

INCREASING PERFORMANCE BY MINIMIZING THE PASSING OF INFORMATION

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Poor construction performance has resulted in researching procurement process efficiency and overall delivery environment. This paper identifies the maximization of the passing of information as one of the root causes of the poor performance. The hypothesis is validated using several approaches: using deductive logic and the analysis by the Kashiwagi Solution Model (KSM), by associating the relationship between the client's professionals and contractors with the process of outsourcing, quality control, measurement, and the construction industry structure, and ongoing research tests with the US Army Corps of Engineers and US Medical Command (MEDCOM). The hypothesis proposes that as communications between the client's professionals and the contractors increases, the level of accountability, transfer of risk, and the minimization of risk by the contractor decreases. The hypothesis proposes that the amount of information that is being passed, the client's documentation, and the management of the contractor by the client's professionals should be minimized. Furthermore, the hypothesis proposes that this will lead to an increase in the contractor's ability and interests to modify their behavior to perform, to preplan, and to measure their performance. The paper proposes that conventional "best practices" of increasing communications, meetings, extensive client representative documentation, and client construction management and inspection are inefficient, results in less accountability, and lead to an environment with a lack of performance information (measurement of value, customer satisfaction, on-time, on-budget, overall costs, and continuous improvement).

Keywords: construction information, maximized information flow.

INTRODUCTION

Information is one of the key driving powers of every organization. It enables correct action to be taken at the appropriate time in order to increase productivity and reduce counterproductive effects. Not only does information encourage beneficial action, but it facilitates the execution of logical action. For example, in Thailand, the proper use of information led to the minimization of a tsunami's destruction. While many people were drawn to the ocean bed at a tide's sudden departure, a young child remembered a school geography lesson. She identified the warning signs of the tsunami saving the lives of her family and those around her (National 2005).

Information allows the user to identify the direction of a given path and assume the responsibility for that path. Jan Carlzon, former president and CEO of the Scandinavian Airlines Group stated, "An individual without information cannot take

responsibility; an individual who is given information cannot help but take responsibility (Peters 1987).” It is only through the utilization of true information that an organization will be capable of empowering their employees with the type of clear understanding that is directly linked to responsibility, and thus to accountability.

This era has been deemed as the “Information Age.” There has never been a time where such large amounts of information have been easily accessible. With electronic information expanding, it is forecasted that internet information will continue to double each passing year (Berger 2003). Companies have kept pace, as the average office worker uses 250 pounds of paper a year – twice the amount consumed 10 years ago (Trout 1996). However, as information increases, its swell must be harnessed in order to avoid drowning in its massive breadth. This also holds true in the realm of construction, where the overabundance of information can lead to a lack of accountability. This paper hypothesizes that the maximization of the passing of information is a significant cause of poor construction performance through the reduction of accountability due to the availability of too much information. Information must be minimized to its smallest efficient level to allow understanding, while also enabling each contract party to take appropriate responsibility and accountability over allocable project risks. An efficient information model can be accomplished by screening information using the following criteria:

1. Eliminate Data and Capture Information
2. Identify the Appropriate and Significant Information
3. Simplify
4. Translate into Measurements
5. Minimize Communications

The following criteria are being integrated into the US Army Corp of Engineers and US Medical Command’s (MEDCOM) construction delivery process in order to increase efficiency and raise performance, and will be further discussed in this report. The MEDCOM Project Report, a weekly report tracking individual project’s risks, will then be analyzed using these principles. A new MEDCOM report will be introduced that eliminates unnecessary data, identifies the chief project issues, simplifies the current risks, maintains a constant measurement of project performance, and reduces communication. It is designed to maximize the impact of information. The new report is currently being tested on several current MEDCOM projects and has resulted in high performance (on time, on budget, customer satisfaction).

INFORMATION VS DATA

Information is not simply relative facts regarding an item of interest. Information clarifies and purges ambiguity from a situation. In the 1949 treatise entitled *The Mathematical Theory of Communications*, information is defined as “that which reduces uncertainty.” Anything that does not work towards this goal is not information, it is data. Jack Trout explains, “What is the difference between data and information? Information must lead to understanding. Therefore, what constitutes information to one person may be mere data to another. If it doesn’t make sense to you, it’s not information (Trout 1996).”

