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INFLUENCE OF ORGANIZATIONAL BEHAVIOR ON
CONSTRUCTION PROJECT CLOSEOUT

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INFLUENCE OF ORGANIZATIONAL BEHAVIOR ON CONSTRUCTION PROJECT CLOSEOUT

By

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ABSTRACT

INFLUENCE OF ORGANIZATIONAL BEHAVIOR ON CONSTRUCTION PROJECT CLOSEOUT

By

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Information exchange plays an important role in an inter-organizational setting. There are continuous interactions among stakeholders throughout the course of a project to complete the project on time and within budget. A study "Assessment and Improvement of Construction Project Closeout" (Abdelhamid et al., 2007) conducted at Michigan State University (MSU), found that during final "Project Closeout", exchange of information often comes to a standstill. This researcher has examined burnout factors derived from the literature on organizational behavior including role stress, role of interpersonal relations, incentives, and lack of motivation in the context of project closeout. Data obtained from interviews of contractors, subcontractors, and owners during the MSU study (Abdelhamid et al., 2007) was analyzed using "Grounded Theory" (Charmaz, 2006) to understand causes for slow closeout and to determine behavioral factors that impact closeout by comparing the literature to the data. Recommendations were developed for midsize contracting and subcontracting organizations by comparing the strategies suggested in the interviews with motivation theory in organizational behavior literature. Recommendations were validated through proof of concept interviews which indicated that organizational behavior has an impact on closeout and that problems that arise during closeout can be prevented by stressing the importance of the recommendations relating to role conflict and role ambiguity.

To the Three

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ABBREVIATIONS

AIA	American Institute of Architects
COAA	Construction Owners Association of America
CCD	Construction Change Directive
GT	Grounded Theory
IRB	Institutional Review Board
MSU	Michigan State University
OB	Organizational Behavior
O & M	Operation and Maintenance Manuals
RFI	Request for Information

CHAPTER 1

INTRODUCTION

1. INTRODUCTION

"Nothing is as fatiguing as the eternal hanging on of an uncompleted task."
William James

1.1 Overview

This research was drawn from a study on construction project closeout conducted by the Construction Management Program in the School of Planning, Design and Construction at Michigan State University (MSU). The MSU study was commissioned by the MSU Office of Vice President for Finance and Operations and developed guidelines and recommendations for improving practices to reduce time and cost of construction closeout within a university construction context. It was evident from that study that seamless exchange of information among project participants became critical during project closeout (Abdelhamid et al., 2007). A delay in transfer of information such as closeout related documents during this phase often led to prolonged closeout.

This research concentrated on the influence of organizational behavior on project closeout within commercial contracting and subcontracting organizations. Behavioral factors that affect exchange of information during final closure of a project based on stress and motivation theories were investigated. The behavioral factors that are discussed include role stress, role overload, role of interpersonal relations, burnout, job context, and incentives. Each of these factors is discussed in detail in the next chapter.

A construction project can be broadly divided into four phases which include initiation, planning, execution and closeout. The researcher here concentrated on the closeout phase. Closeout is generally defined as the time between substantial and final

completion of the project. During this period the owner, contractor, and design professional create a list of items (referred to as punch list) that require attention prior to final completion as well as reconcile change orders, claims and payments. The American Institute of Architects (AIA-A201, 1997), in its general conditions of construction contract defined substantial completion as "the stage in the progress of the work or the designated portion thereof is sufficiently complete in accordance with the contract documents so that the owner can occupy the facility or utilize it for its intended use." Final completion according to AIA-A201 occurs when "the work is complete in accordance with the contract documents and retainage released to the contractor." Substantial completion and final completion are two milestones that prominently define project closeout.

This research correlated organizational behavior factors which impact information exchange in order to assess their role in construction closeout. Literature on organizational behavior, along with project closeout was used to compare and identify factors related to organizational behavior that cause closeout delays and to develop recommendations based on the literature and interviews.

1.2 Research rationale

Closeout is a concern for all project participants. This was evident from the MSU study (Abdelhamid et al., 2007) where contractors, subcontractors, owners, and architects; all indicated that they perceived project closeout to be one of the most time consuming steps in a construction process. Abdelhamid et al. found that projects with less than six months construction duration took an average of 255 days from substantial

completion to contractor's receipt of payment and an additional 236 days from contractor's receipt of final payment to MSU internal closeout. Internal closeout activities conducted internally after the contractor receives final payment may include internal accounting and self perform work by the university such as data, telecommunications and landscaping. Projects with construction durations from six months to one year averaged 255 days from substantial completion to contractor's receipt of final payment. Projects with construction durations of more than one year averaged 348 days from substantial completion to contractor's final payment. Owners other than MSU indicated that for a two-month to six-month project, the typical time to close was five months or less. When twelve-month projects were considered, the typical time to close was found to be approximately nine months (Abdelhamid et al., 2007).

Bennett indicates that many contractors are guilty of putting too little emphasis on this final phase of a project (Bennett, 2003). Projects are said to proceed until they are 95% complete and then remain at 95% forever. The importance of the project closeout phase is often overlooked (Pinto, 1998). In a 1993 customer survey, the Defense Contract Management Command (DCMC) identified the contract closeout process to be "one of the most important services provided and one with which customers are least satisfied" (Valovcin, 1995). The Department of Energy contends that closeout is frequently understaffed, under-funded and not well planned (DOE, 2003).

The significance of closeout in a construction project was highlighted in the MSU study (Abdelhamid et al., 2007) where the researchers investigated the causes of closeout delays and developed recommendations to improve the closeout process. This thesis

study extends the work of Abdelhamid et al. and explores the influence of organizational behavior during closeout within contracting businesses.

1.3 Research goal and objectives

The goal of this research is to determine the influence of organizational behavior on construction project closeout.

In order to achieve this goal, the following objectives are outlined:

1. Identify factors of slow closeout related to organizational behavior by comparing the literature with interview responses.
2. Develop recommendations for contractors and subcontractors based on motivation theories of organizational behavior.
3. Validate these recommendations by conducting proof of concept interviews.

1.4 Scope of the research

Organizational behavior focuses on the "behavior, attitudes and performance of people in organizations" (Champoux, 2006). As depicted in Fig 1.1 within the discipline of organizational behavior, the researcher emphasized causes of low performance of individuals. They include role stress, role overload, role of interpersonal relations, burnout, job context, and incentives. These factors were examined with respect to project closeout to identify the impact of organizational behavior on construction project closeout.

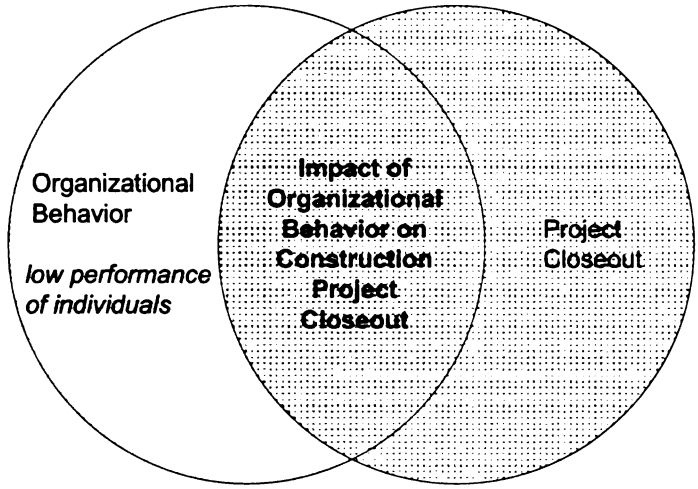

Fig 1.1 Domain and focus area of the research

1.5 Limitations

Organizational behavior factors addressed in this study were limited to those factors that relate to burnout such as role stress, role overload, role of interpersonal relations, incentives, job context, and motivation theory.

The target group was restricted to commercial general contracting and subcontracting organizations in the Mid-Michigan area. Though project closeout can be studied in terms of time or cost or both, the researcher in this study focused on time impacts and did not address costs associated with closeout.

1.6 Methodology

This section outlines the methodology used for conducting the research which was broadly divided into the following steps indicated in section 1.6.1 to 1.6.3.

1.6.1 Literature review

Literature relating to organizational behavior and construction project closeout was reviewed. The connection between these two subjects is established in Chapter 4. Literature on organization behavior was used to identify factors that cause low performance such as role stress, role overload, role of interpersonal relations, burnout, incentives, and job context. Literature on construction project closeout was reviewed to identify existing closeout practices and the role of project personnel during closeout. Since it was evident from the MSU study (Abdelhamid et al., 2007) that there is very little motivation to completely close a project after substantial completion, the researcher uses goal-setting theory to develop strategies to reduce closeout delays.

1.6.2 Data collection through interviews

The research on project closeout was conducted at MSU by the Construction Management Program in the School of Planning, Design and Construction. That research provided a university's perspective on delays in project closeout and provided recommendations for improving closeout processes (Abdelhamid et al., 2007). MSU administrators, personnel from four other universities, contractors, and subcontractors were interviewed as part of that research. In addition to the interviews a "Project Closeout Workshop" at the Construction Owners Association of America (COAA) was held.

Data collected from the closeout workshop and interviews of contractors, subcontractors, and owners collected during the MSU study were used by this researcher to identify factors related to organizational behavior. MSU administrators and attendees of the COAA closeout workshop are termed as owners in this study. This researcher was

involved in developing the MSU study methodology and drafted questions that were included to aid in this research. Though the interviews addressed several topics, the responses to certain questions (explained in Chapter 3) were considered to identify and code them into respective organizational behavior categories. Questions addressed include closeout definitions, perception of problems, causes of slow closeout and strategies for reducing delays.

1.6.3 Analysis of survey responses and development of recommendations

The interview responses of owners, contractors and subcontractors were correlated with organizational behaviors identified through the literature review. Data obtained from the interviews and the closeout workshop was summarized and dominant themes related to organizational behavior indicating causes of closeout delays were identified. Based on the concept of Grounded Theory (Charmaz, 2006; Glaser, 1992; Strauss, 1987) (described in Chapter 2) these themes were coded into different organizational behavior categories. Each organizational behavior category was evaluated and compared to the literature to understand causes and develop recommendations.

1.7 Deliverables

The primary deliverable of this research is a thesis that identifies factors related to organizational behavior which impact construction project closeout and recommendations for reducing their negative influence on closeout.

1.8 Chapter summary

This chapter establishes the groundwork for the research and includes an introduction to the topic and outlines research scope, limitations and methodology. Chapter 2 describes the literature review conducted for the research, identifies the organizational behavior factors impacting closeout, and addresses the steps involved in the closeout process.

CHAPTER 2

LITERATURE REVIEW

2. LITERATURE REVIEW

This chapter outlines the literature review conducted in order to identify factors of organizational behavior including stress and motivation that may impact project closeout. Literature on both organizational behavior and project closeout are discussed independently and laid out in separate sections. The connection between these two subjects is developed in chapter 4 of the thesis.

2.1 Organizational Behavior

As part of the literature review on organizational behavior, PsycINFO- a comprehensive database which links to 1300 journals was reviewed. Along with this, research papers and journal articles from the Journal of Organizational Behavior, Journal of Management, Journal of Construction Engineering and Management, Journal of Business Psychology, Journal of Applied Psychology were reviewed to identify past research and findings.

"Organizational behavior" refers to the behavior of people in organizations and focuses on behavior, attitudes and performance (Champoux, 2006). The study of organizational behavior originated with the concept of 'leadership' by the Greek philosopher Plato but academic importance was associated with the advent of scientific management in the 1890s. "Proponents of scientific management held that rationalizing the organization with precise sets of instructions would lead to increased productivity" (Ash, M.G., 1992). Concepts of organizational behavior were further developed through a number of studies from eminent scholars including Henri Fayol, Max Weber, Follett, Barnard, Hawthorne, Douglas McGregor, and lately through Peter Drucker (Champoux,

2006). Organizational behavior is currently considered to be a developing field and becoming important in the global economy as people with diverse backgrounds and cultural values are coming together to work effectively and efficiently (Robbins, 2004).

Clark described organizational behavior as the "study and application of knowledge about how people, individuals and groups act in organizations. It takes a systems approach by interpreting people-organizational relationships in terms of whole person, whole group, whole organization and whole social system"(Clark, 2007). Schneider defined organizational behavior as the "confluence of individual, group and organizational studies flowing from industrial-organizational psychology, and organization and management theory with headwaters in psychology, sociology and management" (Schneider, 1985). According to Champoux, the discipline of organizational behavior draws on theory and concepts from various branches of psychology, anthropology, political science and sociology. Information about human psychological processes is derived from the discipline of psychology whereas anthropology, political science and sociology of work contribute analytical tools for studying behavior, a base for political behavior and an understanding of social status and social relationships in a work setting respectively (Champoux, 2006).

