scorecard to Translate Strategy into Performance Measures. *Journal of Small Business Management*, 44 (3), 407+.

Haber, S. & Reichel, A. (2005). Identifying Performance Measures of Small Ventures – The Case of the Tourism Industry. *Journal of Small Business Management*, 43 (3), 257+.

Hackman, J. R. & Wageman, R. (1995). Total Quality Management: Empirical Conceptual, and Practical Issues*. Administrative Science Quarterly*, 40 (2), 309+.

Henderson, D. A., Chase B. W., & Woodson B. M. (2002). Performance measures for NPOs: how one organization developed a way to collect meaningful information. *Journal of Accountancy*, 193 (1), 63+.

Herold, D. M & Fedor, D. B. (2008). *Change the Way You Lead Change: Leadership Strategies that Really Work*. Stanford, CA: Stanford University Press.

Herrero, L. (2006). *Viral Change: The alternative to slow, painful and unsuccessful management of change in organizations*. Middlesex, United Kingdom: meetingminds.

Hormozi, A. M. & Dube, L. F. (1999). Establishing Project Control: Schedule, Cost, Quality*, SAM Advanced Management Journal,* 64 (4), 32.

Jahren, C. T. and Federle, M. O. (1999). Implementation of Quality Improvement for Transportation Construction Administration. *Journal of Management in Engineering*, 15, 56-65.

Kale, S. & Arditi, D. (2002). Competitive Positioning in United States Construction Industry. *Journal of Construction Engineering and Management*, 128, 238-247.

Kangari, R. (1995). Risk Management Perceptions and Trends of U.S. Construction. *Journal of Construction Engineering and Management*, 121, 422-429.

Kashiwagi, D. T. (2004). *Best Value Procurement*. Tempe, AZ: Performance Based Studies Research Group.

Kashiwagi, D. (2009). *A Revolutionary Approach to Project Management and Risk Minimization*. Tempe, AZ: Performance Based Studies Research Group.

Kenny, G. (2005). *Strategic Planning and Performance Management: Develop and Measure a Winning Strategy*. New York, NY: Butterworth-Heinemann.

Kingsbury, N., Divorski, S., & Shipman S. (2001). Information-Based Management: Getting Early Warnings and Useful Answers About Performance. *The Public Manger*, 30 (3), 11+.

Koch, R. (1998). *The 80/20 Principle*. New York, NY: Doubleday.

Kotter, J. P. (1996). *Leading Change*. Boston, MA: Harvard Business School Press.

Lobingier, P. G. (2000). Do Performance Plan Adoptions Improve Firm Performance? An Analysis of Nine Industries. *Journal of Managerial Issues*, 12 (3), 288.

Ludeman, K. & Erlandson, E. (2003). *Radical Change, Radical Results: 7 Actions to Become the Force for Change in Your Organization*. Chicago, IL: Dearborn Trade Publishing.

Luecke, R. & Hall, B.J. (2006). *Harvard Business Essentials*: *Performance Management: Manage and Improve The Effectiveness of Your Employees.* New York, NY: Harvard Business School Press.

Luthans, F. & Kessler, D. (1993). Meeting the New Paradigm Challenges Through Total Quality Management. *Management Quarterly*, 34 (1), 2+.

Morledge, R., Wilkinson, S., Eaton, D., Fisher, N., Fortune, C., & Kelly, J. (2002). *Best Value in Construction.* Oxford, England: Blackwell Science Ltd.

Neely, A; Bourne, M.; Mills, J.; Platts, K.; & Richard, H. (2002). *Strategy and Performance: Creating a Winning Business Formula* New York, NY. Cambridge University Press.

Petersen, D. R. & Anderson, D. W. (2006). *The Art of Project Management: Rethinking the Current Paradigms.* Layton, UT: Milestone Publishing

Pheng, L. S., & Teo, J. A. (2004). Implementing Total Quality Management in Construction Firms. *Journal of Management in Engineering*, 20, 8-15.

Pheng, L. S. & Teo. J.A. (2003). Implementing Total Quality Management in Construction through ISO 9001:2000. *Architectural Science Review,* 46 (2), 159+.

Poister, T. H. & Streib, G. (1999). Performance Measurement in Municipal Government: Assessing the State of the Practice. *Public Administration Review*, 59 (4), 325.

Puspasari, T.R. (Jun 27, 2007). Factors causing the poor performance of construction projects. *University of Technology Malaysia, Civil Engineering.*

Rubin, D. K. (2005, November 28). Executives Believe Managing Risk is Their Biggest Challenge. *Engineering News Record*.

Rubin, D. K. (2007, March 19). Owners Weigh Risks to Future Capital Progress. *Engineering News Record*.

Samuelsson, P. & Grans, P. (2004). Approach for Assessment and Review in a Large Construction Company: Case of Skanska Sweden. *Journal of Management in Engineering*, 20, 2-7.

Sauser, W. I, Jr & Sauser, L. D. (2002). Changing the Way We Manage Change. *SAM Advanced Management Journal*, 67 (4), 34+.