Jeff Chasney, the CIO of strategic planning at CKE Restaurants, lists data as the number one cause of obsolete information systems. The only way an information

system will add value to an organization, is “to provide insights, not just mountains of data.” Chasney advises an establishment to consider the information needed to accomplish company goals. He states, “If your business intelligence system is not going to improve your decision making and find problem areas to correct and new directions to take, nobody’s going to bother to look at it (Levinson 2005).” The system becomes ineffective, more confusing than enlightening.

When information is successfully passed, the objectives of the organization are more fully understood. Information identifies the type of relationships that are held within a company and points toward the responsibilities of each member. General Motors was pleased with the results of a program developed to share information between their management and labor, saying, “It makes the goals explicit and the nature of the partnership concrete (Peters 1982).” However, just as information will bring clarity, data will bring greater uncertainty and less accountability. The elimination of reports that do not contain true information for its recipients will increase the efficiency of an organization.

APPROPRIATE INFORMATION

All information does not carry the same level of impact and importance. While two sets of information may influence the execution of a company, one may have a larger consequence on the outcome than the other. For example, while building equipment may have an effect on the quality of a construction project, the history and performance level of the contractor involved plays a far greater weight in the final building conditions. It is important to identify the information that will lead to the greatest owner value.

In the late 1800s Vilfredo Pareto established a relationship that was later termed as the Pareto Principle or the 80:20 rule. He found that most outcomes were driven by a small portion of the contributing factors. That is, 80% of the land in Italy was owned by 20% of the population; 20% of the peapods in his garden yielded 80% of the harvested peas. It has proved effective in the current market, as well. 80% of decisions come from 20% of meeting time; 80% of managerial problems are caused by 20% of employees; 80% of results will come from 20% of action items. Joseph Juran calls this the, “separation of the vital few from the trivial many.” (Dugan 2003)

While the exact impact of information may carry varying weights, Pareto’s concept holds true. By isolating the essential from the non-essential, accurate conclusions may be reached with minimal information. This improves efficiency as it saves time as well as other company resources. In fact, an excess of information can actually weaken an entity’s ability to make favorable decisions.

In a study of predictive abilities, Paul Slovic and Oregon Research Institute Associates tested the ability of eight professional horse-race handicappers to predict race outcomes. In the first round, the handicappers were allowed to use five pieces of information per horse from the charts. They made the same predictions using ten pieces of information per horse, then twenty, and then forty pieces of information. While the accuracy of the predictions did not increase, the trust in their predictions rose. He reported “The additional information simply overloaded the handicapper, causing inconsistency and error (Ruso and Schoemaker 1990).”

SIMPLICITY

As the industrial age has evolved, companies, techniques, and information systems have become more and more complicated. Advanced technology has led to elaborate models which have brought on a higher level of confusion and disorientation. In order to balance the effect of new innovation, the market has stabilized itself by focusing on the simplification of information. These straightforward information systems seem basic, but produce greater results than those that are more complex. The greatest misconception is that simple is equivalent to little or no work. While it is true, that a simple system is easy to understand, it is not necessarily the easiest to attain. John Sculley, the former chairman of Apple Computer stated, "Simplicity is the ultimate sophistication." (Trout 1996)

Jack Welch echoes these sentiments. He teaches that insecure people cling to complexity. They surround themselves with data and information to suppress what they do not know or understand. Real leaders will release all unnecessary information and hold on to only that which applies. Their mission is not to hide, but to discover the unknown. Welch warns, "Simplicity is not easy. You can't believe how hard it is for people to be simple, how much they fear being simple. They worry that if they're simple, people will think they're simple-minded. In reality, of course, it's just the reverse. Clear, tough-minded people are the most simple." (Welch 2002)

Within an organization, information must be easily understood, with a clear purpose. The founding logic must be straightforward and work in coordination with the group's goals. Everyone in the organization should be able to understand it. Simplistic information requires the greatest amount of logic and thought. It eliminates everything but the critical. It may only be found when the desire for truth is cleared of ego and pride.