Organizational behavior encompasses a wide range of topics such as motivation, leadership, stress, communication, groups, socialization, culture and organizational change. Two topics of interest to the researcher: stress and motivation are explored in this thesis.

2.2 Stress

A recent survey conducted on occupational stress by the National Institute for Occupational Safety and Health (AIS, 2007) cites that "40% of workers reported their job was very or extremely stressful, 25% view their jobs as the number one stressor in their lives, three fourths of employees believe that workers have more on-the-job stress than a generation ago, 29% of workers felt quite a bit or extremely stressed at work, 26 percent of workers said they were often or very often burned out or stressed by their work." The above statistics indicate that occupational stress is a significant factor plaguing organizations.

Stress is a condition that results when person-environment transactions lead the individual to perceive a discrepancy between the demands of the situation and resources of the person's biological, psychological and social systems (Champoux, 2006). Jamal defines job stress as an individual's reactions to work stress environment that appear threatening to the individual (Jamal, 1990). A person experiences stress when an event in the environment presents a constraint, an opportunity or an excessive physical or psychological demand (Champoux, 2006) that will lead to important outcomes (McGrath, 1976; Schuler, 1980). Stress can be positive or negative as represented in Fig 2.1. According to Champoux, "stress can be negative when constraint blocks a person's efforts to reach a desired goal. This is commonly known as distress. An opportunity from the person's environment may present a chance with something a person values which is construed positive. This is commonly known as eustress. But when an event in the person's environment presents excessive physical or psychological demand, the stress is again construed to be negative" (Champoux, 2006). A person's perception determines

whether the object or an event leads to a stress response. Stress is beneficial when a person feels challenged and stimulated, but negative when a person feels overloaded or under stimulated. At opposite ends of the spectrum a person can suffer from 'burn out' or 'rust out' (OHS & W, 2007).

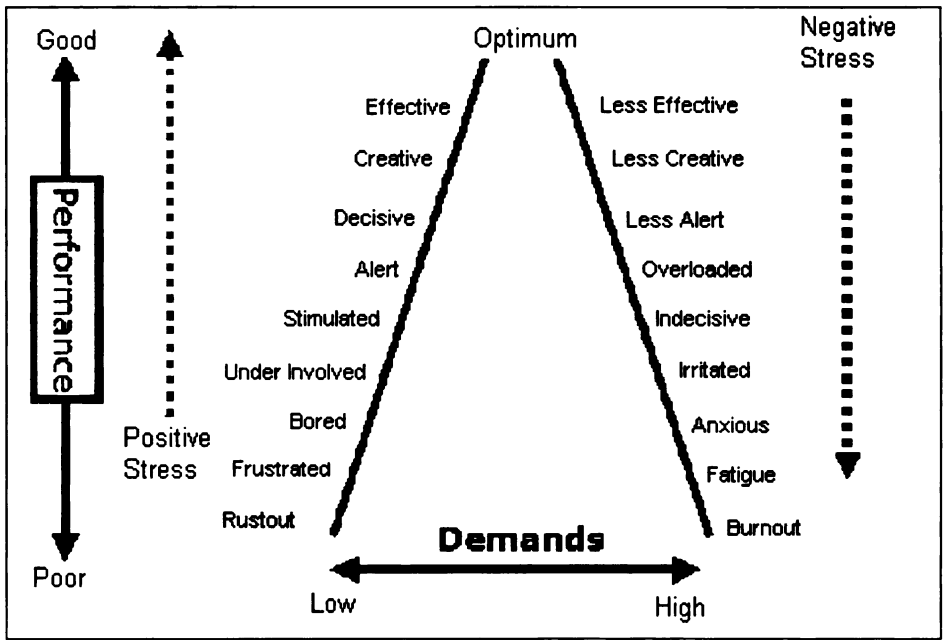

Fig 2.1 Understanding stress

Source - http://www3.hantsfire.gov.uk/manage/safety/managingstress (11/10/2007)

Champoux indicates that "understanding stress, especially stress in organizations, is important because it can have both positive and negative effects. For an individual, stress is associated with health problems and for organizations; stress is associated with high absenteeism rates, high turnover, poor productivity and poor decision-making" (Champoux, 2006).

Prolonged and unmitigated stress leads to professional burnout. Despite the growing consensus surrounding the concept of burnout, the distinction between burnout

and stress has not been clearly defined (Cordes and Dougherty, 1993). Ganster and Schaubroeck argue that burnout in fact, is a type of stress - specifically, a chronic affective response pattern to stressful work conditions that features high level of interpersonal contact (Ganster and Schaubroeck, 1991). Cordes and Dougherty indicated that although most researchers define stress as an outgrowth of person-environment interactions (Cordes and Dougherty, 1993; French and Caplan, 1972; McGrath, 1976; Schuler, 1980) or as a result of dysfunctional role relationships (Kahn et al., 1964), there has been little definitional or operational agreement among job stress conceptualizations (Schuler, 1980). On this basis, a number of authors advocated the treatment of stress as a general concept that can provide a "framework" for research on a number of problems. Based on the above definitions, burnout is subsumed to be one of the outcomes of stress (Cordes and Dougherty, 1993). In the following sections, organizational factors related to antecedents of burnout which have been used in coding and categorizing data are described.

2.3 Burnout

Burnout is a chronic state of emotional exhaustion that stems from an unrelenting series of on-the-job pressures with few positive experiences (Champoux, 2006). The term burnout was coined by Herbert Freudenberger to characterize the psychological state of individuals involved in emotionally charged interactions with clients (Brock & Grady, 2002). The concept of burnout was more clearly conceptualized and defined during the early 1980's when systematic empirical studies on burnout were clearly conducted and published. Burnout is a distinctive aspect of stress which has been defined primarily as a

pattern of responses of stressors at work (Shirom, 1989). The most widely accepted definition of burnout is Maslach's three component conceptualization (Cordes and Dougherty, 1993; Wright and Bonett, 1997). Maslach and Jackson defined burnout as "a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who do 'people work' of some kind" (Maslach and Jackson, 1986). As the definition suggests, burnout is characterized by three primary symptoms. Emotional exhaustion refers to depletion of emotional resources (Halbesleben and Buckley, 2004). Repeated exposure to work results in emotional exhaustion (Champoux, 2006). The second component, depersonalization is characterized by negative cynical attitudes and feelings about one's clients (Wright and Bonett, 1997). Depersonalization of response is a way of building an impersonal barrier which results in reduced personal accomplishment. Employees experience increased dissatisfaction with their accomplishments on the job, coupled with a heightened perception of minimal work-related progress. Wright and Bonett, in their study of burnout and work performance found that burnout leads to poor performance in individuals (Wright and Bonett, 1997). Different hypotheses exist regarding the sequence in which these three primary characteristics result in an individual. Unlike the above conceptualization of Maslach, Golembiewski and Munzenrider hypothesized that significant depersonalization is necessary to diminish feelings of personal accomplishment and significant reductions in personal accomplishments are necessary to result in high levels of emotional exhaustion (Golembiewski and Munzenrider, 1981). Of the two hypotheses proposed by Maslach and later by Golembiewski, Maslach sequencing of three components has gained

empirical support (Maslach and Jackson, 1986; Golembiewski and Munzenrider, 1981; Lieter, 1988; Lieter and Meechan, 1986; Liter and Maslach, 1988).

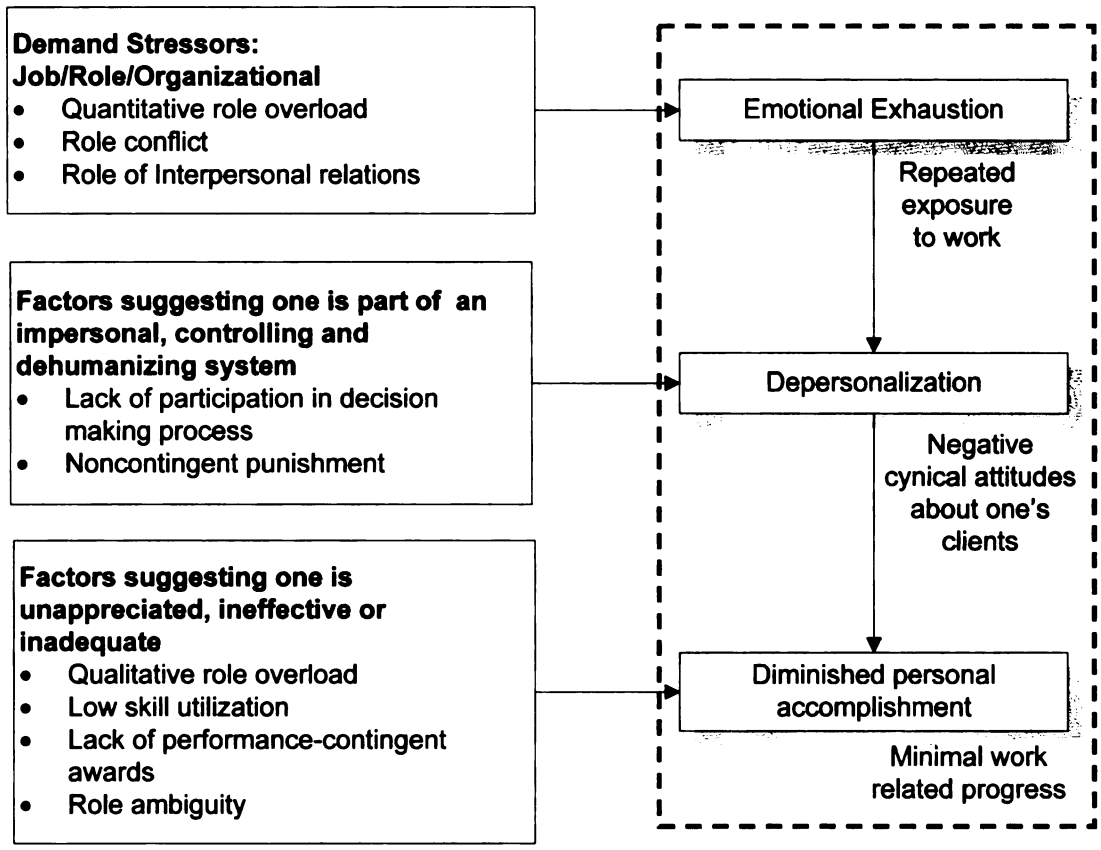

Fig 2.2 Conceptual framework for burnout proposition (Cordes & Dougherty, 1993)

Fig 2.2 depicts the conceptual framework for burnout proposition developed by Cordes and Dougherty. It indicates the three Maslach's components, their causes and consequences. The causes are divided into job and role characteristics, organizational characteristics and personal characteristics. The job and role characteristics highlight the role of interpersonal relations, effect of role conflict, role ambiguity and role overload. The researchers indicate that, client interactions that are more direct, frequent or of a

longer duration are associated with higher levels of burnout. Role stress which includes role conflict and role ambiguity has been shown to be associated with burnout to varying degrees. Individuals who report higher levels of these variables report higher levels of burnout (Cordes and Dougherty, 1993).

Organizational characteristics include the effects of rewards and punishments as linked to performance and job context whereas personal characteristics include personal expectations and social support (Cordes and Dougherty, 1993). In this research, the researcher attributes importance to the first two criteria discussed by Cordes and Dougherty which include job and role characteristics along with organizational characteristics.

Job characteristics which include role stress, role overload, and role of interpersonal relations and organizational characteristics which include job context and incentives are termed antecedents of burnout in the literature (Cordes and Dougherty, 1993). These antecedents, described below are considered to be precursors to burnout.