Schambach, P. & Duke, E. (2003). Making Performance-Based Contracting (and Relationships) Work: Learn How the Federal Government's Transportation Safety Administration Has Used Non-Traditional Procurement Methods to Establish and Information

Technology (IT) Infrastructure with Nothing Less Than the Safety and Freedom of the Traveling Public at Stake. *The Public Manager*, 32 (4), 7+.

Simonson, K. (2008, Sept. 21). Quick Facts About the Construction Industry.

Singh, A. & Shoura, M. M. (1999). Assessment of Organizational Change for Public Construction Organizations. *Journal of Management in Engineering, 15,* 59-70.

Smith, D. K. (1999). *Make Success Measurable!: A Mindbook-Workbook for Setting Goals and Taking Action*. New York, NY: John Wiley & Sons, Inc.

Stankard, V. (2008, July 8) U.S. Real Estate and Construction and Industry Trends. Retrieved from www.associatedcontent.com/article/5566918/us-real-astate-and-construction-industry.html

Stewart, L. J. (2001). *Improving competitiveness through performance-measurement systems: An integrated performance-measurement system can improve competitiveness by meshing the organization's long-term goals with its day-to-day clinical and administrative functions.* Retrieved July 29, 2007 from http://findarticles.com/p/articles/mi_m3257/is_12_55/ai_82481893.

Stiffler, M. A. (2006). *Performance: Creating the Performance-Driven Organization*. Hoboken, NJ: John Wiley & Sons, Inc.

Strischek, D. & McLaughlin, K. (2008, October). Why do Contractors Really Go Under? A Construction Industry Consultant Looked For the Real Reasons Behind Contractor Failures and Found Some Surprising Results. *The RMA Journal*.

Swaney, J. A. (1996). Comparative Risk Analysis: Limitations and Opportunities. *Journal of Economic Issues*, 30 (2), 463+.

Theurer, J. (1998). Seven pitfalls to avoid when establishing performance measures. *Public Management*, 80 (7), 21+.

Walker, P. L. & Shenkir, W. G. (2008). Implementing Enterprise Risk Management. *Journal of Accounting,* 205 *(3), 31.*

Wang, X. (2002). Perception and reality in developing an outcome performance measurement system. *International Journal of Public Administration*, 25 (6), 805+.

Washington, J. (2003). Employee Development and Organizational Performance: a review of literature and directions for future research. *Human Resources Development International, 6 (3), 343-354.*

Williams, M. J.; Allen, Peter L.; Carney, K.;, Hattersley, M. E.; Gary, L.; Johnson, L. K.; McFarland, J.; Plotkin, H.; Hoffman, C. V; & Prewitt, E. (2007*). Managing Performance to Maximize Results.* Boston, MA: Harvard Business School Publishing Corporation.

Wright, R. N. (1996). The Performance Approach to Construction Goals. Retrieved July 29, 2007 from http://www.fire.nist.gov/bfrlpubs/build96/PDF/b96147.pdf

Yates, J. K. (1994). Construction Competition and Competitive Strategies. *Journal of Management in Engineering*, 10, 58-69.

Young, R. (1999). Measure What Really Matters. Retrieved July 29, 2007 from http://www.managementhelp.org/perf_mng/measure.htm

Zaffron, S. & Logan, D. (2009). *The Three Laws of Performance: Rewriting the Future of Your Organization and Your Life*. San Francisco, CA: Jossey-Bass.

Zbaracki, M. J. (1998). The Rhetoric and Reality of Total Quality Management. *Administrative Science Quarterly*, 43 (3), 602+.

APPENDIX A

ATTRIBUTE MEASUREMENT SURVEY

ATTRIBUTE MEASUREMENT SURVEY

Your evaluation is extremely important to my thesis work to determine the measurements of a Best Value Organization.

Re: Best Value Measurement _____

(Name of company being surveyed)

Please rate each of the criteria on a scale of 1 to 10, with 10 representing that you always complete the process, 5 representing that you conduct the task half the time, and 1 representing that you never carry out the operation. Please rate each of the criteria to the best of your knowledge.

NO	CRITERIA	UNIT	
1	Does your Company measure your organization's performance in terms of meeting strategic goals and objectives?	(1-10)	
2	Do you know how the organization is doing on those performance measures right now?	(1-10)	
3	Does your Company measure performance of your subcontractors in terms of quality, risk management, on-time, and on-budget?	(1-10)	
4	Does your Company measure performance of your employees in terms of meeting strategic goals and objectives?	(1-10)	
5	Do employees know where they stand on their performance measures?	(1-10)	
6	Do employees know what is important?	(1-10)	
7	Do employees take accountability?	(1-10)	
8	Does your Company conduct formal feedback from your customers on every project?	(1-10)	
9	Do you know how your clients feel about your service?	(1-10)	
10	Does your Company use your performance measures to market your products and/or services?	(1-10)	
11	Does your Company use your organization's measures to continuously improve?	(1-10)	
12	Does your Company conduct Risk Assessments before every project?	(1-10)	
13	Do the Risk Assessments get reviewed with your customers?	(1-10)	
14	Does your Company require your subcontractors to conduct Risk Assessments?	(1-10)	
15	Do you conduct planning activities prior to beginning work?	(1-10)	