MEASUREMENT

Benchmarking has enormous importance when analyzing a system. Humans are only able to interpret information through the comparison and contrast of differences and similarities (Bateson, 1972). Through measurements, a user is able to translate results into comparable figures and prioritize their order of importance.

In measuring the performance of a system, information is available to account for the following corporation results (Behn 2003):

1. The level each group or entity is achieving their assigned target.
2. The level of performance for other entities or groups in the organization.
3. The level of performance each entity has in relation to the others.

Measurements provide quantifiable effects and dictate the areas of emphasis that will direct future actions. It isolates the bottom line responsibility and risk of each entity. The Organizational theorist Mason Haire stated, "What gets measured gets done (Cram 1993)." By determining the factors that gauge performance, and selecting attributes that induce performance, the organizations goals will be explicit, and the processes will gravitate towards these objectives. When measurements are circulated, an organization will respond. This type of information induces people to act.

MINIMIZING COMMUNICATION

In order to understand why the communication of information must be minimized, the motivation for the action must first be addressed. Information is used in order to clarify a situation to the extent that a rational decision can be made. Information is transferred in order to relocate the responsibility of a decision. The transmission and acceptance of information inherently point to clarification, and indicate that some type of evaluation will be executed, and an action ensued.

When information is distributed to an entity that is not responsible or accountable for the presented decision, it is often difficult for the receiver to refrain from making a judgment. It is often done in the best interest of the organization. However, this assessment deflects responsibility from the true accountable source and distributes risk among all respondents. By distributing risk and liability, there is no accountability and the boundaries between individual roles become obscure. It promotes an environment of finger pointing, litigation, and confusion.

Kashiwagi classifies the passing of large amounts of information through the means of Kashiwagi Solution Models (KSM). KSMs recognize that there is a veritable relationship between system attributes. Therefore, the level of a system's efficiency will be directly correlated to the application of associated characteristics (Kashiwagi 2004). In using the KSMs, Left Side (LS) attributes are traits correlated to a "Type A" or highly efficient systems. Right Side (RS) attributes are traits correlated to a "Type C" or highly inefficient system. Through the KSM's methodology, the Minimization of Communication can be correctly associated with performance, accountability, and an "efficient" system (See Figure 1).

For example, consider two teams working on simultaneous projects. "Team Alpha" has consistently performed inefficiently, while "Team Beta" has performed efficiently. The inefficient group, Team Alpha, will regularly exhibit attributes of a Type C system, with low performance, passing risk with no accountability, needing multiple group meetings to distribute information, and communicating more. The efficient group, Team Beta, will exhibit attributes of a Type A system, performing with accountability and minimizing communication to its lowest reasonable level by limiting the information passed depending on the relevancy to each role in the job. Risk will be successfully allocated and efficiency maximized, resulting in the minimization of communication.

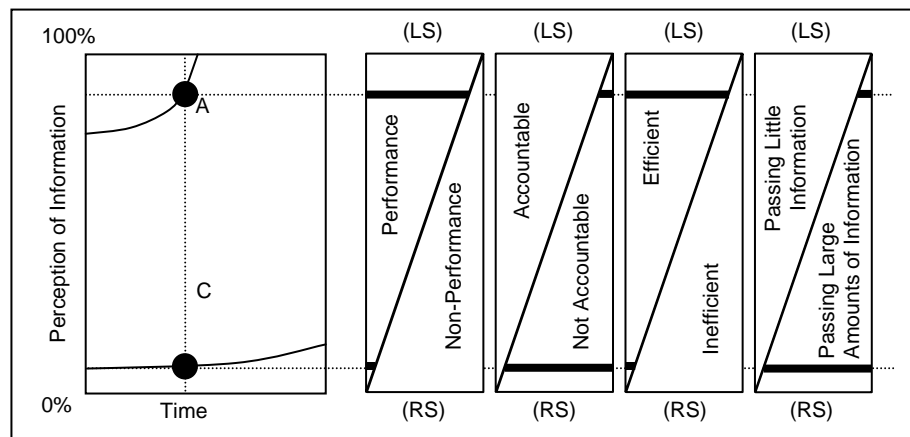


Figure 1: Kashiwagi Solution Model (KSM)

