LEADERSHIP, THE INFORMATION ENVIRONMENT, AND THE PERFORMANCE MEASURING PROJECT MANAGER

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The hypothesis of this paper is that the construction industry will not be able to significantly increase its value and move away from commoditization until it becomes efficient. Best business practices have identified increased management, the lack of performance measurements, and subjective decision making as obstacles to efficiency. The paper proposes that a leadership model is required to effectively increase construction and organizational efficiency. The paper also proposes that the developed leadership model, an information environment, and the project manager who uses performance information will impact construction performance with greater positive results and sustainability. The authors also propose that the number of leaders who represent construction clients and contractors is insufficient to sustain the developed structure. By using a Deming concept of process structure and stability to create an organizational and project framework that forces efficiency instead of depending on the "information worker" project manger, the benefits of a leadership model can be realized without the presence of the traditional leader figure. This will result in an increase in construction performance.

Keywords: information environment, leadership structure, performance information.

INTRODUCTION

The construction industry is a large, influential commerce that impacts the world. Approximately $3.22 trillion is used on world-wide construction. The International Monetary Fund reported the total gross domestic products of the world as approximately $32 trillion. From this, it is noted that construction accounts for 10 percent of the world's economy (Engineering Technology 2004).

In the United States alone, $1.15 trillion was spent on construction projects in 2005. That accounts for 12 percent of the gross national product (GNP) and nearly 9 percent of the gross domestic product (GDP). The statistic is high considering the percentage of people employed in the construction industry (Simonson 2005). Over 6 million people are employed in 1.9 million construction companies throughout the United States. Construction is the United State's largest manufacturing sector, and the second largest employer in the nation – right behind the U.S. Government, which includes the Armed Forces. Construction employs approximately 6.9 million individuals annually, 6.4 percent of the total U.S. workforce (Engineering Technology 2004; ICAF 2000).

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Construction is an industry that has high demand, profit, and impact, both nationally and globally. However, despite the expanding margins, the industry is suffering.

The construction industry is highly inefficient. Contractors are retaining very low profit margins while yielding a high failure rate. There are an inadequate number of potential and current craftspeople. Construction performance statistics are substandard, and quality is very low (Post 2001). Conversely, surety rates are at a record high, accompanied by an abundance of legal complications and suits. Lukow, an industry representative stated, "The industry is fragile at best… (Illia 2004)." It is proposed that the inefficiency of the industry is directly correlated to the amount of management roles that have inundated the market in the last fifty years due to the commoditization of construction. This paper offers that to reduce inefficiency, there will have to be a minimization of management and a movement to a leadership model to create a sustainable performance level and eventual de-commoditization of construction.

HYPOTHESIS

The core hypothesis of this paper asserts that a system's efficiency level has a strong negative correlation to the level of management imposed on the system. Thus, by minimizing the management role in the construction process and moving to a leadership model, efficiency will increase. This translates into higher project performance (competing on time, on budget, with high customer satisfaction), lower requirement of user time, and a decreased amount of communication/inspection between the owner and vendor. An environment can be sustained that enforces the transfer of risk through minimal management, requiring nominal maintenance and resulting in greater efficiency. This can be demonstrated through the attainment of the following objectives:

1. Identification of an information environment.
2. Development of a process that can transform an organization into an information environment.
3. Implementation and measurement of the information environment's level of efficiency and performance.

METHODOLOGY

This research proposes that by transforming an organization into an environment that is based off of information through the development and integration of tools that minimize management, the division director will become more efficient and increase in performance. This will be accomplished through the following actions:

1. Identify the theoretical changes needed in order to transform the current construction industry to an efficient, performing environment.
2. Correlate the directives for raising the efficiency of the industry to current best practices (literature review).
3. Model and define the current system of a client organization and the constraints involved in moving to an efficient environment.
4. Develop automated technology that will compensate for the clients limitations and allow the simulation of an efficient environment based on the studies previously performed.