16	Do you manage risks that you don't control?	(1-10)	
17	How often are your projects free from "surprises" during execution?	(1-10)	
18	Do you conduct Quality Control on projects in terms of client expectations?	(1-10)	
19	Does your Company measure quality?	(1-10)	
20	Does your Company utilize a quality improvement program?	(1-10)	

APPENDIX B

CONTRACTOR SURVEY RESULTS

CONTRACTOR SURVEY RESULTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		Ave
A	10	10	10	10	8	9	10	9	10	8	10	10	10	10	10	9	9	10	9	9	190	190
	10	10	10	10	9	8	10	10	9	8	10	10	10	10	10	8	8	9	8	8	185	
	10	10	10	10	9	10	10	10	10	8	10	10	10	10	10	10	10	10	10	9	196	
B	10	8	7	8	8	10	8	10	10	5	10	10	10	10	10	8	7	10	8	8	175	175
	9	7	8	7	7	10	9	10	10	7	9	10	9	9	9	9	7	9	8	8	171	
	10	9	7	8	9	10	9	10	10	7	10	10	9	9	10	8	7	9	9	9	179	
C	8	9	8	8	9	10	9	10	9	8	9	10	10	8	10	7	8	10	8	9	177	166
	9	5	8	9	7	9	9	8	9	6	7	8	10	9	9	9	7	9	10	8	165	
	8	10	7	8	6	9	9	7	10	9	9	8	10	7	9	8	5	10	9	8	166	
	8	7	8	9	6	8	8	6	8	9	10	9	9	8	10	6	2	9	9	8	157	
D	10	7	6	7	7	8	10	7	6	9	10	10	8	7	10	8	5	9	9	9	162	145
	10	7	5	7	9	9	9	5	5	9	9	9	7	6	9	7	3	8	7	5	145	
	10	5	1	5	10	10	10	5	1	10	10	5	5	5	10	5	1	5	10	5	128	
E	9	8	9	7	7	9	7	10	10	7	8	10	10	9	8	7	6	7	9	8	165	165
	9	6	7	9	6	9	9	10	8	4	5	9	9	9	10	8	6	8	7	5	153	
	10	8	10	8	8	10	9	10	10	6	8	10	9	9	10	8	7	9	10	9	178	
	150	126	121	130	125	148	145	137	135	120	144	148	145	135	154	125	98	141	140	125		

APPENDIX C

CONTRACTOR PERFORMANCE DATA ANALYSIS

Contractor A					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
1%	1%	0%	52%	92%	-40%
16%	16%	0%	290%	290%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0.0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
12%	12%	0%	0%	0%	0%
3%	3%	0%	9%	9%	0%
1%	1%	0%	12%	12%	0%
1%	1%	0%	27%	27%	0%
0%	0%	0%	28%	28%	0%
0%	0%	0%	28%	28%	0%
9%	9%	0%	31%	31%	0%
24%	24%	0%	32%	32%	0%
0%	0%	0%	35%	35%	0%
14%	14%	0%	59%	59%	0%
0%	0%	0%	76%	76%	0%
0%	0%	0%	102%	102%	0%
0%	0%	0%	158%	158%	0%
0%	0%	0%	165%	165%	0%
26%	26%	0%	216%	216%	0%
41%	41%	0%	240%	240%	0%
0%	0%	0%	698%	698%	0%
4%	4%	0%	72%	72%	0%

Contractor A continued					
% over budget	**% over budget due to client**	**% over budget without client**	**% over schedule**	**% over Schedule due to client**	**% over schedule without client**
12%	12%	0%	0%	0%	0%
0%	0%	0%	52%	52%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	12%	12%	0%
14%	14%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
2%	2%	0%	0%	0%	0%
3%	3%	0%	6%	3%	2%
0%	0%	0%	57%	50%	6%
1%	0%	1%	58%	46%	12%
1%	0%	1%	15%	0%	15%
8%	6%	2%	17%	0%	17%
3%	0%	3%	44%	0%	44%
5%	2%	3%	47%	0%	47%
9%	0%	9%	97%	44%	53%
10%	0%	10%	57%	0%	57%
13%	0%	13%	114%	46%	68%
19%	0%	19%	108%	25%	83%
48%	0%	48%	106%	0%	106%
		Standard Deviation			**Standard Deviation**
		7.3%			24.3%
		% on-budget			**% on-schedule**
		81.5%			77.8%