APPLICATION OF HYPOTHESIS TESTING UNDER THE US MEDICAL COMMAND (MEDCOM)

The US Army Medical Command (MEDCOM) conducts \$100-\$200 Million (USD) per year in design and construction services. The overall system is wrought with inefficiency, dual layer bureaucracy, and prevalent low customer satisfaction. In response, MEDCOM partnered with the Performance Based Studies Research Group at Arizona State University to implement concepts of performance and efficiency. To the purpose of this paper, MEDCOM sought to increase the efficiency in its information system through the implementation of a system that included the five concepts discussed thus far:

1. Eliminate Data
2. Identify the Significant
3. Simplify
4. Translate into Measurements
5. Minimize Communications

Initial MEDCOM Process

MEDCOM operates to construct and maintain health services facilities for the United States military. The MEDCOM process includes scope development, design (or work plan) creation, construction, and turnover, commissioning, and operation and maintenance (See Figure 2). Within this system the key form of communication during each project process was a set of weekly meeting minutes. Standard to most construction projects, the meeting minutes included:

1. List of Meeting Attendees
2. Old Business Issues needing to be addressed
3. New Business Issues
4. Quality Control Inspections Applications
5. Safety Inspections Assessment and Needs
6. Two Week Look-Ahead Schedule

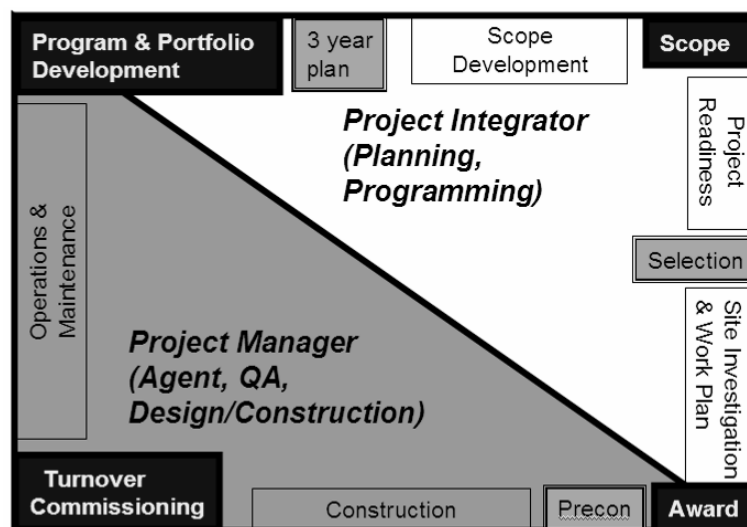


Figure 2: MEDCOM Project Process

An assessment of the initial MEDCOM communication process yielded the following:

- 25 percent of issues recorded were never resolved – instead the issues would eventually stop being reported
- 50 percent of document and resolved issues, would continue to be discussed at future meetings, despite being “resolved”
- Issues initialization dates and resolution dates were not recorded
- No standard existed to deem an issues open or resolved
- No description of how each issue was proposed to be resolved
- No description of how each issue was actually resolved
- If a issue was left unsolved over a span of several weeks, there was no record of if the issue was being ignored, could not yet be resolved, or if some other circumstance were interfering with its resolution
- The “Old Business” section of the weekly report contained little connection to previous issues and items would appear and disappear without justification

In addition, the report failed to appraise the overall status of the project. Budget and schedule condition were unaddressed and the two-week look-ahead schedule was submitted without context. Of the issues that were included, no prioritization or level of importance was provided. Summarily, the initial report failed to accurately track the project concerns, did not assign accountability for item resolution, did not capture and reciprocate project status, and reported all available project data to all parties and persons involved in a project regardless of position or rank. An analysis of the initial reporting system was performed by senior level MEDCOM personnel, evaluating the system on various aspects of project, personnel, and organizational efficiency. The results were compiled together to produce an overall system rating of 1.68 out of 10 (on a scale of 1-10, 10 being highly efficient and 1 being highly inefficient). This system utilized maximum data, a lack of clarity, a lack of clear measurement, and ignorance of the significant.