2.3.1 Role of interpersonal relations

Most of the systematic research on the concept of burnout has focused on individuals in the helping professions, specifically health, social services and teaching where burnout is typically believed to be experienced due to the high level of arousal from direct, frequent and rather intense interactions with clients. Maslach theorized that potential for emotional strain is greatest for workers in the helping professions because they are constantly dealing with other people and their problems (Maslach, 1978). Jackson and colleagues in their research focusing on the role of client and employee's caseload in contributing to burnout suggested that, caseload be divided into quantitative

and qualitative dimensions (Jackson et al., 1986). The quantitative dimensions include frequency of contact, number of interactions and percent of time spent with clients. As the number of clients increases, the demands on the employee's personal resources increase. If these demands are continuous rather than intermittent, the employee may be vulnerable to burnout (Cordes and Dougherty, 1993). Qualitative dimensions of client caseload include interpersonal distance such as phone contact versus face-to-face contact. Cordes and Dougherty indicate that though the variables are viewed in context of client or service recipient contacts they may provide insight into the generalizability of burnout. Maslach, Jackson and Shirom noted that there are many occupations not included under the rubric of helping professions where interpersonal contacts cause strain, in which employees may be vulnerable to burnout (Maslach and Jackson, 1984; Shirom, 1989). Jackson and Schuler have speculated that managers and supervisors also may experience burnout because they are required to help their employees resolve job-related and personal difficulties (Jackson and Schuler, 1983; Jackson, 1984)

2.3.2 Role Stress

Role Conflict and Role Ambiguity are two components of role stress. According to Cordes and Dougherty, "role conflict occurs as a result of incongruity or incompatibility of expectations communicated to a role incumbent by his or her role senders (Cordes and Dougherty, 1993; Kahn, 1978). Role ambiguity is associated with one's need for certainty and predictability especially regarding one's goals and means of accomplishing them. It may occur if an individual lacks adequate information to accomplish required activities or when the information is not clearly defined or articulated" (Cordes and Dougherty, 1993). Lack of clarity regarding either proper

procedures for performing job tasks; or criteria for performance evaluations result in role ambiguity (Miles and Perreault, 1976). Cordes and Dougherty in their research study on burnout compared the findings of past researchers. It was found that in a Schwab and Iwanicki study, these two variables role conflict and role ambiguity, accounted for a significant amount of variance in the emotional exhaustion and depersonalization dimensions for a sample of 469 teachers (Schwab and Iwanicki, 1982). Brookings and colleagues reported statistically significant relationships between perceived role conflict and role ambiguity and all three burnout components for 135 female human service professionals (Brookings et al., 1985). Fimian and Blanton found both role variables were related to total burnout for a sample of teacher trainees and first-year teachers (Fimian and Blanton, 1987). Cordes and Dougherty found the effect of role conflict and role ambiguity on burnout to be consistent in their comparative studies. These researchers report that the relationship between these two role variables and burnout are not restricted to human service professionals but extend to corporate and industry settings as well (Cordes and Dougherty, 1993).

2.3.3 Role Overload

Burnout was believed to result partially from qualitative and quantitative overload (Maslach & Jackson, 1984). Individuals experiencing qualitative overload feel they lack the basic skills or talents necessary to complete the task effectively. Quantitative overload refers to the individual's perception that the work cannot be done in the allotted time (Kahn, 1978; Pines and Maslach, 1978). In many organizations, this may come about due to resource scarcity and the continual threat of cutbacks (Jackson, 1984). As a result, workers may often be overloaded with cases or clients (Maslach, 1976).

2.3.4 Contingency and noncontingency of organizational outcomes

Organizational characteristics comprise contingency and noncontingency of organizational outcomes and job context (Cordes and Dougherty, 1993). Though contribution of job or task to burnout has been investigated, the question of how variables associated with the organization itself and its policies may affect burnout has received comparatively little attention. Jackson and colleagues studied contingency of organizational outcomes in two ways. First, they examined the role of this variable as a job condition that might contribute to burnout. Next, they examined the role of this variable in the experience of unmet job expectations. In both cases, they did not find any significant relationships (Jackson et al., 1986). Contingencies do not have an effect either as contract clauses with incentives attached or when payment is linked to performance.

2.3.5 Job context

Empirical evidence indicates that specific context affects the incidence of stress and burnout in the workplace (McCarthy and Catano, 1992; Cordes and Dougherty, 1993). The context is characterized by a variety of factors such as subsystem, work shift and psychological environments. A critical factor contributing to burnout may be the nature of the employee-client relationship. If job contexts differ significantly by the types of interaction that characterize them, contexts would be differentially related to burnout.

2.4 Consequences of Burnout

Cordes and Dougherty illustrated the importance of burnout as a practical concern by associating it with negative organizational outcomes and various types of personal dysfunction (Cordes and Dougherty, 1993). In their meta-analytical research, they

compared the consequences of burnout in various fields as illustrated by previous researchers. Though it is indicated that the consequences discussed are not unique to burnout, they illustrate how potentially costly and damaging burnout can be and highlight the importance of better management. In a review of burnout research, Kahill grouped the consequences into five categories such as physical, emotional, interpersonal, attitudinal and behavioral consequences (Kahill, 1988)

Physical and emotional consequences have been linked with a variety of mental and physical health problems such as low self-esteem, depression, irritability, anxiety and fatigue (Maslach and Pines, 1977; Champoux, 2006). Lee and Ashforth found psychological and physiological strain to be associated with higher levels of emotional exhaustion and depersonalization in a study of supervisors and managers from a public welfare agency (Lee and Ashforth, 1990).

The effects of job-related activities on a person's interpersonal relationship received recognition in the early 1980's with the work of Jackson and Maslach. Studies conducted on interpersonal consequences found that links between burnout and work-nonwork conflict have received empirical support (Cordes and Dougherty, 1993; Burke and Deszca, 1986; Jackson and Maslach, 1982). In their studies, Burke and Deszca found that those individuals who reported higher levels of the burnout components reported a greater negative impact of the job demands on their personal lives (Burke and Deszca, 1986).

Attitudinal consequences involve the development of a negative attitude towards the client, job, organization and oneself (Kahill, 1988). Cordes and Dougherty in their meta-analysis of burnout research found that burnout components also have been linked

to lower levels of organizational commitment for public service lawyers (Jackson et. al., 1987) and nurses (Leiter and Maslach, 1988; Cordes and Dougherty).

Behavioral consequences include turnover, absenteeism and decrease in the quality and quantity of job performance (Cordes and Dougherty, 1993). In studies of police workers, Burke and Deszca found that individuals reporting higher levels of burnout components were more likely to report intentions to leave their jobs (Burke and Deszca, 1986). In another study conducted by Firth and Britton, it was found that absenteeism was reported to be higher among nurses with high levels of emotional exhaustion (Firth and Britton, 1989). Maslach and Jackson in their study of public contact employees in a federal service agency found that the burnout components are linked not only to turnover but also to poorer job preparation (Cordes and Dougherty, 1993; Maslach and Jackson (1985)). These instances indicate that burnout has a consequence not only on the individual but also on the organization as well.

To mitigate the effects of stress, several researchers have linked stress to motivation of employees. The following sections review research on motivation. A recent study links burnout and motivation to monitor changes in academy cricket players over a competitive season (Weston and Thelwell, 2007). Similar studies on the relationship between burnout and motivation have been conducted in various fields such as sports, medicine and teaching. In this research, the researcher utilizes the literature available on both burnout and motivation to study their influence on construction project closeout.

2.5 Motivation

Motivation refers to those psychological processes that cause the arousal, direction and persistence of voluntary actions that are goal directed (Champoux, 2006). Pinder defines work motivation as "a set of energetic forces both within and beyond an individual's being to initiate work-related behavior and to determine its form, direction, intensity and duration (Pinder, 1998). This indicates that motivation is a psychological process which is a result of interaction between the individual and environment (Latham and Pinder, 2005). "Motivation is said to be individualistic, intentional and multifaceted (Mitchell, 1982). This indicates that motivation is unique to each individual, under control of the employee and multifaceted in terms of its activation and direction of behavior.

Champoux says that organizations intentionally or unintentionally build "motivation systems." These systems hold assumptions about what affects behavior and which behaviors are important for job performance. Theories of motivation developed by earlier researchers provide tools to analyze an organization's existing motivation system. The motivation theories are differentiated into need theories and cognitive theories. Need theories of motivation use personal characteristics or attributes to explain motivation whereas cognitive theories relate to a person's cognition (Champoux, 2006). In this thesis, emphasis is placed on cognitive theories with focus on goal-setting.

2.5.1 Goal- setting theory

Goal setting theory was formulated by Edwin Locke in the mid 1960's. Locke derived the idea for goal setting out of Aristotle's theory of final causality. According to

Aristotle, action is caused by a purpose; thus, Locke began researching the impact goals have on individual performance (Locke, 2001). Locke's theory of goal setting (1981) deals with the relationship between conscious goals and actual performance (Locke, 1981). The premise of the theory is that the individual's conscious intentions dictate his actions. (Latham et. al, 1975) A goal is defined as what the individual is consciously trying to do. Goldstein (1993) indicates that "goals provide a sense of direction and purpose" (Goldstein, 1993). Locke and Latham (2002) contrary to the management style of most managers who urge their employees to 'do their best'; state that outlining clearly and concisely what is required elicits the required response. "Doing your best has no external referent and hence does not elicit specific behavior." To elicit some specific behavior it is imperative that the person has clear view of expectations. A goal is thereby of vital importance because it facilitates an individual in focusing his efforts in a specified direction.

According to Champoux "goals that are specific, challenging, reachable, and accepted by a person lead to higher performance compared to goals that are fuzzy, unchallenging, not reachable or not accepted. Goal specificity includes what needs to be done, how much needs to be done and the performance period. Goal setting affects behavior through the psychological processes of directing attention, stimulating effort, persisting in the effort and finding ways to do the task well" (Champoux, 2006).

In addition, the theory states that a person's goals mediate how performance is affected by monetary incentives, time limits, performance feedback, participation in decision making and competition. Goals that are assigned to a person have an effect only to the extent that is consciously accepted by the person (Latham and Yukl, 1975). Locke

states that "It is not enough to know that an order or request was made; one has to know whether the individual heard it and understood it, how he appraised it and what he decided to do about it before its effects on his behavior can be predicted and explained." Goal setting theory recommends the following steps to set goals (Champoux, 2006):

1. Specify the tasks, duties and responsibilities.
2. Specify how performance will be assessed. Be specific about the way job performance will be assessed and behaviors that will be part of the assessment.
3. Specify the goal or target to reach.
4. Specify the time span of employee performance.
5. Set priorities among goals. When several goals are set, the more important ones should be distinguished from less important.
6. Specify goal difficulty and goal priority. Achieving goals of low priority is not as high a level of performance as achieving goals of high priority. Locke et al. examined the behavioral effects of goal-setting, concluding that 90% of laboratory and field studies involving specific and challenging goals led to higher performance than easy or no goals (Locke et al., 1981).
7. Review goals for coordination and cooperation with others.

The goal setting steps can produce goals that are specific about the task and the time to finish the task. Stating how performance will be measured and stating the priorities among multiple goals makes a task even more specific. Champoux indicates that "goal setting theory does not view the goal as static. Goals are based on the past and some predictions about the future. As circumstances change, goals might need to change." It is

said that an important element is the ability to change goals after they have been set because the circumstances have changed (Champoux, 2006).

Locke and Latham have distilled four mechanisms through which goal setting is able to affect individual performance (Locke and Latham, 2002):

1) Goals focus attention towards goal-relevant activities and away from goal-irrelevant activities.
2) Goals serve as an energizer; higher goals will induce greater effort while low goals induce lesser effort.
3) Goals affect persistence; constraints with regard to resources will affect work pace.
4) Goals activate cognitive knowledge and strategies which allows employees to cope with the situation at hand. Through an understanding of the effect of goal setting on individual performance, organizations are able to use goal setting to benefit organizational performance.

Locke and Latham have therefore indicated three moderators which indicate the success of goal setting namely goal commitment, feedback, task complexity, employee motivation and macro-economical characteristics. They mention that with respect to "goal commitment", people will perform better when they are committed to achieve certain goals. Goal commitment is dependent on importance of the expected outcomes of goal attainment and on self-efficacy. Self efficacy is one's belief that one is able to achieve the goals. In "feedback", the employee's performance record is tracked, to see how effective they have been in attaining the goals. Without proper feedback channels it is impossible to adapt or adjust to the required behavior. In "task complexity", goals that

are more difficult require more cognitive strategies and well developed skills. The more difficult the tasks ahead, a smaller group of people will posses the necessary skills and strategies. From an organizational perspective it is thereby more difficult to successfully attain more difficult goals since resources become more scarce. With "employee motivation", the more employees that are motivated, the more they are stimulated and interested in accepting goals. When goals are established at a management level and thereafter solely laid down, employee motivation with regard to achieving these goals is rather suppressed (Locke and Latham, 2002). Thereby to facilitate motivation, the employees not only need to be allowed to participate in the goal setting process but the goals have to be challenging as well. Participation increases information about the way the goal can be reached. The information can let employees to discover alternate ways of doing the job (Champoux, 2006). Also, "macro-economical characteristics" have an impact to an extent. The position of the economy in the conjuncture puts pressure or simply relieves the organization. This means that some goals are easier set in specific macro-economical surroundings.

Latham and Yukl reviewed eleven studies to examine the effects of setting specific goals. It was found that ten studies provided strong support that specific goals increase performance and that difficult goals, if accepted, result in better performance. This indicates the effectiveness of goal-setting in organizations (Latham and Yukl, 1975).

The researcher after reviewing literature on organizational behavior shifts focus to closeout to define the process and understand problems related to construction project closeout.