Contractor B					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
3%	3%	0%	-44%	0%	-44%
3%	3%	0%	0%	37%	-37%
12%	12%	0%	-30%	0%	-30%
18%	17.7%	0%	-30%	0%	-30%
3%	3%	0%	-28%	0%	-28%
6%	6%	0%	-27%	0%	-27%
3%	3%	0%	-25%	0%	-25%
2%	2%	0%	13%	37%	-24%
1%	1%	0%	26%	48%	-22%
0%	0%	0%	-18%	0%	-18%
0%	0%	0%	42%	57%	-15%
0%	0%	0%	40%	54%	-14%
0%	0%	0%	9%	22%	-13%
0%	0%	0%	-12%	0%	-12%
13%	12.6%	0%	43%	55%	-12%
0%	0%	0%	-11%	0%	-11%
0%	0%	0%	21%	32%	-10%
0%	0%	0%	-10%	0%	-10%
0%	0%	0%	19%	26%	-8%
0%	0%	0%	123%	130%	-7%
0%	0%	0%	-2%	0%	-2%
0%	0%	0%	0%	2%	-2%
0%	0%	0%	-24%	-24%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0.0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%

Contractor B continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0.0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
3%	3.4%	0%	0%	0%	0%
11%	11%	0%	0%	0%	0%
24%	24%	0%	0%	0%	0%
28%	28%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0.0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	11%	11%	0%
0%	0%	0%	15%	15%	0%
2%	1.9%	0%	17%	17%	0%
0%	0%	0%	17%	17%	0%
0%	0%	0%	19%	19%	0%
0%	0%	0%	24%	24%	0%
0%	0%	0%	24%	24%	0%
0%	0%	0%	25%	25%	0%
4%	4%	0%	27%	27%	0%
45%	45%	0%	30%	30%	0%
0%	0%	0%	36%	36%	0%

Contractor B continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
0%	0%	0%	42%	42%	0%
0%	0.0%	0%	48%	48%	0%
6%	6%	0%	48%	48%	0%
0%	0%	0%	55%	55%	0%
17%	17%	0%	56%	56%	0%
17%	17%	0%	58%	58%	0%
0%	0%	0%	62%	62%	0%
0%	0%	0%			0%
0%	0.0%	0%	81%	81%	0%
8%	8%	0%	83%	83%	0%
5%	5%	0%	85%	85%	0%
49%	49%	0%			0%
2%	2%	0%	96%	96%	0%
0%	0.0%	0%	102%	102%	0%
0%	0%	0%	108%	108%	0%
5%	5%	0%	112%	112%	0%
0%	0%	0%	117%	117%	0%
7%	7%	0%	120%	120%	0%
1%	1%	0%	126%	126%	0%
0%	0%	0%	150%	150%	0%
0%	0%	0%	156%	156%	0%
		0%	183%	183%	0%
23%	23%	0%	195%	195%	0%
0%	0%	0%	200%	200%	0%
0%	0%	0%	220%	220%	0%
0%	0%	0%	442%	442%	0%
0%	0%	0%	528%	528%	0%
100%	100%	0%	4%	0%	4%
0%	0%	0%	4%	0%	4%
		0%	7%	0%	7%
0%	0%	0%	9%	0%	9%
29%	29%	0%	49%	37%	12%
0%	0%	0%	14%	0%	14%
10%	10%	0%	15%	0%	15%
9%	9%	0%	15%	0%	15%
0%	0%	0%	16%	0%	16%
0%	0.0%	0%	89%	73%	17%

Contractor B continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
0%	0%	0%	85%	67%	17%
0%	0%	0%	45%	26%	19%
2%	2%	0%	88%	69%	19%
3%	3%	0%	19%	0%	19%
7%	7%	0%	20%	0%	20%
9%	9%	0%	129%	109%	20%
0%	0%	0%	21%	0%	21%
19%	19%	0%	23%	0%	23%
17%	17%	0%	56%	31%	25%
0%	0%	0%	64%	38%	26%
18%	18%	0%	49%	21%	28%
4%	4%	0%	28%	0%	28%
3%	3%	0%	240%	207%	33%
87%	87%	0%	131%	98%	33%
0%	0%	0%	131%	98%	33%
17%	17%	0%	86%	51%	35%
3%	3%	0%	66%	30%	36%
1%	1%	0%	66%	27%	39%
1%	1%	0%	111%	67%	44%
2%	2%	0%	157%	111%	47%
5%	5%	0%	47%	0%	47%
1%	1%	0%	153%	104%	49%
0%	0%	0%	57%	6%	51%
1%	1%	0%	78%	20%	57%
0%	0%	0%	86%	28%	58%
4%	3%	1%	60%	0%	60%
1%	0%	1%	62%	0%	62%
2%	0%	2%	97%	25%	72%
0%	-2%	2%	125%	37%	88%
5%	1%	4%	90%	0%	90%
13%	6%	8%	202%	105%	97%
12%	2%	10%	104%	5%	99%
35%	25%	10%	111%	0%	111%
30%	0%	30%	201%	90%	111%
34%	0%	34%	237%	81%	156%

Contractor B continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
58%	0%	58%	271%	70%	201%
		Standard Deviation			Standard Deviation
		6%			33%
		% on-budget			% on-schedule
		91.9%			69.1%