Modified MEDCOM Process

Under the hypothesis that through the passing of increased information, the proper transfer of risk, contractor accountability, and minimization of risk all decrease, the research sought to minimize the amount of information and communication flow between MEDCOM and its contractors and to increase the efficiency of the information and the transfer of the information. Moving towards simplicity, MEDCOM considered three items of utmost importance to project success:

1. Budget Adherence
2. Schedule Adherence
3. Meeting of requirements (client satisfaction, quality, safety, etc.)

The peril of each item above is unidentified, unassigned, and/or unmitigated project risk. The modified MEDCOM project tracking process adjusted the information and communication process to:

1. Identify any project risk that could affect budget, schedule, or client requirements.

2. Require contractors to propose succinct risk mitigation and minimization plan(s) for each risk identified
3. Risk Identification Date
4. Proposed Risk Resolution Date
5. Actual Risk Resolution Date
6. Impact to Budget
7. Impact to Schedule

In addition to the seven items above, an eighth item tracked is client satisfaction, which is the client representative's satisfaction with each proposed risk and risk minimization plan (along with resolution date, budget impact, and schedule impact). Furthermore, the client representative can also add risks when deemed appropriate; however, it is the responsibility of the contractor to complete and submit the above report items weekly. A system was developed that allows easy submission and automatic dissemination of the reports and report summary information (at the project level and summary upper-management level). The dissemination of information also focused on simplicity with the key software applications being Microsoft Excel and Outlook. Logistically, the report uses a simple Microsoft Excel template with column for each reporting category and rows for each risk. Risk items of established severity (dollars, time, and/or client expectation) are highlighted and each weekly report and overall update is sent to the proper personnel across all organizations (MEDCOM, Contractor, US Army Corp of Engineers, and Facility Managers). The information received by each participant is dependent upon their involvement in the project and managerial level.

The information is tracked for all projects, with summary and overview reports being distributed to upper-level MEDCOM personnel. The summary reports provide MEDCOM project status for all project budgets, schedules, change order rates, etc. and can be categorized based upon project manager, region, size, etc. Moreover, a risk number is calculated (considering budget, schedule, and client satisfaction) for each project. The projects containing the greatest amount of risk are also highlighted at the director level to allow oversight and action when needed. The system was created during the 2005 fiscal year and has been in full implementation for approximately three months at the time of this paper. Moving forward over fiscal year 2006, the system will be monitored to evaluate the impact on performance and efficiency beyond communication and information flow to include project and organizational performance. The question of performance measurement causing performance movement has been asked and is being tested. Though in the opinions of the authors, an analysis of the system's impact is premature, an initial subjectively rated evaluation conducted by MEDCOM has indicated:

- Clarity of organizational functions has increased
- Excess information flow has been reduced
- Measurement of key indicators has increased
- Efficiencies have been realized in time, dollars, and satisfaction
- Contractor performance has increased as the use of the weekly tracking has increased

CONCLUSION

The purpose of this paper was to consider the hypothesis that over communication and information sharing results in an environment of inefficiency, lack of accountability, confusion, and lack of proper measurement. It was thought that the movement to a performance environment will result in a reduction of information flow and communication to the lowest efficient level, thus creating contractor accountability for performance. In the case of the US Army Medical Command, the initial project tracking system captured all information shared at each weekly meeting and it was shared with all parties involved in the project, regardless of their level of involvement. The system was inefficient, did not capture project status, irregular, inconsistent, and added little value (though all information was captured). MEDCOM moved to a new tracking system that focused on simplifying the significant though the measurement of risk, in terms of impact to budget, schedule, and client expectations. The system has been implemented for three months and the initial results have shown an increase in organizational and site efficiency, as well as contractor performance improvement.

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