2.6 Project Closeout

It's been said that "Projects proceed smoothly until 95% complete, and then they remain 95% forever" (Bennett, 2003). It has also been said that "if 90% of the effort is expended on the first 90% of the project then, another 90% is expended on the remaining 10% of the project" (Bennett, 2003). According to Westland, more than 90% of the projects fail to conduct a post-implementation review to determine the level of success after completion (Westland, 2006). All these indicate that not enough attention is being paid by project personnel to accelerate "Project Closeout" and that, it also requires an equal if not greater attention as other phases in a project. Some organizations such as the Department of Energy (DOE), and the Facilities Construction and Renovation Department at the Yale School of Medicine have identified the need for formal project closeout procedures. Perspectives on project closeout vary based on project participants. The American Institute of Architects,(AIA Best Practices, 2007) in very concise and in apt terms describes the perspectives of various participants. "To the Contractor, it means resolving the punchlist, reconciling the job cost and collecting the final payment. To the architect it is the satisfaction of the design resulting in a completed project that substantially conforms to the construction documents and functions as intended to meet the client's needs. To the owner, it brings about nervous anticipation and anxiety since the facility will be soon transferred into their hands." Several sources (Yale School of Medicine, 2005; Busansky, 2003; Bennett, 2003; DOE, 2003) indicate that though various definitions are prevalent, there is no well defined process for project closeout.

The Facilities Construction and Renovation Department at Yale School of Medicine defines construction closeout as "the time period between substantial

completion until all punch list items have been addressed and are completed (Facilities Construction and Renovation Department at Yale School of Medicine, 2005)."

Project closeout is considered an important activity during the final phase of the completion of the project. It is the "completion of the contract and related inspection, correction and acceptance of the work" (LA DPW Engineering, 2003). The project closeout and completion phase is often thought of as a project unto itself. According to Bennett, "this phase must be planned and programmed, tasks must be assigned, the phase must be executed effectively and its costs, schedule and quantity must be controlled" (Bennett, 2003).

Busansky refers to closeout as "the process that is verified complete and administratively processed for official closure. Closeout is completed when all administrative actions have been completed; all disputes settled and final payment has been made" (Busansky, 2003) This aligns with an MSU study where Abdelhamid et al., defines MSU closeout processing times as T_1 and T_2 where T_1 represents the time from substantial completion to contractor's final payment and T_2 represents time from final payment to owner's internal closing of all accounts (Abdelhamid et al., 2007).

The Department of Energy, DOE indicates that "closeout begins at beneficial occupancy or project termination, and is complete after all the physical, regulatory, contractual and financial closeout activities are complete." DOE defines "physical closeout as those activities remaining after the user accepts the project; contract closeout includes each project contract and subcontract" (DOE, 2003). Regulatory Closeout for required projects is defined by the DOE as those projects which comply with regulatory requirements and financial closeout includes reviewing of closing statement of cost,

authorizing the release of excess funds and preparing the project final cost report for the project (DOE, 2003). Fig 2.2 shows the interrelation of physical, contractual, regulatory and financial closeout in the DOE closeout process. DOE indicates that "closing a project is a time of emotional and user satisfaction. It is the time when necessary steps are taken to ensure that customer, user, project team members and contractors are treated properly and all loose ends on the project are completed" (DOE, 2003).

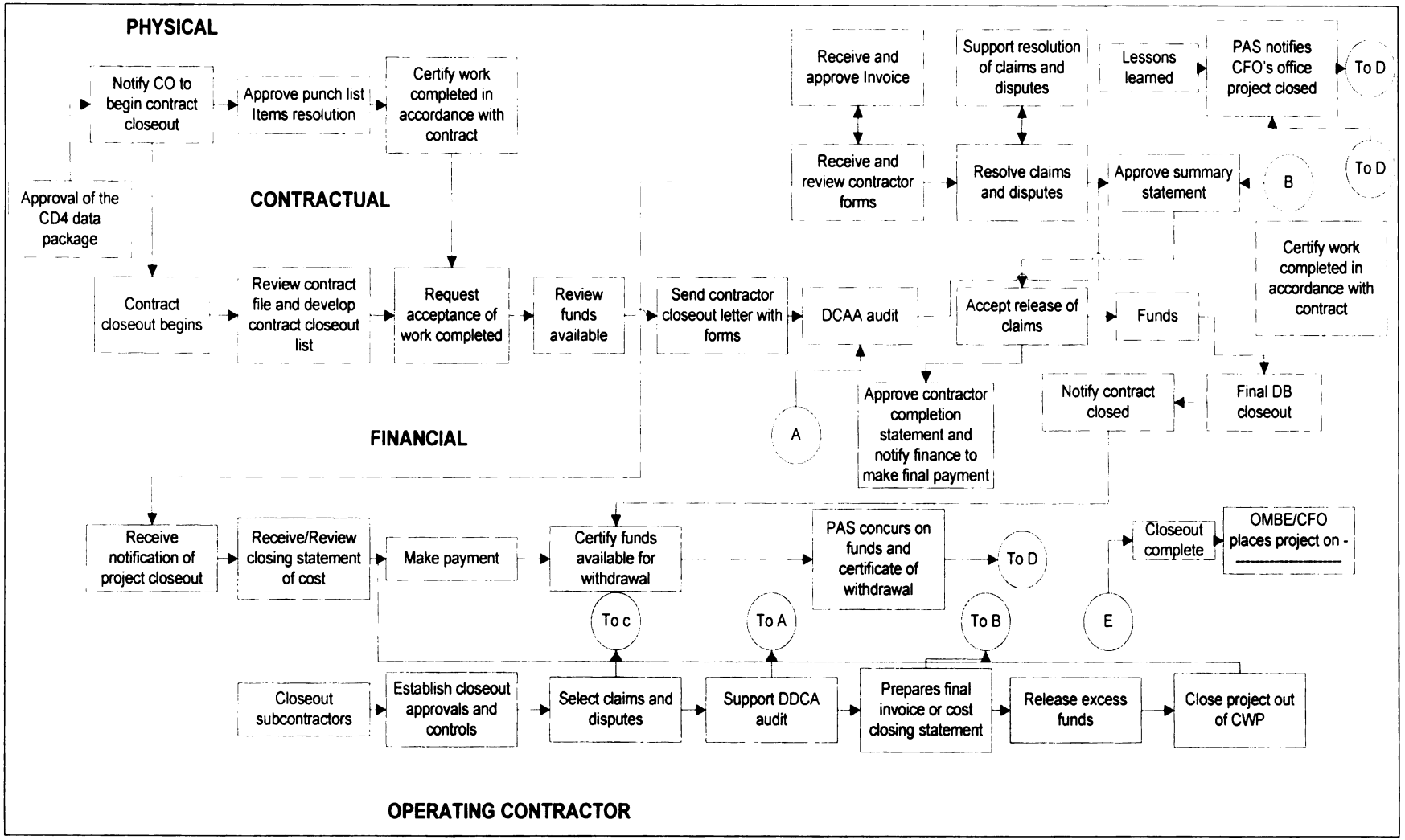

Fig 2.3 Closeout relationships
(DOE, 2003)

2.7 Project Closeout Activities

Bennett indicates two main categories that overlap and interact throughout the phase. Sometimes these activities occur concurrently in the closeout phase (Bennett, 2003). These categories include-

1. Completing the work which includes physical activities that must be accomplished on the site.
2. Administrative closeout which mainly involves the multitude of required documents and paperwork issues.

Completing the work mainly includes testing and startup, cleanup, punch list completion, inspection and corrective work whereas administrative closeout includes payment to subcontractors, waivers of lien and request for final payment (Bennett, 2003). Along with all the activities described above, at the time of project closure, the contractor is required to provide and maintain documents such as as-built drawings, operating and maintenance manuals (O & M's), warranties and other records. These documents form part of the information exchange between owner, contractors and subcontractors. In some cases, contractors are also required to provide training for maintenance personnel before handing over the operations of various equipment.

2.7.1 As-built drawings

Producing and furnishing as-builts are an integral part of contract closeout and they are generally maintained by the contractor (Bennett, 2003). As-builts represent a set of record drawings that depict the actual locations, dimensions and features that are different from the original contract drawings. They are used to show the finished

condition of the work as it was actually constructed and accepted. The process requires that any change that modifies the original work be incorporated over a separate set of drawings maintained just for that purpose (Pettee, 2005). Pettee indicates that the change documentation may include incorporation change orders, field orders, value engineering agreements and sometimes responses to Requests for Information (RFI).

As-builts are considered to be an important part of contractor's scope of work. They are often neglected until the end of the project when they are really needed. Pettee indicates that this neglect mainly occurs due to the fact that there are several other activities occurring at the same time and during that stage, documenting as-builts takes a backseat. As-builts are treated as an administrative obstacle, among many others needed to close a project. They are generally the last submittal to be processed.

As-builts play a very important role as these record documents contain all the latest pertinent information required for all the project parties. According to Pettee, they act as a one-stop repository of all directed changes. Theoretically, these are the set of drawings that all the subcontractors are supposed to refer to as the work progresses. After the construction of the facility, they depict what was actually built. They also aid the owner during future renovation or demolition of a facility.

As-builts though important, are not updated regularly due to either a lack of motivation or a full understanding of what is ultimately expected of them or both (Pettee, 2005). There is also the perception of not being paid for the effort which has also led to neglect of as-built drawings.

It is necessary and convenient for the contractor to update the as-built drawings regularly as the project proceeds as it will not only aid contractors but will help

subcontractors as well. Updating as-builts regularly will help in preventing final payment delay as contractors are required to submit as-built drawings to the owner in order to receive final payment (Bennett, 2003)

2.7.2 Operation and Maintenance Manuals (O & Ms)

Operation and maintenance manuals provide information necessary to perform installation, test, operate, adjust and repair equipment. O & Ms are necessary for effective operation and maintenance and are critical to long term viability of any project.

Operation and maintenance manuals are usually required to be furnished by the contractor in accordance with contract terms. The contractor is responsible for assembling all O & M's provided by manufacturers. The main effort involves gathering and organizing documents as they are received from manufacturers (Bennett, 2003). Various operation and maintenance manuals are gathered and transferred to the facility's operating and maintenance personnel at the time of project closeout. Like as-built drawings, a contract requires that these drawings be furnished in complete form prior to final payment (Bennett, 2003).

2.7.3 Records archiving and transfer

Bennett maintains that project records form an essential part of a project history and are required for operation and maintenance of a facility (Bennett, 2003). Contractors are required after completion of a project to maintain records and correspondences of the project for future reference by the contractor's own personnel. This provides historical data for future projects.

In addition to the archiving of records, the contractor also has an obligation to transfer the required documents to the owner or the design professional in an organized

and complete manner. As mentioned by Bennett, these documents include O & Ms, as-builts, certificates, progress photographs, materials and testing inspection results and any other documents required by the contract.

At Michigan State University (MSU), the contractor has to submit all documents mentioned in a 'final payment/closeout checklist' which provides a list of all the documents that have to be submitted prior to the final payment of the contractor. A university representative within the university ensures the submittal of all the required documents before the project is closed completely (Abdelhamid et al., 2007).

2.7.4 Warranties

The term "warranty" in construction contracts indicates the obligation that the contractor assumes for repairing defects in the work for a specific period of time after substantial completion of the facility (Bennett, 2003). Warranties are provided to the owner before final completion of a project. The AIA-A201, defines warranty as "general representation by the contractor that materials, equipment and workmanship will conform to the good quality standards and requirements of the contract documents." The warranty period as mentioned in AIA-A201 is typically for one year and commences at the time of substantial completion of the facility (AIA-A201, 1997)

2.7.5 Post-project analysis

After completion of the project, a post-project analysis should be conducted by contractors internally in order to realize the lessons learned from a project. This aids contractors in their assessment and management of future projects. It is considered to be the most neglected aspect of the project as there is pressure on the contractors to move ahead to the next job rather than look backward to the work already completed (Bennett,

2003). Some of the topics suggested by Bennett include personnel and labor relations, construction methods and on-site coordination, safety issues, subcontractor performance, fabrication and delivery matters, cost control, schedule issues, owner and design professional relationships, and the quality of the project, its components and systems. The "lessons learned" process will help in building the firm's intellectual capital. The AIA Best Practices, indicates that at the end of each project, the firm should collect all the lessons learned from project team members and incorporate them to improve the firm's processes (AIA Best practices, 2007).

A written report by the project manager which is a compilation of all the analyses of various project personnel will serve as a good historical record for the contractor, prevent recurring mistakes and help in continuous improvement (Bennett, 2003). The lessons learned can be compiled by the organization and used as a "knowledge-based" system for future purposes.

All the above activities are important steps which occur either concurrently or one after the other during the closeout phase (Bennett, 2003).

2.8 Responsibilities of various project personnel

In order to understand the project in its entirety, it is necessary to understand who the project participants are, and their roles and responsibilities in making a successful project. With regard to this, several organizations including the Associated General Contractors (AGC), American Institute of Architects (AIA), and many major universities such as Penn State University, and the University of Wisconsin have outlined certain responsibilities for project team members in order to close a project effectively. Division

of responsibilities by project personnel ensures smooth flow during closeout and saves project time and money (Penn State University, 2006; University of Wisconsin, 2007)

AIA and universities such as Penn State University and the University of Wisconsin outline some of the responsibilities for owners, contractors, subcontractors and design professionals at the time of project closeout (Penn State University, 2006; University of Wisconsin, 2007). These responsibilities originate from the time of substantial completion and end at final completion of a project. The researcher has integrated the roles and responsibilities of project personnel from these sources and identified them in Table 2.1 below.