Contractor C					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
3%	3%	0%	-1%	17%	-17%
2%	2%	0%	-11%	0%	-11%
0%	0%	0%	0%	8%	-8%
0%	0%	0%	2%	5%	-3%
0%	0.0%	0%	-2%	0%	-2%
0%	0%	0%	-11%	-11%	0%
4%	4%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0.0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0.0%	0%	0%	0%	0%
0%	0.0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%

Contractor C continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
2%	2%	0%	3%	3%	0%
0%	0%	0%	9%	9%	0%
0%	0.0%	0%	11%	11%	0%
0%	0%	0%	15%	15%	0%
53%	53.3%	0%	17%	17%	0%
0%	0%	0%	22%	22%	0%
7%	7%	0%	25%	25%	0%
0%	0%	0%	33%	33%	0%
0%	0.0%	0%	34%	34%	0%
0%	0.0%	0%	57%	57%	0%
0%	0.0%	0%	75%	75%	0%
0%	0%	0%	93%	93%	0%
0%	0%	0%	104%	104%	0%
17%	16.9%	0%	303%	303%	0%
0%	0%	0%	506%	506%	0%
24%	23.6%	0%	28%	28%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	1%	0%	1%
0%	0%	0%	8%	0%	8%
0%	0%	0%	8%	0%	8%
26%	26%	0%	8%	0%	8%
		0%	9%	0%	9%
1%	0%	1%	16%	0%	16%
10%	8%	2%	23%	5%	17%
11%	0%	11%	19%	0%	19%
12%	0%	12%	25%	0%	25%
15%	0%	15%	43%	0%	43%

Contractor C continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
19%	0%	19%	50%	0%	50%
43%	0%	43%	95%	0%	95%
		Standard Deviation			Standard Deviation
		7%			16%
		% on-budget			% on-schedule
		87.7%			78.9%

Contractor D					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
1%	1%	0%	8%	8%	0%
0%	0%	0%	15%	15%	0%
5%	5%	0%	15%	15%	0%
5%	5%	0%	32%	32%	0%
0%	0.0%	0%	52%	52%	0%
-6%	-5.9%	0%	65%	65%	0%
3%	1%	1%	0%	0%	0%
9%	0%	9%	0%	0%	0%
0%	-13%	13%	139%	139%	0%
6%	0%	6%	68%	67%	1%

Contractor D continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
0%	0%	0%	5%	3%	2%
0%	0%	0%	8%	0%	8%
4%	0%	4%	11%	0%	11%
4%	4%	0%	12%	0%	12%
0%	0%	0%	23%	7%	16%
0%	0%	0%	35%	2%	33%
2%	2%	0%	34%	0%	34%
0%	0%	0%	54%	1%	53%
0%	0%	0%	57%	0%	57%
6%	0.0%	6%	66%	4%	63%
		Standard Deviation			Standard Deviation
		3%			20%
		% on-budget			% on-schedule
		76.0%			56.0%

Contractor E					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
2%	2%	0%	203%	242%	-39%
2%	2%	0%	0%	36%	-36%
5%	5.3%	0%	138%	159%	-21%
1%	1%	0%	100%	120%	-20%
0%	0%	0%	47%	58%	-12%
19%	19.4%	0%	-11%	0%	-11%
7%	7%	0%	141%	150%	-9%
25%	25%	0%	17%	25%	-8%
21%	21%	0%	102%	109%	-7%
0%	0%	0%	22%	28%	-6%

Contractor E continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0.0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%
10%	10%	0%	0%	0%	0%
12%	12%	0%	0%	0%	0%
16%	16%	0%	0%	0%	0%
0%	0%	0%	8%	8%	0%
21%	21%	0%	11%	11%	0%
0%	0%	0%	20%	20%	0%
0%	0%	0%	28%	28%	0%
5%	5%	0%	30%	30%	0%
16%	16%	0%	41%	41%	0%
25%	25%	0%	52%	52%	0%
20%	20%	0%	53%	53%	0%
0%	0%	0%	53%	53%	0%
0%	0%	0%	64%	64%	0%
0%	0%	0%	79%	79%	0%
22%	22%	0%	80%	80%	0%
0%	0%	0%	85%	85%	0%
190%	190%	0%	112%	112%	0%
0%	0%	0%	184%	184%	0%
81%	81%	0%	193%	193%	0%

Contractor E continued					
% over budget	% over budget due to client	% over budget without client	% over schedule	% over Schedule due to client	% over schedule without client
0%	0%	0%	636%	636%	0%
9%	9%	0%	16%	16%	0%
0%	0%	0%	279%	279%	0%
8%	8%	0%	2%	2%	0%
35%	35%	0%	0%	0%	0%
0%	0%	0%	51%	49%	2%
0%	0%	0%	8%	5%	3%
12%	12%	0%	57%	53%	4%
0%	0%	0%	95%	88%	7%
0%	0%	0%	7%	0%	7%
0%	0%	0%	12%	0%	12%
0%	0.0%	0%	72%	59%	12%
19%	19%	0%	17%	0%	17%
7%	7%	0%	17%	0%	17%
1%	1%	0%	292%	275%	17%
0%	0%	0%	18%	0%	18%
21%	20.9%	0%	18%	0%	18%
0%	0%	0%	20%	0%	20%
50%	50%	0%	74%	42%	32%
1%	1%	0%	0%	-41%	41%
1%	1%	0%	85%	44%	41%
0%	-1%	1%	61%	0%	61%
6%	3%	3%	172%	99%	73%
4%	0%	4%	129%	51%	78%
5%	0%	5%	91%	9%	81%
6%	1%	5%	117%	22%	95%
20%	15%	5%	101%	0%	101%
6%	0%	6%	118%	0%	118%
12%	0%	12%	131%	0%	131%
22%	10%	12%	431%	282%	149%
		Standard Deviation			**Standard Deviation**
		2%			35%
		% on-budget			**% on-schedule**
		88.3%			67.5%