5. Test created process by implementing the technology and measure the client's resulting performance.
6. Develop and hone the system to remove user errors and require minimal maintenance effort.
7. Create and implement a monitoring plan that documents the rate of change of the client, the risks, and methods to minimize the risk.
8. Measure success of the process by having the client rate the process in terms of performance.

Organizational Testing: US Army Medical Command

The US Army Medical Command (MEDCOM) is presently engaged in transforming its facility management/construction procurement program to an effective information-based, outsourcing procurement system that results in accountability, efficiency, and high performance. The director of MEDCOM, Mr. Nathan Chong, identified the current construction procurement process as inefficient. There were constant emergencies to handle, low contractor performance (finishing projects on time, on budget, and with owner satisfaction), an inability to keep up with the construction demand, a lack of definable roles of accountability, and constant passing of reports, with little recognizable use or substance. There was no existing system or ability to measure the performance information of the division, or each procurement agent, site personnel, IDIQ contractor, or subcontractor. In the spring of 2004, MEDCOM contracted with the Performance Based Studies Research Group (PBSRG) at Arizona State University to develop and implement control minimizing tools that would transform the facility management/construction procurement program into an information environment that reduces management and supports best value and leadership practices.

Tests will be performed on the US MEDCOM division analyze the hypothesis that the minimization of management and movement to leadership increases the efficiency of a system.

THEORETICAL CHANGES: CONSTRUCTION INDUSTRY STRUCTURE

Figure 1 shows the Construction Industry Structure model with competition on the x-axis and performance on the y-axis. Quadrant I is an environment where construction is delivered as a commodity. In other words, this is the quadrant having specified (or minimum) performance requirements. The construction industry has predominately operated in this quadrant via low bid selection, where ability and competence are not competed; only price matters. In the price based environment, management of every aspect of the work, through abundant specification to third and fourth party inspections, is managed, and to minimize risk in this quadrant, the industry has increased the role of the construction management professional. The performance in this quadrant has hovered at a level of 42 percent of all projects being completed late, 33 percent over budget and 13 percent ending with litigation (Post 2001).

Conversely Quadrant II is a performance based environment where the concepts of leadership are prevalent. Risk is transferred to a performing contractor and they are forced to take accountability for project success, conduct self-implemented quality control, and ensure they have the proper personnel on the appropriate aspects of the

work. With risk comes accountability, with accountability comes the need for a proper information environment so performance can be tracked and measured.

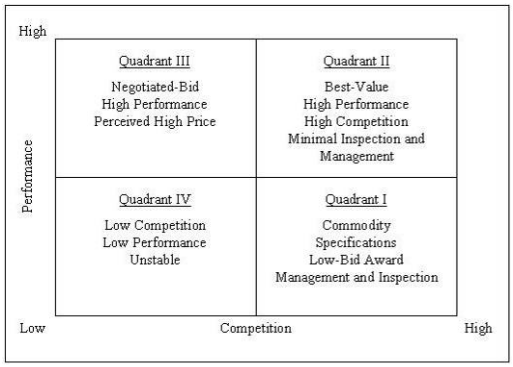

Figure 1: Construction Industry Structure (Kashiwagi, 2004)

Migrating Between Quadrants

For most of the facilities/client project managers that are in the low-bid sector (Quadrant I), moving to the best-value sector (Quadrant II) requires a cultural change in how the owner and vendor should interact. Clients that reside in Quadrant II focus on the selection process. They are efficient leaders. They hire performing contractors, and then empower the vendors by making them accountable for their work. These owners practice very little control and are founded on the outsourcing model of transferring risk to performers. On the other hand, owners working in Quadrant I focus on the technical relationship. They hire contractors based on the lowest bid, and then are forced to manage the vendor throughout the project's duration. They constantly inspect and control the vendor by making technical decisions and retaining the risk involved. Figure 2 shows the interaction of the client's in-house professionals and project managers under each environment.