Table 2.1 Roles and Responsibilities of project personnel
Adopted from AIA, 2007; Penn State University, 2006; University of Wisconsin, 2007

Responsibilities	Roles
Responsibility of the Owner	Creation of the punchlist along with contractor and design professional Training and orientation Accept O & M's manuals from contractor Distribute O & M's to project manager Distribute warranties to project manager and other concerned personnel
Responsibility of the Contractor	Request for substantial completion inspection in order to create a punchlist Completion of all punchlist items created along with owner and design professional Deliver O & M's to the user Submit as-built drawings Ensure testing and balancing is complete Ensure all the inspections are complete Installation of owner furnished equipments if any Request for final inspection Submit warranties to owner Perform a post-construction evaluation

Table 2.1 continued	
Responsibility of the Subcontractor	Complete punchlist items Deliver O & M manuals to contractor Deliver shop drawings to contractor
Responsibility of the Design Professional	Create a punchlist at the time of substantial completion Ensure completion of punchlist items by contractor
	Receive as-builts from contractor Receive warranties of equipment from contractor

2.8.1 Role of Contractors and Subcontractors

AGC indicates that final completion of a project and acceptance of project by the owner should be the ultimate goal and that project closeout procedures must be integrated into all phases of the project. In its "Guideline on Project Closeout" AGC indicates that, both contractors and subcontractors must work in tandem to accomplish the project closeout objectives which are as follows (AGC et al., 2003):

- Assure the owner and the A/E that all work on the project will be completed in a timely manner and in accordance with the contract documents.
- Cause the owner to provide the general contractor a positive incentive to complete the work properly or ahead of time by providing prompt and proper payment for work satisfactorily performed.
- Prevent multiple punch lists through effective communication with all the parties and timely inspections.

The researcher has developed a process map from the AGC guidelines (AGC et al., 2003) depicting the steps involved during construction closeout and it is included in Fig 2.2. Similar to AGC, AIA Best Practices indicates six critical aspects with respect to

project closeout. One is the use of checklists which gives a logical sequence to complete tasks in closeout. AIA Best Practices states that, this logical sequence disappears in the final 10% of the project (AIA Best Practices, 2007). Second, is not allowing anyone to work on anything which is not in the checklist. Anything beyond the checklist will act as a distraction resulting in incomplete and unfinished work of the actual items and will also be a strain on the project budget. AIA Best Practices indicates that, in order to keep the focus of all personnel on project closeout frequent meetings should be conducted. Third, the firm's intellectual capital can be built through "lessons learned" processes. Fourth, is safeguarding project records so that they are easily accessible to the company even years after completion of the project. Fifth is asking for a referral from the client to ensure in writing that the project was successful. The last suggestion is to plan for project completion party at the beginning of the project and allocating budget to it, to motivate the team to look forward to project success.

Sometimes, though projects reach substantial completion according to schedule, there are an inordinate number of delays during closeout. Valovcin, in his research on naval project closeout cites some of the causes for untimely closure of projects which are briefly described below (Valovcin, 1995).

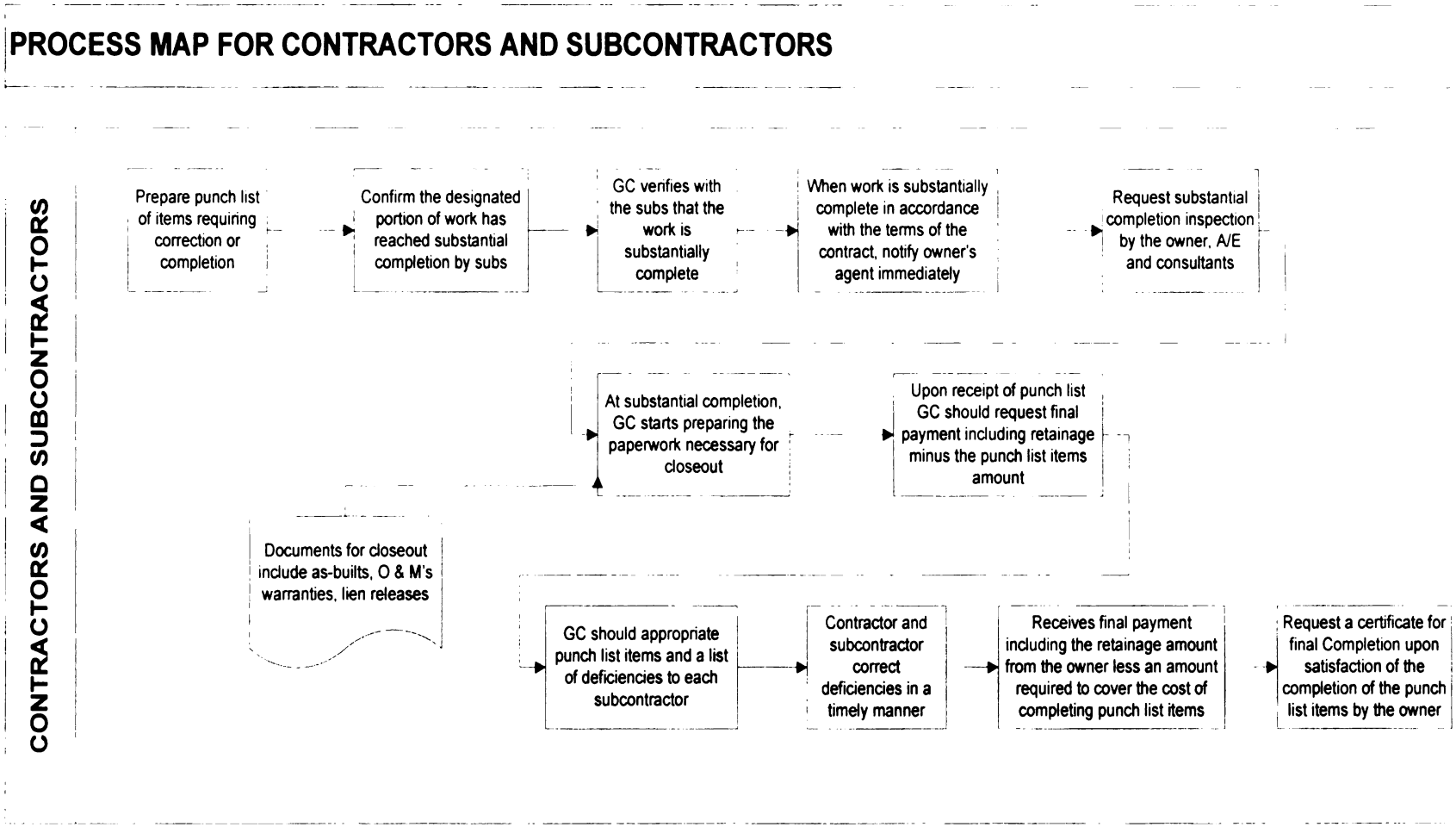

Fig 2.4 Closeout process map for contractors and subcontractors
Adopted from Associated General Contractors of America (AGC et al., 2003)

2.9 Causes of Untimely Closeout

Closeout is a final and important phase in the lifecycle of a project. A delay in this phase leads to delay in the final completion of the project thereby resulting in monetary and relationship losses. Each project has its own history in terms of why a delay was caused during closeout of a project. The DOE and Valovcin discuss some of the reasons that have led to prolonged and lengthy closeout time (DOEa, 2005; Valovcin, 1995). Firstly, after substantial completion of a project, when the owner can actually use the facility for its intended purpose, the pressure to complete the project reduces and there is little or no incentive to close the project on time. During this phase, since project personnel will be moving on, enough personnel may not be assigned to completely close the project. The main staff who are closely related to the project would have moved on and new staff assigned would be unaware of the history of the project. It becomes a daunting task for newly assigned people to piece together whatever remains, complete file documentation and deal with the administrative burden of closing out the project. Issues that seemed complete look less so to the newly arrived, and finding the party or parties that have first hand knowledge of hazier details gets more difficult with time (Criss, 2005).

Some of the other factors indicated as causes of untimely closeout include lack of management attention to closeout, poor management information systems to monitor contract closeout processes, poor coordination among project teams, lack of closeout checklists, low priority in organizations, inaction by contractors and subcontractors and lack of internal controls (DOEa, 2005; Valovcin, 1995). Although project closeout is considered important by some organizations, there is no well defined process which

would aid in effective closeout. All these lead to inefficiency and delay in closeout and increase burnout of project participants and have led to inefficiency.

Organizational behavior factors and project closeout were described in the previous sections of this chapter but in order to identify and analyze factors of organizational behavior in the closeout data; Grounded Theory was adopted and is described below.

2.10 Grounded Theory

Grounded theory is a systematic qualitative research methodology in the social sciences emphasizing generation of theory from data in the process of conducting research (Charmaz, 2006; Glaser, 1992; Strauss, 1987). This theory was developed by Barney Glaser and Anselm Strauss and has its origins in organizational or professional settings (Martin and Turner, 1986). Grounded theory contradicts the traditional model of research, where the researcher chooses a theoretical framework, and only then applies this model to the studied phenomenon (Allen, 2003). It is a research method that operates almost in a reverse fashion to traditional research and at first may appear to be a contradiction of the scientific method. Rather than beginning by researching and developing a hypothesis, a variety of data collection methods are the first step. Table 2.2 depicts the four stages of analysis in this theory. From data collected as an initial first step, key points are marked with a series of "codes," which are extracted from the literature. The codes are grouped into similar "concepts," in order to make them more workable. From these concepts "categories" are formed, which form the basis for the creation of a "theory", or a reverse engineered hypothesis. "Theory" forms a core stage

and emerges from a constant comparison of data. "All is data" is a fundamental property of Grounded Theory and includes both literature and interviews (Glaser, 1998). This process of comparing data is termed as "memoing." Glaser asserts that "memos are important tools to both refine and keep track of ideas that develop when comparing incidents to incidents and then concepts to concepts in the evolving theory. In memos, ideas are developed about naming concepts and relating them to each other. In memos, relationships are established between concepts in two-by-two tables, in diagrams or figures or whatever makes the ideas flow, and generate comparative power. Without memoing, the theory is superficial and the concepts generated not very original. Memoing works as an accumulation of written ideas into a bank of ideas about concepts and how they relate to each other. This bank contains rich parts of what will later be the written theory."

Table 2.2 Four stages of analysis
(Charmaz, 2006, Glaser, 1992; Strauss, 1987)

Stage	Purpose
Codes	Identifying anchors that allow the key points of the data to be gathered
Concepts	Collections of **codes** of similar content that allows the data to be grouped
Categories	Broad groups of similar **concepts** that are used to generate a **theory**
Theory	A collection of explanations that explain the subject of the research

Grounded Theory is said to be well suited when dealing with "qualitative data of the kind gathered from participant observation, from the observation of face to face interaction, from semi-structured or unstructured interviews, from case-study material or from certain kinds of documentary sources" (Martin and Turner 1986).

This researcher applied Grounded Theory to closeout data because it provides a formal process for evaluating qualitative information rich data. Organizational behavior formed the key emphasis examined in the closeout data obtained from interviews and the COAA workshop. The data was grouped and categorized based on organizational behavior literature. The categories were based on role stress, role overload, role of interpersonal relations, burnout, job context, and incentives. These categories were compared to the literature to identify common themes and generate recommendations for closeout relative to organizational behavior. This process of comparing data is termed "memoing" and was achieved during analysis (described in chapter 4) through the use of figures, tables and graphs.

2.11 Chapter Summary

This chapter reviews literature of two independent topics including organizational behavior and project closeout. In the review of Organizational behavior, concepts such as stress, burnout, role stress, role overload, role of interpersonal relations, job context, incentives, motivation, and goal-setting theories were examined. Project closeout literature includes a definition of the closeout process and roles and responsibilities of the project parties. The relation between organizational behavior and project closeout is explained in Chapter 4 of this thesis through the principles of Grounded Theory.

CHAPTER 3

METHODOLOGY

3. METHODOLOGY

This chapter outlines the methodology that was used for this research. The researcher evaluated available data based on the principles of "Grounded Theory" (GT) proposed by Barney Glaser and Anselm Strauss (Charmaz, 2006; Glaser, 1992; Strauss, 1987). Data was obtained by a research team at MSU from contractor, subcontractor, and owner interviews, and a COAA closeout workshop (Abdelhamid et al., 2007). The interviews were conducted as part of a project titled "Assessment and Improvement of Construction Project Closeout at Michigan State University" (Abdelhamid et al., 2007).