APPENDIX D

HFS COMPANY'S SURVEY RESULTS

HFS COMPANY'S SURVEY RESULTS

Question		A	B	C	Total	Difference
1	Before	5	5	4	14	
	After	10	9	7	26	12
2	Before	6	3	4	13	
	After	10	8	7	25	12
3	Before	8	8	4	20	
	After	9	10	7	26	6
4	Before	7	6	4	17	
	After	10	9	9	28	11
5	Before	5	3	5	13	
	After	9	7	8	24	11
6	Before	8	7	7	22	
	After	10	9	8	27	5
7	Before	7	7	5	19	
	After	9	9	8	26	7
8	Before	10	10	10	30	
	After	10	10	10	30	0
9	Before	9	9	7	25	
	After	10	9	9	28	3
10	Before	4	2	4	10	
	After	10	8	9	27	17
11	Before	8	7	4	19	
	After	10	9	8	27	8
12	Before	7	6	7	20	
	After	9	9	9	27	7
13	Before	6	3	7	16	
	After	9	9	9	27	11
14	Before	3	2	5	10	
	After	9	8	8	25	15
15	Before	7	8	5	20	
	After	10	10	9	29	9
16	Before	6	6	5	17	
	After	9	8	8	25	8
17	Before	6	5	5	16	
	After	9	8	7	24	8
18	Before	8	9	7	24	
	After	10	9	10	29	5
19	Before	8	9	7	24	
	After	10	10	9	29	5
20	Before	9	9	5	23	
	After	10	9	8	27	4
Total	**Before**	**137**	**124**	**111**		
	After	**192**	**177**	**167**		

APPENDIX E

HFS COMPANY'S PERFORMANCE DATA

HFS Company Performance Information 2008

Project #	% over budget due to HFS	% over schedule due to HFS	Client Satisfaction
1	0%	12%	7.285
2	0%	0%	10
3	0%	0%	10
4	0%	0%	10
5	0%	0%	10
6	0%	0%	10
7	0%	0%	10
8	0%	0%	10
9	0%	0%	8
10	0%	0%	10
11	0%	0%	10
12	0%	0%	10
13	0%	0%	10
14	0%	0%	10
15	0%	0%	10
16	0%	0%	10
17	0%	16%	8.142
18	0%	0%	10
19	0%	0%	10
20	0%	0%	10
21	0%	0%	10
22	0%	0%	10
23	0%	0%	8.25
24	0%	0%	9.625
25	0%	0%	8.375
26	0%	8%	8.375
27	0%	0%	8.375
28	0%	0%	8.375
29	0%	0%	8.375
30	0%	0%	8
31	0%	0%	9.875
32	0%	8%	10
33	0%	0%	9.375
34	0%	0%	10
35	0%	0%	10
36	0%	0%	10
37	0%	8%	7.5
38	0%	0%	7.14
	% on-budget	**% on - schedule**	**Average client satisfaction**
	100%	87%	9.34

HFS Company Performance Information 2010

Project #	% over budget due to HFS	% over schedule due to HFS	Client Satisfaction
1	0%	0%	10
2	0%	0%	10
3	0%	8%	10
4	0%	0%	10
5	0%	0%	10
6	0%	0%	10
7	0%	0%	10
8	0%	0%	10
9	0%	0%	10
10	0%	0%	10
11	0%	0%	10
12	0%	0%	10
13	0%	0%	8.25
14	0%	0%	10
15	0%	0%	9.625
16	0%	0%	10
17	0%	0%	10
18	0%	0%	10
19	0%	0%	10
20	0%	0%	10
21	0%	8%	8
22	0%	0%	9.875
23	0%	0%	10
24	0%	0%	9.375
25	0%	0%	10
26	0%	0%	10
27	0%	0%	10
28	0%	0%	10
29	0%	0%	10
30	0%	0%	10
31	0%	0%	10
32	0%	0%	10
33	0%	0%	10
34	0%	0%	10
35	0%	0%	10
36	0%	0%	10

Project #	% over budget due to HFS	% over schedule due to HFS	Client Satisfaction
37	0%	0%	9
38	0%	0%	10
39	0%	0%	10
40	0%	0%	7.25
	% on-budget	**% on - schedule**	**Average client satisfaction**
	100%	95%	9.78