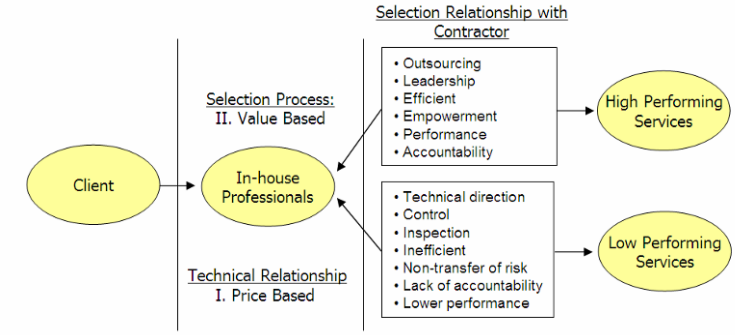

Figure 2: Technical, Price Based Relationship vs. Value Based, Leadership Relationship

It is difficult for an owner's representative or project manager to move from Quadrant I to Quadrant II. In order for an owner to change, they must modify their current mindset and relationships. This can be accomplished by adjusting the degree of management to a leadership model used through the following directives:

1. Minimize project management and inspection; force entities to become information workers
2. Minimize design direction and specifications (decision making)

3. Minimize communication/the transfer of information
4. Transfer risk and accountability (outsource) requiring Quality Control
5. Measure status through performance information; encourage competition and self-assessment

ALIGNMENT OF BEST PRACTICES

A comparison of the five leadership model directives above was made by considering the successful business practices of twelve noted business experts (Table 1):

Table 1: Comparison of Five Directives and Current Best Practices

NO	SUCCESSFUL BUSINESS PRACTICES	Buckingham & Clifton	Covey	Crosby	De Brabandere	Deming	George	Gladwell	Kouzes & Posner	Maxwell	Peters & Waterman	Senge	Welch	Womack & Jones	Percentage
1	Minimize project management and inspection; force entities to become knowledge workers.	X	X			X	X		X	X	X	X	X	X	83%
2	Minimize design direction and specifications. Define outcomes instead of actions.	X	X			X			X	X	X	X	X	X	75%
3	Minimize communication/the transfer of information.				X	X	X	X	X		X	X	X	X	75%
4	Transfer Risk and accountability (Outsource). Put the vendor at risk.	X	X		X	X		X	X				X		58%
5	Measure status through performance information; encourage competition and self-assessment.	X			X	X	X	X	X	X	X			X	75%

It was found that an average of 73 percent of the five business practices was addressed in each of the books regarding the efficiency of an organizational system. These directives were taken as the foundation of the leadership model developed to move the US MEDCOM from a managerial model to one of leadership, measurement, accountability, and performance.

Traditional leadership models rely upon a unique leader, or person, that can drive change and improvement through an organization. Collins (2001) notes that "Level 5 Leaders" identify the right persons for the right positions at the right times and set the vision and organizational roadmap before moving forward with change. However, Collins shows that there are few leaders with the requisite characteristics to successfully implement a system or leadership model with the five directives given above. In response, the authors propose that a process structure, using the concepts of Deming and other researchers, be implemented to create a framework that forces efficiency instead of depending upon a traditional leadership figure. The system will allow an organization to realize the benefits of a traditional leader without the presence of a traditional leader.

MANAGEMENT REDUCTION AND MOVEMENT TO A LEADERSHIP MODEL

Initial System – Management Model

Testing was performed on the MEDCOM organization in order to verify that minimizing management and moving to a leadership model would increase efficiency. For this case, due to limited time and funding, and in order to narrow the scope of the tests, the results were measured in terms of the director's efficiency and ability to lead

the division. While there should be an increase of efficiency at all levels in the system, this test will measure the overall group, i.e. the results of the director.

The components involved in the system were defined in order to understand the structure and interaction of the system. For any given project, a Contracting Office (CO), Project Integrator (PI), Facilities Manager (FM), Project Manager (PM), IDIQ Contractor, and Quality Assurance (QA) representative are needed. The entities can be divided into two primary groups, the Army Engineering Corps and the Medical Command Division. While the Medical Command is responsible for planning, procurement, and programming, the Corps is responsible for the actual design, construction, and finished project. Thus the two groups work hand in hand, and have a common goal in mind – a high quality, completed project. They are also constrained by their counterparts. One group cannot work with out the other.