3.1 Methodology

Fig. 3.1 depicts the methodology that was used for this research and includes the following primary activities:

1. Definition of the project, identification of needs, goals, and objectives of the research.
2. Literature review of organizational behavior and project closeout.
3. Development of interview questionnaires to address existing closeout processes (Abdelhamid et al., 2007).
4. Extraction of data from the interviews conducted of owners, contractors and subcontractors to understand their perspective on closeout and ascertain dominant causes of closeout delays (Abdelhamid et al., 2007).
5. Identification of organizational behavior factors in the data obtained from interviews and COAA closeout workshop. This step in Grounded Theory is referred to as "codes."

6. Collection of "codes" of similar content that allowed the data to be grouped in order to recognize "concepts."
7. Data obtained from interviews and the COAA workshop were "categorized" into different organizational factors to generate a "theory."
8. "Theory" was developed by constantly correlating literature on organizational behavior factors to the responses obtained from interviews to recognize causes of delays and to develop strategies for improvement. This process of comparing data termed "memoing" was achieved in this research through the use of figures, tables and graphs.
9. Development of recommendations through further comparison of motivation theories and interview responses.
10. Approval from the MSU Institutional Review Board (IRB) was obtained and proof of concept interviews with contractors and subcontractors were conducted in order to review the recommendations and to gain feedback regarding their correctness and usefulness.
11. Revision of recommendations to incorporate input obtained from the proof of concept interviews with contractors, and subcontractors.
12. Preparation of a summary of the research.

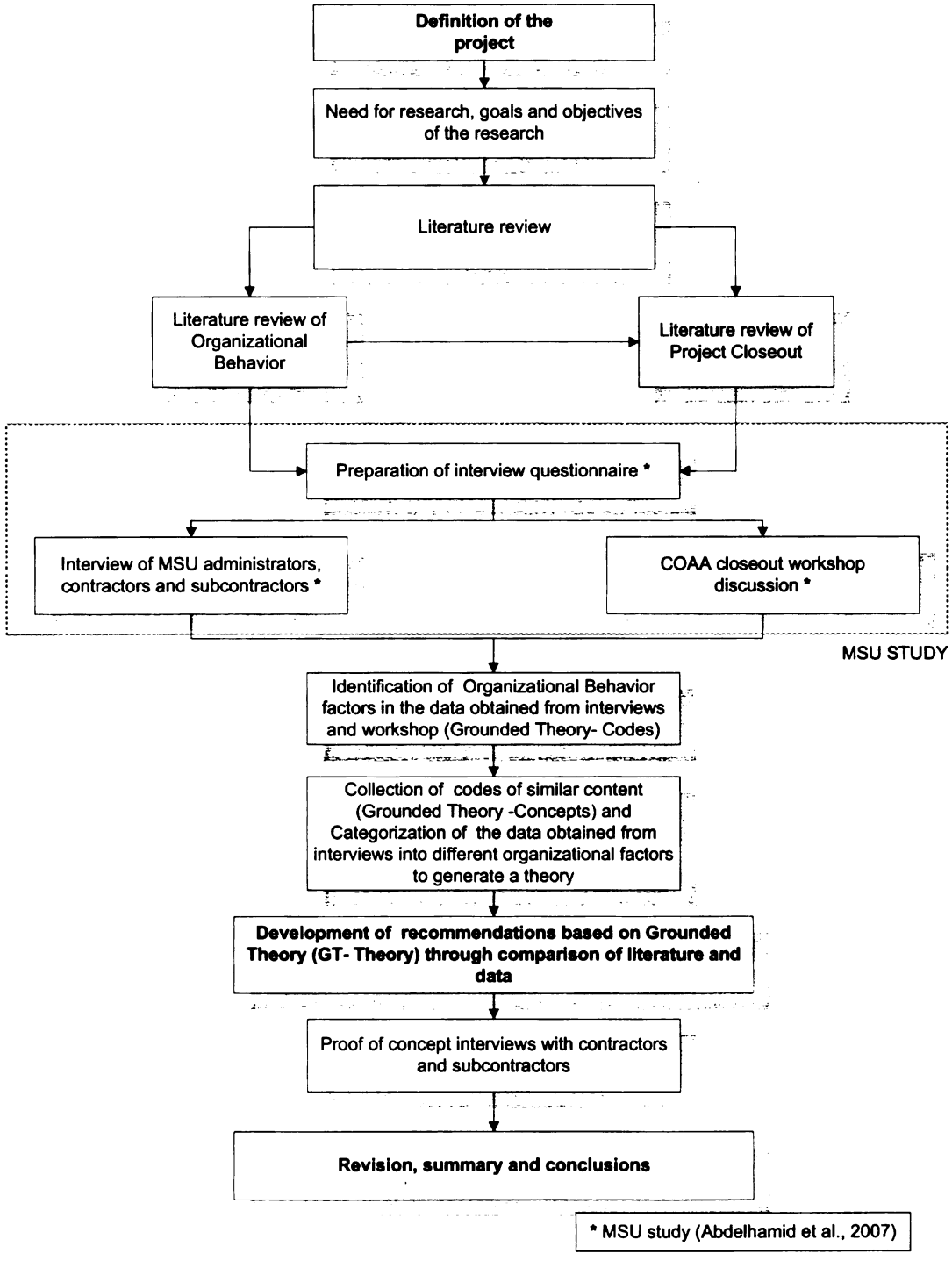

Fig 3.1 Methodology of Research

3.2 Data from the MSU study

The raw data for this research was obtained from interviews conducted for the research project titled "Assessment and Improvement of Construction Project Closeout at Michigan State University" (Abdelhamid et al., 2007). The researcher revisited this database to identify responses related to organizational behavior.

As part of the interview process for the MSU study, twenty one MSU administrators, eight contractors, four subcontractors, two architects and personnel from four other universities were interviewed to understand their current processes. In this current research, the researcher evaluated only the contractor and subcontractor responses along with responses from the COAA closeout workshop. Contractors and subcontractors were chosen from the list generated by an MSU closeout research Oversight Committee. The Oversight Committee consisted of operations and administration staff from Physical Plant, Housing and Food Services, and Capital Planning and Administration. The research team selected the interviewees based on their availability and their willingness to share their information. The selected interviewees were not disclosed to the Oversight Committee. The interviewees were contacted by phone and appointments were set up based on their convenience. At least two members from the research team met them personally at their respective offices to conduct these interviews.

3.2.1 Preparation of Interview Questionnaire

The interview questionnaire was an important tool which aided the research team in its quest for data. It addressed two research topics mainly project closeout and vendor performance. This researcher was involved only in the development of project closeout

questions. A rough draft of the questionnaire consisted of 150 questions which later were reduced to 42 questions. The interview questionnaire covered various aspects of owners', contractors' and subcontractors' processes such as organization structure, project management and closeout. It focused on their perception of closeout - whether contractors and subcontractors perceive closeout to be a problem in their organization, their prevailing process at the time of project closeout, dominant causes which have led to delay in closeout, time consuming steps, timeframe for closeout, and any strategy they might have implemented for effective project closeout.

After final review and editing by the research team, the interview questionnaire was sent to MSU's Institutional Review Board (IRB) for review and approval. MSU's IRB is responsible for the protection of individuals who are the subjects of research (IRB, 2007). IRB review ensured that the questionnaire was in compliance with its ethical and safety procedures.

Prior to the interviews, the IRB approved questionnaire was tested in an interview setting with one of the members of the Oversight Committee to determine its duration and also to receive positive feedback on the questions and the interview process itself. The feedback obtained was considered and adopted during the interviews of owners, contractors and subcontractors. Based on the pilot interview, an actual timeframe of 90 minutes was set for these interviews.

3.2.2 Interview of Owners, Contractors and Subcontractors

Based on the list generated by the oversight committee, the interviewees included mainly MSU administrators and staff, contractors, subcontractors and architects involved in projects at MSU. Before each interview, a consent form was read and signed by both interviewer and interviewee. The consent form developed by the research team maintained confidentiality and was in accordance with MSU's IRB submitted protocol. The interview questionnaire for the external and internal parties followed a similar pattern; however, the contractor and subcontractor questionnaires had an additional section which addressed MSU construction processes. The consent form and the interview questionnaire are included in appendices I, II, and V.

The average duration of the interviews was 90 minutes and generally, two members from the research team were present during these interviews. While one member interviewed the subjects, the other made detailed notes which were later transcribed in an MS-Excel® spreadsheet. The response spreadsheets developed as a result of these interviews were used as data by this researcher. Though the interview addressed several topics, the responses to the following questions were considered to identify and code them into respective organizational behavior categories:

- What is your company's definition of construction project closeout?
- Can you outline for us the basic steps and activities in the project closeout process? Are these project closeout activities identified in the construction schedule?
- Do incentives exist within your firm to quickly and effectively closeout a project?
- Is project closeout perceived as a problem by the contractors? If so, why?

- What are the most difficult or time consuming steps in the project closeout process? Why?
- Have you drawn any conclusions with respect to the dominant causes of slow project closeout process times (punch list, quality of design documents, etc.)? What are they?
- In your opinion, what are the main causes of slow completion of punch list items or end of project administrative tasks such as record documents, turning over operation and maintenance manuals, etc, by contractors?
- Do contract clauses have an impact on overall project closeout?
- Does retainage, or the threat of holding retainage, affect the project closeout process?
- In your opinion, what motivates contractors to work for timely project closeout?
- Based on your work with other large owners, what organizational traits influence timely and effective project closeout?
- Describe effective project closeout techniques performed by subcontractors or vendors you have observed.
- What incentives or measures have you seen used on projects (or department) that can help lead to quickly closeout a project? If none exist, what incentives do you feel would be effective?

The data was analyzed based on the principles of Grounded Theory and is presented in Chapter 4 of this thesis. Through the interviews, the researcher was able to gather information on the dominant causes of delay and the most time consuming steps during closeout.

3.2.3 Construction Owners Association of America (COAA) Survey and Project Closeout Workshop

The researcher also considered responses from attendees of a project closeout workshop in order to expand the range of the study. The "Project Closeout" workshop was part of the Construction Owners Association of America (COAA) Spring Conference 2007 held on May 9 in New Orleans. Workshop attendees consisted mostly of owners and several contractors and subcontractors. The 39 attendees were divided into nine workgroups during the workshop session. A consent letter was signed by the workshop attendees prior to commencement. The workshop began with a presentation of preliminary results of a construction project closeout survey of COAA members which was later followed by a discussion related to closeout causes and strategies. This survey consisted of an interview questionnaire similar to that of contractors in a format which was prepared and posted online by the research team two weeks prior to the workshop. Data was analyzed beforehand and presented during the workshop. The reasons for delay in project closeout, main causes and improvement strategies were addressed by the workgroups.

Four pertinent questions were raised for which a discussion followed as part of a "barn raising" session. These questions were:

- What are the critical factors that affect the project closeout process?
- How does the relative impact of these factors rate with respect to the likelihood of project delays?

- What upstream actions during the programming design and construction phases might be taken to reduce the impact of the identified factors on project closeout process?
- Building on our knowledge of effective contractual systems and team processes, what integrated approach can be developed that leads to better project closeout, hence more successful construction projects?

The groups reported their responses and discussions ensued for each of the questions. For the first question, the critical factors that were listed by all the groups were further rated by the attendees. Based on the rating given to these factors, the research team picked the 10 most important factors. Similarly, strategies to improve closeout were also discussed during the workshop session. Through this session, the research team was able to observe significant factors which impact closeout. The final workshop responses were summarized and used by this researcher as data. Analysis of this data is presented in Chapter 4. Although several pertinent factors were discussed, this researcher placed emphasis on discussions relating to the causes for delay in closeout and strategies for improvement.

3.3 Analysis of responses from Contractor and Subcontractor interviews and the COAA closeout workshop

The interview response spreadsheets and summarized workshop responses obtained from the MSU study (Abdelhamid et al., 2007) were used as data by this researcher. Data was analyzed based on the principle of Grounded Theory proposed by Barney Glaser and Anselm Strauss. Grounded Theory (GT) has its origins in

organizational or professional settings (Martin and Turner 1986) and is a systematic qualitative research methodology in the social sciences emphasizing generation of theory from data in the process of conducting research. (Charmaz, 2006; Glaser, 1992; Strauss, 1987) This researcher followed the four steps for analysis suggested in Grounded Theory: Codes, Concepts, Categories, and Theory.

The data which included responses of interviews and COAA workshop session was coded by identifying those responses that relate to organizational behavior. The codes consisted of anchors that allowed key points relating to organizational behavior in the data to be gathered. These codes were collected in a separate spreadsheet. This is termed "concepts" in Grounded Theory. They were further broadly grouped into various categories. Categories derived from the literature relating to organizational behavior included role stress, role overload, role of interpersonal relations, burnout, job context, and incentives. Categories that emerged from the data were then compared to the literature on factors of organizational behavior. Through this process of comparison termed "memoing," causes of delay with respect to organizational behavior factors emerged. A further comparison of strategies suggested in the data with motivation theory, resulted in the development of recommendations. This complete process of constant comparison in order to understand causes and develop recommendations is termed "theory" in Grounded Theory.