APPENDIX F

HFS COMPANY'S PERFORMANCE MEASUREMENT SYSTEM

HFS COMPANY'S PERFORMANCE MEASUREMENT SYSTEM

The Performance Measurement System supports the goals of HFS to provide timely and quality support to our clients while assisting our employees to improve their skills and efficiency. The purpose of the Performance Measurement System (PMS) is to identify to our employees what is important to HFS Company and improve our company by assisting our employees with their own professional development. Our program consists of a "barcode" that measures three important components:

1) Client satisfaction
2) Professional Development
3) Timely reporting

Client satisfaction is measured by the results of the performance survey submitted by each client on each task order. If there is more than one employee on a specific task order at the same location, they will share a team rating. The surveys ask 8 questions with a 1-10 rating (10 being the highest score.) The ratings will be averaged for use in the barcode. Surveys will be distributed to clients midway through completion for new task orders and at the completion of each task order by HFS management.

Professional Development will be determined by each employee's ability to identify a personal annual goal and achieving that goal by the end of the year. Participation in annual goal setting is voluntary. If you choose to participate, each goal will be rated by HFS management and will use the following parameters:

- 1 point for improving your own capabilities (an example would be improving MS Excel skills)
- 1 point for improving a client's processes or procedures (an example would be developing a key word searchable electronic file system for their project files)
- 1 point for improving HFS expertise and/or competitiveness (an example would be to develop AutoCAD skills that could be utilized for other task orders)
- 1 point for obtaining training certification (an example would be to become OSHA certified)

- 2 points for obtaining a professional certification (an example would be to achieve a Project Management Professional (PMP) certification)

A personal goal can achieve more than one point category. For example, by obtaining PMP certification, the employee is also improving their own capabilities and improving HFS expertise, so the total rating of that goal is 4.

Timely reporting is measured by the percent of reports turned in by its due date. All reports and timesheets are due within 2 business days of the period ending and should be emailed to ReportIt@HFSCompany.com. Your percent of on-time reports will be your portion of the "barcode." If an employee submits all of their reports on or before the due date they will receive a 100% for that portion of their "barcode".

Participating employees must submit their annual goals by January 15th each year. Proof of goal completion must be received at the Corporate Office by the end of the calendar year. The result will be a barcode of average annual ratings achieved for each goal. A goal that is not achieved will receive a zero rating for that year. For example, in the first year you achieve a goal that has a rating of 4 and the second year you achieve the goal that has a rating of 2, your average goal completion rating will be a 3.

Barcodes will be confidentially distributed every year and will include the current barcode rating, the average barcode rating and any other applicable goal rating information. The intent is to share HFS Company performance information with employees so that they can see possible improvement areas.

New employees are encouraged to submit their goals within a month of hire. The initial submission will need to be based upon reasonable goal completion within the calendar year of hire. In following years, annual goal submission will be required by January 15th.

Goals can be submitted electronically or on the attached Goal Submission Form. Contact Corporate Human Resources for more information.

APPENDIX G

EXAMPLE TRAINING INFORMATION

PIPS (Performance Information Procurement System) AKA Best Value System

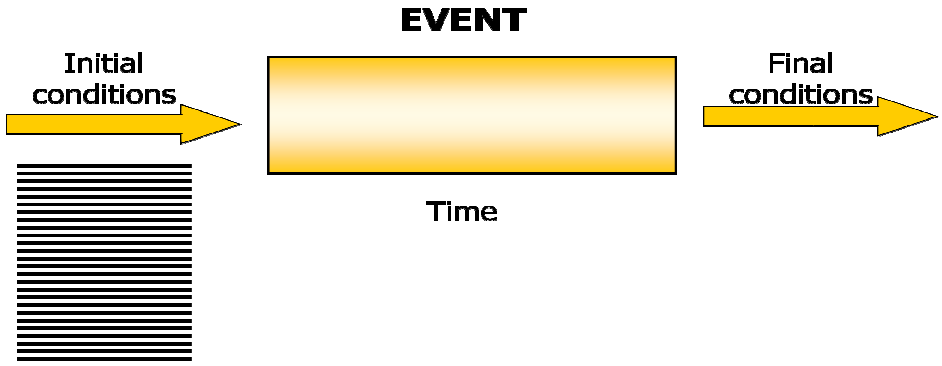
What is it? System of using information to select the best value contractor, manage risk, and measure performance.

Selection information includes: Past Performance Information (PPI), Risk Assessment Plan (RAP), personnel interviews, and cost

Management of risk utilizes the tools of a risk management control plan and weekly risk reports

Measurement of performance is provided by a "bar code" which includes: number of projects, dollar value of projects, % on-time, % on-budget, customer satisfaction rating.

Theory:
The more information we have before the event, the easier it becomes to predict the final outcome



Conclusion: The initial conditions affect the final outcome. Gather information at the beginning of a project and preplan. Pre-planning reduces "surprises" and a produces a more successful project (the desired final condition).