The initial system was outlined, and the activities that constrained the system the most were pinpointed, a brief description follows. MEDCOM Project Integrators (PI's) constantly track the facility needs of the army medical posts around the states with a three year predicted schedule. When a facility requires any type of construction, foreseen or unforeseen, a "Request for Construction Designs" is submitted to a contracting office, where a procurement officer will either approve or refute the claim. If the contracting office denies the claim, it is sent back to the FM for resubmittal. If it is approved, a QA Rep and IDIQ are assigned to the project, depending on the location and availability. There are a set number of IDIQ contractors that handle all projects and do not compete for their work. Depending on the type of project, the scope development is performed, and the design is either assigned internally or contracted to the IDIQ as well. The project is then awarded to a contractor in a method decided on by the IDIQ. The contractor creates a work plan (WP), and submits the WP in order to receive a notice to proceed (NTP) with construction. At this point construction proceeds. During the construction process, the QA, FM, PM, and PI, are tracking construction and performing management and inspection functions in order to ensure a quality product. The project is closed when a final inspection has been completed.

On evaluating the system, it was established that the majority of time for the MEDCOM division head and the PI's was devoted to handling emergencies in the design and construction process. Interestingly, this was not the focus of their roles in the system. Because the bulk of their time was devoted to non-core duties, their main responsibilities (planning and preparation) were being neglected. Instead of focusing on the preparation for project construction, addressing problems before they became issues, the group was focusing on damage control. They were managing and inspecting the projects because of the neglect of their original role. The MEDCOM's method of adding value to the program was to minimize project risk by hiring a contractor that was capable of minimizing the risk. In trying to minimize the risk themselves, they became managers working in an environment that was not their expertise.

Additionally, an excess amount of communication was being inefficiently passed through the system. In order to identify a problem or risk in a project, the contractors were working through the chain of authority. Since the contractors were several levels under the director, by the time information was received, it had been screened by several biased sources. This created a delayed reaction that magnified the disjointed communication and risk.

In order to minimize the amount of redundant management performed by MEDCOM, and maximize the value added, the role of the Project Integrator was outlined and defined. Since the PI's role had been vitiated by management functions, the role of the PM had become intertwined, till the two roles were not distinguishable. The inefficiencies in the process were clearly evident.

Modified System – Leadership Model

In order for the MEDCOM environment to transform into a Quadrant II, leadership environment with minimal process management, the attributes had to be altered to conform to the five directives established from the theoretical and best practices concepts.

With the relative dearth of traditional leader figures, this type of change is extremely difficult. In response, specific tools were designed in order to assist the PI's in the conversion and allow the forcing of leadership attributes into a process through the use of key performance concepts. The tools created were a Weekly Report that minimizes external management, the PI Weekly Report that minimizes internal management, and the Director's overview, that allows the head of the department to focus and track the performance of the group as whole. These tools encompass the five directives of a leadership model. A brief description of these tools is given below:

The Weekly Report - Minimizing External Management

The Weekly Report was created in order to assist the MEDCOM division in performing less external management and becoming a more efficient unit. It is intended to replace the current status report and pass the correct information to the appropriate entities. This, in turn, compelled the entities accountable to resolve risks and problems directly without forcing management to make a decision. The report is also designed to increase efficiency, by providing a user friendly program that requires little program management time. The tool considers project risk, risk mitigation strategies, cost and time impacts, and client satisfaction.

The Project Integrator (PI) Reports - Measuring Internal Performance

The PI Weekly Report was created in order to measure the performance of the PI's in the original capacity of their positions. The responsibilities of a PI center around the planning activities that occur before the actual project construction. Because of the external conditions and management required in the initial system, the events where the PIs had focused their time had not added value to the system. They were not concentrating on their core expertise. Completing a weekly form that measures the desired performance of the participant is based off of Mason Haire's theory, "What gets measured gets done." How it is accomplished is not significant, and each PI is given the flexibility to choose how their responsibilities are met.