3.4 Proof of Concept

To practically evaluate the developed recommendations and test their workability in practice, the researcher conducted "Proof of Concept" follow-up interviews with contractors and subcontractors. For this purpose, all contractors involved in the first MSU closeout study were contacted. Based on availability, four were selected for follow-up interviews. Questions were targeted towards improvement of factors in an organization to provide seamless exchange of information during construction project closeout. The proof of concept questions are presented and discussed in chapter 5 of this thesis.

3.5 Chapter Summary

In this chapter, the researcher has laid out the steps that were followed in conducting the research. It briefly describes the interview process and workshop session of the MSU study (Abdelhamid et. al, 2007) and the method of analysis of the data that lead to an understanding of the causes of closeout delays and development of recommendations in order to provide seamless exchange of information during closeout. The data and its analysis are discussed in chapter 5.

CHAPTER 4

DATA ANALYSIS

4. DATA ANALYSIS

This chapter presents the data and the analysis used to draw conclusions by the researcher about how organizational behavior impacts closeout. In conducting the analysis, interview responses were compared to the literature presented in chapter 2 using the principles of Grounded Theory. Figures, tables, and graphs were used as a basis for comparison in this chapter. All these form a part of the "memoing" process in Grounded Theory which was described in section 2.10.

4.1 Analysis of Interview responses

In order to understand whether closeout is a problem from available data, contractors and subcontractors were asked "Is Project Closeout perceived as a problem?" Eight out of twelve contractors and subcontractors indicated that they perceive closeout to be a problematic and time-consuming step in a project. This is depicted in Fig 4.1 below. To understand the reason for this perception in terms of organizational behavior, the researcher analyzed the data relating to causes for slow closeout and identified key points relating to organizational behavior.

Using the principles of Grounded Theory, the key points which are termed codes in Grounded Theory were collected, grouped in a spreadsheet and categorized into different factors of organizational behavior. Tables 4.1 to 4.9 depict these categorizations. These categories were further compiled in Table 4.10 and organizational factors obtained through the interviews were compared to the literature to arrive at conclusions and develop recommendations.

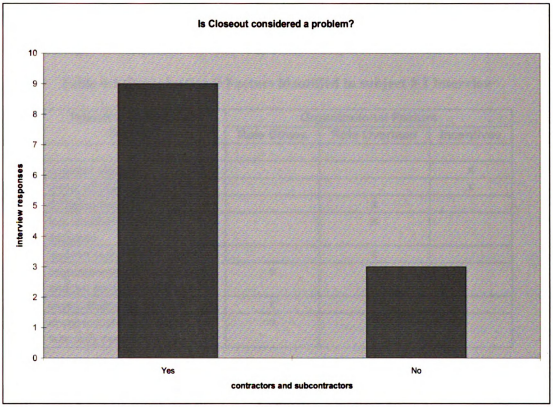

Fig 4.1 Contractor and subcontractor responses

4.2 Subject 1 Interview responses

This interview was of a commercial contracting organization which was involved in institutional projects such as schools, universities, hospitals, offices, and other infrastructure with dollar value of projects ranging from $30,000 to $23 million. In this organization, closeout for a project was defined by its specifications and included documentation that varied based on the requirement of owners and designers. The basic closeout steps included collection of O & M manuals after 50% of project completion, test reports, and collection of second set of shop drawings for owner's documentation. These steps along with major milestones are outlined in scheduling software. Closeout was perceived as a problem by this organization and informally there are internal reviews

conducted after completion of projects. The researcher in the following paragraph identifies organizational behavior factors and later compares them to the literature.

Table 4.1 Organizational Factors identified in subject # 1 interview

Interview Responses (causes)	Organizational Factors		
	Role Stress	Role Overload	Incentives
contract clauses			x
threat of holding retainage			x
different team		x	
less number of people assigned		x	
project team's focus shifts		x	
requirements are boilerplate and not project specific	x		
expectations are unclear	x		
disagreement over the warranty period	x		

During construction project closeout activities of Subject 1, contract requirements are broken down into manageable parts. In the literature, one of the motivation theories, the goal-setting theory indicated that tasks, duties and responsibilities should be specified (Champoux, 2006). Locke and Latham further reinstated that outlining clearly and concisely what is required elicits the desired response (Locke and Latham, 2002).

Further, the interviewee indicated that there are no incentives to close a project on time. Jackson and colleagues examined incentives and burnout with respect to job condition and job expectations and found that incentives did not have a significant impact on burnout (Jackson et al., 1986). Contrarily, the interview indicated that contract clauses and threat of holding retainage impact project closeout by motivating project personnel to work towards final completion. Along with the above mentioned factors, the interviewee indicated that staffing problems arose when the number of people dedicated to this phase was low or when personnel actively involved during a project moved on to another

project after substantial completion. The most difficult and time consuming steps listed included pursuing people for information, researching items that were unique, unclear closeout items at the front end, and extra extension of warranty period.

Overall, the interview stressed the importance of assigning tasks and responsibilities and also using project specific checklist instead of boilerplate checklists.

4.3 Subject 2 interview responses

Subject 2 interview responses were from a contracting organization that specialized in institutional projects, historic preservation, hospitality, K-12 projects with dollar volume ranging from $5 million to $100 million. Project Closeout in this organization was defined as when project requirements were completed in accordance with the contract documents, final invoice submitted, warranties provided, and final payment was being released. Closeout was considered at the pre-construction stage where the owner's criteria were established with follow-up at each stage of percentage completion. The schedule included a line item for closeout where submittals were approved, O & M manuals requested and training documents prepared. The closeout time in this organization was approximately 30 to 90 days from substantial completion. This was monitored by senior management in the organization both financially and operationally and a closeout log was maintained which was generic or project specific based on the project. Along with this log, project management software was used to track and verify closeout documents. Closeout was not perceived as a problem but recognized as a phase that may add scope.

The most difficult and time consuming steps as indicated included receiving and reviewing O & M manuals, preparing and coordinating as-built drawings with subcontractors. Staffing decisions seemed to be the dominant cause of slow closeout. It was indicated that there was less motivation among project personnel to completely close a project during this phase.

Strategies suggested included decentralization and autonomy of project representative, and use of knowledgeable personnel to enable faster decision-making during a project. Proactive behavior from subcontractors and a good understanding of closeout requirements were said to aid in effective closeout. The above factors stressed commitment that most organizations need to undertake to improve their closeout process. Table 4.2 depicts the organizational behavior factors that were identified in this interview.

Table 4.2 Organizational Factors identified in the interview

Interview Responses # 2 (causes)	Organizational Factors		
	Role Stress	Role Overload	Incentives
less motivation			x
different team		x	
less number of people assigned		x	
shift in project team's focus		x	
lack of responsible, knowledgeable personnel		x	
lack of autonomy		x	
lack of decentralization		x	
clear and accurate O & M's not obtained	x		
preparing and coordinating as-built drawings with the subcontractors	x		

4.4 Subject 3 Interview Responses

This commercial contracting organization was involved in construction and renovation projects such as schools, banks, universities, community colleges, dorms, manufacturing and others with dollar volume ranging from $500,000 to 13 million. Project closeout, though considered at the beginning of a project; actively commenced with use of a facility by the owner whereupon all O & M's were collected and turned over to the owner. A closeout process which included a list developed from specifications was passed on to subcontractors. This process was identified in the schedule as several line items. Incentives to complete closeout early were through profit-sharing where every project member had a stake in their project.

The most difficult and time consuming step for this organization indicated was ensuring that subcontractors read and understood the specifications completely. One of the dominant causes indicated was with respect to project personnel; who were less knowledgeable about the process. The transfer of documents also played a part in causing delay. Contract clauses were said to have an impact on overall project closeout and money along with a strong desire to close projects early acted as motivators to complete projects.

Table 4.3 Organizational factors identified in interview # 3

Interview Responses # 3 (causes)	Organizational Factors		
	Role Stress	Role Overload	Incentives
contract clauses			x
different team		x	
transfer of documents not completed on time		x	
lack of responsible, knowledgeable personnel		x	

4.5 Subject 4 Interview Responses

This contracting organization was involved in projects such as schools, infrastructure, city halls, municipal projects, and restoration projects. Dollar volume of projects ranged from $13 million to $20 million. During closeout, all documents including as-builts were submitted and final payment was expected from the owner. Project closeout was considered when the project was 50-60% complete, during which time requests for closeout documents were made to subcontractors. Closeout was included as a line item in the construction schedule but, it was not itemized. A closeout checklist was derived from the specifications for each project. Closeout was perceived to be one of the expected problems in a project. Smaller subs were believed to cause problems during this stage since they were unable to understand the process.

Acquiring closeout documents including as-builts were considered to be the most difficult and time consuming step. In some projects a single point of contact with the owner was said to aid in closeout process. The type of project was also believed to have an impact. The restoration projects took more time compared to new construction projects due to more CCD's (Construction Change Directive) that were issued. With respect to subs, retainage was considered to be a motivator but with respect to contractors the psychological feeling of having completed the project was considered to be the driving force during closeout.

Table 4.4 Organizational factors identified in interview # 4

Interview Responses # 4 (causes)	Organizational Factors		
	Role Stress	Job context	Incentives
psychological feeling			x
retainage			x
project type		x	
clear and accurate O & M's not obtained	x		
preparing and coordinating as-built drawings with the subcontractors	x		

4.6 Subject 5 Interview Responses

This contracting organization worked on projects such as hospitals and institutions with total dollar volume ranging from $10,000 to $4-5 million. During project closeout, all documents including as-builts, O & M's, testing reports were collected. Construction schedules included line items for closeout, during which time all documents were assembled, change orders approved and final billing processed.

The most difficult and time consuming step according to this contractor was obtaining information from subcontractors to close a project on time. The flow of documents among project team was considered to have an impact on closeout.

Table 4.5 Organizational factors identified in interview # 5

Interview Responses # 5 (causes)	Organizational Factors	
	Role Stress	Role Overload
transfer of documents		x
clear and accurate O & M's not obtained	x	
preparing and coordinating as-built drawings with the subcontractors	x	

4.7 Subject 6 Interview Responses

This commercial contracting organization was involved in projects such as healthcare, K-12, institutional, automotive, industrial and national level project with total dollar volume ranging from $15 million to $ 500 million. Project Closeout included completion of punch lists, paperwork approval, final invoice submission, owner occupancy of buildings and obtaining final payment. An expected timeline for closeout was laid out at the start of a project and activities were broken down accordingly. Time for closeout varied from three months to one year.

The dominant cause of slow closeout included lack of diligence by project personnel during the project closeout phase. Closeout paperwork was delayed in the absence of important project team members. Clear expectations, good control of the process, and having essential people working on a project were considered to be important organizational traits to improve closeout.

Table 4.6 Organizational factors identified in interview # 6

Interview Responses # 6 (causes)	Organizational Factors		
	Role Stress	Role Overload	Incentives
less motivation			x
different team		x	
unclear expectations	x		
lack of responsible, knowledgeable personnel		x	
clear and accurate O & M's not obtained	x		
preparing and coordinating as-built drawings with the subcontractors	x		

4.8 Subject 7 Interview Responses

This contracting organization worked on a broad range of projects with total dollar volume ranging from $5 million to $100 million. The closeout phase was divided into two categories; field closeout, and financial closeout. Field closeout involved completion of punch list items whereas financial closeout involved issuance of warranties, bonds, waivers and other documents. A closeout meeting to discuss and identify closeout requirements was held at 50% completion of the project. Subcontractors were recommended to identify line items for as-builts, O & M's, and warranties. Though closeout was perceived as a problem, an effort was made to obtain warranties early to ease the difficulties later on in a project.

The most difficult and time-consuming step indicated included obtaining accurate O & M's and as-builts. There was a delay in the submission of closeout documents by subcontractors. The number of people working on closeout and a project team's focus was also said to have an impact because project teams were said to focus their energies on a new project without completely closing their current project. One of the strategies for improvement included streamlining processes within the organization so that the number of approvals required for a project was considerably reduced. Also, subcontractors who were proactive in submitting O & M's and updated as-builts regularly were said to have a positive impact.

Table 4.7 Organizational factors identified in interview # 7

Interview Responses # 7 (causes)	Organizational Factors		
	Role Stress	Role Overload	Role of Interpersonal relations
less number of people assigned		x	
shift in project team's focus		x	
lack of responsible, knowledgeable personnel		x	
clear and accurate O & M's not obtained	x		
preparing and coordinating as-built drawings with the subcontractors	x		
lack of proactive behavior/pursuing people for information			x
delay in transfer of documents		x	

4.9 Subject 8 Interview Responses

This organization was involved in commercial projects such as hotels, resorts, K-12 with dollar volume of the projects ranging from $5 million to $200 million. During closeout, two categories of documents were delivered to the owner. One was financial which included warranties, waivers, sureties and the other was work related documents which included O & M's and as-builts. Closeout was identified in construction schedules. Kick-off meetings outlined closeout procedures. Submittals required by the contract documents were requested 90 days prior to substantial completion. Closeout was reviewed for all projects and annually meetings were held which reviewed project data. Regardless of these defined procedures, closeout was perceived as a problem by the organization. One of the reasons cited included problems with project staffing, others included collecting and organizing closeout data.