What is a RMP? The purpose of the RMP is to identify client expectation, identify action items with owner and due date, and identify potential pitfalls that are outside the contractor's control. The RMP should be used by the contractor as a tool to communicate the expectation of the project with the client. It sets a baseline of what can be expected and if schedules are not met or information is not obtained in a timely manner, how it will affect the project in terms of the performance indicators

1. Milestone schedule, include any issues that may impact the client's satisfaction (ie comment period for client, excessive noise, utility outages, etc) An example of what a milestone schedule might look like is shown below. It identifies the activity, the date that is initially set as the contract dates, the actual or planned date for completion and percent complete. This schedule will be updated on a weekly basis as part of the quality management implementation.

Activity	% Complete	Actual/Planned Date	Initial/Contract Date
Notice to Proceed	100%	09/26/08	09/26/08
Abbreviated Accident Prevention Plan Submitted	100%	10/15/08	10/01/08
Site Investigation/Design Charrette	100%	10/20/08	10/15/08
Site Investigation Report Submitted	100%	12/03/08	11/16/08
SIR comments by Gov't and Facility	100%	12/18/08	12/18/08
Interim 65% Work Plan Submitted	100%	02/09/09	12/31/08
Government Review Period	100%	02/23/09	01/14/09
100% Work Plan Submitted	100%	03/30/09	02/28/09
Government Review Period	100%	04/14/09	03/14/09
Corrected for Renewal Work Plan Issued	100%	05/27/09	03/16/09

2. List of action items and/or information required by the client along with the person responsible for the action and a due date. This assists the contractor with communicating with the client on what remains outstanding in regards to information or action items. Below is an example of an action item listing

Action Items/Information Needed	Person Assigned	Due Date
Client Construction Policies	Quality Assurance Representative	10/30/11
Weekly Progress Meeting date/time	Facility Manager	10/30/11
Temporary X-ray shielding requirements	Radiation Protection Officer	11/13/11
Identification of stakeholder changes	Facility Manager	01/03/11
Move plan and duration between phases 1 and 2	Clinic Operations Manager	04/02/11

3. Any risks that the contractor does not control should be identified by the contractor and the client, subcontractor and suppliers should provide any issues that they are concerned about. This should include impact to the project of action items that are not completed by the due date.
4. Mitigation and/or elimination plans for each risk.
5. Course of action (COA) plans if, even with mitigation/elimination plans, the risk comes to fruition.
6. Checklist of how and how often the risks will be assessed to determine if they no longer pose a threat to the success of the project or if the action plans must be executed.

Items 3-6 can be combined and be displayed as shown below.

☐	**RISK** to schedule: Timely transition of Staff from upcoming construction area (14 days) **MITIGATION**: Keep Staff informed on any change in schedule. Meet by 1 Apr 07 with Transition Officer on when move is scheduled, to include phones and computers, and how dental casework will be moved to reuse in transition building. By 15 Apr 07, schedule the training of facility components such as nurse call, fire alarm system, mechanical systems, etc before move takes place. **COA PLAN**: If move begins and will not be complete in 14 days, contractor will develop a plan to work in areas that have been cleared and impact to schedule will be identified. **CHECK**: Upon conclusion of ***each workday*** – has completion date been impacted? If so, discuss with Transition Officer at weekly progress meeting.

☐	**RISK** to client satisfaction: Infection, dust, and noise control during demo **MITIGATION**: Develop infection control plan (Infection Control Risk Assessment - ICRA) in coordination with infection control practitioner. Monitor barriers and exhaust daily. Identify all HVAC intakes and keep demo activities clear. Demo of noisiest areas where walls are lead lined will be accomplish before the facility opens for staff and patients and jack-hammering will be coordinated with staff. **COA PLAN**: If noise disruption occurs, contractor will stop demo and alternate work schedules will be vetted through the client. **CHECK**: ***Once daily***, barriers and exhaust system in-place and operating correctly. All AHU intakes and returns clear of demo activities. Discuss schedule to demo lead lined walls at the weekly progress meeting
☐	**RISK** to schedule and budget: Complete site work before ground freezes. Freeze normally occurs by mid-Dec 06 **MITIGATION**: Begin work tomorrow and work Saturdays that weather permits. If schedule slips, all stakeholders will be notified. **COA PLAN**: if ground freezes before mid-Dec, site work may need to wait until spring for completion. Impact will be 90 days to schedule and $25,000 to cost. **CHECK**: Upon conclusion of ***each workday*** – impact due to weather will be reviewed and schedule adjusted if required.

7. Contractor operations overview identifying key policies and procedures that may affect the client (ie parking area for crew member, designated smoking areas, etc) Site maps and walking-through procedures can be used to explain issues that may be of concern to the client.

Conclusion: The best time to identify issues is before they become a problem. A good way to launch the risk management plan is to conduct a meeting immediately after contract award to outline to all the stakeholders involved the understanding of the scope of work and the risk management strategy. Conducting RMPs forces planning and reduces the number of “surprises” that are encountered during the project. Although the RMP is conducted at the beginning of the project, it is a living document that should be reviewed weekly. As potential risk items are identified, they are added the RMP and mitigation techniques provided