The Division Overview - Comparing Performance

The Division Overview allows the head of the division to compile the information accumulated through the individual project weekly reports and PI reports in order to capture the current status of the organization, identify the risk that needs to be minimized, direct action and change without exerting great effort, and minimize the need for management. It also permits the director to receive information directly from the source involved, omitting the non-value added management of a third party.

Computer-based technology using standard industry programs allows all of the above to be performed quickly and seamlessly. Simple Microsoft Excel spreadsheets capture, track, and store information. Microsoft Outlook transfers the information automatically to the correct project personnel. Embedded programming and macros allow for summary and analysis of the system data.

SYSTEM IMPACT AND ORGANIZATIONAL CHANGE

The weekly reporting system and overview program are designed to support an information driven environment that advocates the usage of leadership principles instead of management. Leadership becomes increasingly efficient through such an information environment.

To determine the level of management and efficiency of the Weekly Reporting System, the MEDCOM director, the key comparison point as identified in the hypothesis and methodology, compared to the initial system to the new system. The results were very polar; the new weekly report reflected a great capacity to add efficiency and lower management at an average of 8.84 on a scale of 1-10, 10 being the highest aptitude, and the initial system at an average of 1.21. This pointed out several pieces of information including that it will be difficult to provide actual performance changes in numbers between the initial and new system, due to a lack of data from the initial system. Since there were little to no measurements in the initial system, there was nothing to compare the actual results to. Thus, the importance of the director's perception increases in importance for this test. Also, the Weekly Reporting System has increased the efficiency of the organization as a whole, specifically for the director. Table 2 (below) shows the results.

CONCLUSION

The movement of an organization and its personnel into a leadership based model that relies upon efficient information and performance metrics is an arduous task that requires consistent pressure from superiors and over patience for adaptation. Coupling the five leadership directives as taken from the best practices of industry experts with the theoretical concepts of the research, the authors tested a model system on a large, multidimensional, multifaceted organization with poor to nonexistent *efficient* performance and information measurement. The MEDCOM system is moving from one of information overload, which had no value (as assessed by the director), to a leadership prototype that focuses on information workers, minimized decision making, minimizing information flow to its lowest efficient level, and the constant measurement of performance. Measurement can cause change and system improvement. The current system, as tested thus far, has shown positive results; however, the roles of the PI's and PM's are still poorly defined, the system has met resistant from some users (as expected) and the implementation time has not be of such duration that any rigorous conclusions can be drawn. The research effort will continue for 1-2 more years with further refinement to the system, but initial results have shown that a leadership model using information and performance measurement can improve the overall efficiency of a system and organization.

Table 2: MEDCOM Director Assessment of Information Systems

NO	CRITERIA	SCALE	INITIAL REPORTING SYSTEM	PIPS WEEKLY REPORTING SYSTEM
1	Identifies and prioritizes projects according to risk	(1-10)	1	10
2	Clarifies the functions of the organization	(1-10)	1	5
3	Minimizes owner risk	(1-10)	1	8
4	Provides information that assists in leading the organization	(1-10)	1	8
5	Reduces confusion	(1-10)	1	10
6	Transfers risk to the contractor and forces the minimization of risk	(1-10)	1	10
7	Encourages planning ahead	(1-10)	1	10
8	Allows the comparison of employees through performance numbers	(1-10)	1	10
9	Requires continual self-assessment	(1-10)	5	10
10	Minimizes excess information flow between all entities	(1-10)	1	10
11	Easy to integrate into the procurement/ management system	(1-10)	1	10
12	Requires minimal time to maintain	(1-10)	1	10
13	Places each entity at risk for their respective responsibilities	(1-10)	1	10
14	Discourages owner management	(1-10)	1	10
15	Provides current division statistics (#Projects, Award $$, #On Time, #On Budget, etc.)	(1-10)	1	10
16	Supports competition in the organization	(1-10)	1	8
17	Does not promote relationships	(1-10)	10	10
18	Advocates a performance environment (projects are finished on time, within budget, with high quality)	(1-10)	1	8
19	Overall Satisfaction Level	(1-10)	1	10
	AVERAGE		**1.68**	**9.31**

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