The dominant causes for slow closeout indicated included lack of effort, lack of interest, project personnel moving on to new projects and unclear expectations. Strategies suggested to improve closeout included creating a strong organizational commitment, having organized and proactive subcontractors and employment of knowledgeable, responsible personnel with enough authority and accountability.

Table 4.8 Organizational factors identified in interview # 8

Interview Responses # 8 (causes)	Organizational Factors		
	Role Stress	Role Overload	Burnout
different team		x	
shift in project team's focus		x	
lack of responsible, knowledgeable personnel		x	
lack of effort			x
unclear expectations	x		
clear and accurate O & M's not obtained	x		
preparing and coordinating as-built drawings with the subcontractors	x		
lack of interest			x
lack of autonomy		x	
lack of decentralization		x	

4.10 Interview responses of subcontractors

Subcontractor responses were compiled and reported together here since the researcher could not find sufficient varying data related to organizational behavior in these interviews. All four subcontractors perceived closeout to be a problem. The basic closeout steps outlined by all subcontractors included completion of punchlist items, obtaining O & M manuals from suppliers, and providing as-builts and warranties.

Each subcontractor interviewee indicated that a project team's shift of focus to a new project and scope creep were considered to be main problems associated with closeout. Along with these, preparing as-builts and collecting O & M manuals were said to be time consuming closeout steps. Also, personality traits of a project team were said to influence a project. Aggressive project management was suggested as one of the organizational traits to influence timely and effective closeout.

Table 4.9 Organizational factors identified in subcontractor interviews

Interview Responses of subcontractors (causes)	Organizational Factors	
	Role Stress	Role Overload
shift in project team's focus		x
lack of responsible, knowledgeable personnel		x
clear and accurate O & M's not obtained	x	
preparing and coordinating as-built drawings with the subcontractors	x	

4.11 COAA Survey

Out of the four questions discussed in the COAA project closeout workshop, two questions relating to causes and strategies for improvement were selected by the researcher for her study. The responses obtained were recorded and later synthesized to identify common themes. These responses were further subdivided based on their relation to organizational behavior and are depicted in Table 4.10. The overarching themes found included commitment of project team, communication, quality of design and construction documents, handling of documents, administrative procedures, staffing, and punchlist issues. The critical factors for project closeout delays related to organizational behavior included complexity of the project, burnout, project personnel moving out after

substantial completion, lack of contractual agreements with clearly defined closeout procedures, lack of organizational commitment, selection of contractors, lack of pressure after substantial completion, limitations of project manager (or owner) in terms of time, knowledge and motivation, retainage, project team loss of focus, delay in submitting closeout paperwork such as as-builts, and O & M manuals, and unclear expectations of owner.

Though several strategies were discussed and recorded to avert delay during closeout, the researcher chose to concentrate on strategies relating to organizational behavior and presented them in Table 4.11.The organizational behavior strategies discussed include:

- clearly defined closeout documents.
- contractual understanding by all team members.
- well established roles and responsibilities.
- involving subcontractor and asking for suggestions.
- use of partnering down to subcontractor and sub-consultant level throughout project life with one common goal or motivation.
- monetary incentive to inspector and superintendent for completed documents.
- with minimum restrictions; select, develop and nurture project team members and align team member goals with overall project success.

The above responses regarding causes and strategies were compared to the literature to discern factors that were similar or dissimilar in nature. They are depicted in Tables 4.10 and 4.11 respectively. Champoux indicated that along with outlining the responsibilities, in order to complete work satisfactorily, it is necessary to ensure that these responsibilities are clearly interpreted and understood by team members

(Champoux, 2006). Latham and Yukl highlighted that; goals that were assigned to a person had an effect only to the extent that was consciously accepted by the person. Both the literature and interview responses highlighted the importance of partnering; involving subcontractors to review goals for coordination and cooperation with others (Latham and Yukl, 1975). Locke and Latham (2002) indicated that people performed better when they were committed to a certain goal which is termed as "goal commitment" (Locke and Latham, 2002).

The COAA Workshop revealed certain factors related to organizational behavior that impact construction project closeout and are indicated in Table 4.11 Most of the responses obtained in this workshop supported the literature on organizational behavior however some do vary from the literature.

Table 4.10 Comparison of causes found in all the interviews with the literature

Organizational Factors	**Interview Responses (Causes of closeout delays)**	**Literature**
Role stress	Project requirements are boilerplate and not project specific Expectations are unclear Closeout not understood well by smaller subcontractors Documents required not clearly communicated to contractors and subcontractors by the owner Clear and accurate as-builts and O & M's not obtained Disagreement over the warranty period	Literature discusses role conflict and role ambiguity as part of role stress Expectations communicated by the sender and those perceived by the receiver are incompatible Lack of adequate information to accomplish required activities Information not clearly defined or articulated, Lack of clarity regarding proper tasks to be performed (Champoux, 2006; Cordes and Dougherty, 1991; Kahn 1978; Miles and Perrault, 1976)

Table 4.10 continued		
Role Overload	A different team assigned to closeout that does not have sufficient knowledge Number of people to complete closeout activities is reduced considerably Lack of autonomy and decentralization Project team's focus shifts to a new project Lack of responsible, knowledgeable personnel	Characterized by qualitative and quantitative overload Lack of basic skill or talent to complete task effectively Work cannot be done within allotted time Resource scarcity (Maslach and Jackson, 1984; Kahn, 1978; Pines and Maslach, 1978)
Role of Interpersonal Relations	Pursuing people for information is time-consuming and requires more personal resources	Potential for strain because of constant contact with people Increase in number of clients results in increase in demand on personal resources (Cordes and Dougherty 1993; Maslach and Jackson, 1984;Maslach, 1978)
Job Context	Complexity of the project	Nature of employee client relationship Specific context related to a job (McCarthy and Catano, 1992; Cordes and Dougherty, 1993)
Incentives	Less motivation to close projects due to lack of incentives Contract clauses and the threat of holding retainage impact project closeout by motivating project personnel to work towards final completion	Incentives do not have significant impact on organizational outcomes (Cordes and Dougherty, 1993; Jackson et al., 1986)

Table 4.11 Comparison of strategies from interviews with literature

Organizational factors	Interview Responses (strategies)	Literature
Motivation theory	Commitment of project team Communication Clearly define closeout documents Contractual understanding of all team members Establish roles and responsibilities Involve subcontractor and ask for suggestions Use of partnering down to the subcontractor and sub-consultant level throughout project life with one common goal or motivation Monetary incentive to inspector and superintendent for completed documents Select, develop and nurture project team members Align team member goals with overall project success	Goal-setting theory indicates that tasks, duties and responsibilities should be specified Outlining clearly and concisely what is required elicits the desired response. Partnering - involving subcontractors to review goals for coordination and cooperation with others. Champoux indicates that along with outlining the responsibilities, in order to complete work satisfactorily, it is necessary to ensure that these responsibilities are clearly interpreted and understood by the team members. Goal commitment- people will perform better when they are committed to certain goal Goals that are assigned to a person have an effect only to the extent that is consciously accepted by the person (Champoux, 2006; Locke and Latham, 2002; Latham and Yukl, 1975)

4.12 Organizational factors

The organizational factors found in the literature were compared to data obtained during the interviews to identify common themes or variances. Table 4.10 lists the causes for closeout delays and associates them with the organizational behavior literature.

The causes indicated by contractors and subcontractors and referenced in Table 4.10 such as unclear expectations, absence of a formal closeout process, lack of clear understanding by subcontractors, and lack of clarity in performance of tasks, suggest evidences of role conflict and role ambiguity. Role conflict occurs when the expectations communicated by the sender and those perceived by the receiver are incompatible. A lack of clarity in performance of proper tasks results in role ambiguity.

Goal setting theory, which is one of the motivational theories states that tasks, duties and responsibilities should be specified at the onset of a project. A clear view of expectations is imperative to elicit a specific behavior. Outlining clearly and concisely what is required elicits the desired response. In order to ensure that expectations are met, it is necessary to bring all project personnel together to discuss goals, assign tasks and responsibilities, and identify required steps and activities. AIA Best Practices indicated that there is an absence of logical sequence in the final 10% of projects (AIA Best Practices, 2007). Therefore, in order to maintain focus on closeout items, it is necessary to develop a project closeout checklist and set priorities among goals. Along with this, organizations should make an effort to enable project personnel to achieve the goals outlined for closeout by providing constant feedback and motivating employees. The relationships between organizational behavior concepts and the literature are depicted in Table 4.10 under the role stress section.

The researcher incorporated concepts from goal setting theory along with the interviews to develop a group of recommendations included as 1, 2, 3, 4, 5 & 6 and indicated below.

1. *Conduct closeout meetings in the presence of all necessary personnel to discuss specific goals and to assign roles and responsibilities. The studies on goal setting theory indicate that setting specific goals increase performance and that difficult goal if accepted results in a better performance.*

2. *Expectations should be clearly articulated. All project personnel should ensure that the expectations communicated by the sender and those perceived by the receiver are compatible.*

3. *A well defined process for closeout should be laid out. This process should outline steps and activities that are required in order to closeout a project effectively.*

4. *The project requirements should be project specific and not boilerplate.*

5. *Create an "organizational commitment" to achieve the goals set out for effective closeout. The literature indicates that this can be achieved through feedback, task complexity and employee motivation. The employee's performance record is tracked to see how effective they have been in attaining the goals. Without proper feedback channels it is impossible to adapt or adjust to the required behavior. When goals are established at a management level and thereafter solely laid down, employee motivation with regard to achieving these goals is rather suppressed. Thereby to facilitate motivation employees should not only be*

allowed to participate in goal setting processes but goals have to be challenging as well.

6. *Set priorities among goals with the help of checklists. The literature indicated that having checklists prevented personnel from working on other items and also alleviated strain on project budget.*

The relation between the literature and interviews which relate to role overload are depicted in Table 4.10. The causes indicated included a different team being assigned which lacked sufficient project knowledge, shift in the focus of the project team, resource scarcity in terms of labor, and lack of autonomy and decentralization. All these causes have resulted in the development of following recommendations:

7. *A closeout team that is aware of project details and has sufficient knowledge should be assigned to close projects. Project details should be available to the team through a common database which shares pertinent project information. Since the focus shifts to a new project after substantial completion, the closeout team can ensure that the project is closed out completely to the owner's satisfaction.*

8. *Enough resources should be allotted to complete closeout activities within the given time. The interviews indicated that there was a lack of resources in terms of labor during closeout. This resulted in an extension of closeout time.*

9. *Empower frontline personnel with decision making authority so that less time is spent in getting approvals from higher levels in the organization.*

The role of interpersonal relations plays a significant part and is depicted in Table 4.10. Since the project team worked on multiple projects simultaneously, there was a potential for strain when contractors had to pursue subcontractors for closeout documents. This was said to be time consuming and required additional resources in terms of project management time and money. This results in burnout which in the literature is characterized by lack of effort and lack of interest. The project team disassociated itself from a project after substantial completion. This may have been due to less importance attached to closeout or lack of defined procedures for closeout. The interviewees with respect to job context indicated that complexity of a project played a significant role during closeout. A complex project took longer to closeout than a simple project. The nature of the relationship of project participants and personality traits also contributed to closeout. This resulted in recommendations 10 and 11 which are as follows:

10. *The closeout documents should be submitted in a timely manner. It was evident from the interviews that more personnel time was spent pursuing people for documents.*

11. *An open line of communication between the project participants should be ensured for quick and easy resolution of problems.*

The interviews indicated that there was less motivation for the project team to close a project due to lack of incentives. The threat of holding retainage and contract clauses

relating to closeout were suggested as alternatives to motivate people to close a project on time. Contrarily, the literature suggested that incentives do not have a significant impact on organizational outcomes. This indicates that further research in this field is required to assess the impact of incentives on organizational outcomes.

To assess the frequency of a particular cause with respect to organizational behavior factors in all the interviews, a frequency table was created which is presented below as Table 4.12.

Table 4.12 Frequency of responses in interviews

Interview responses causes	Role stress	Role overload	Role of interpersonal relations	Incentives	Job context
contract clauses				xx	
threat of holding retainage				xx	
different team		xxxxx			
less number of people assigned		xxx			
project team's focus shifts		xxxxx			
requirements are boilerplate and not project specific	x				
expectations are unclear	xxx				
disagreement over the warranty period	x				
less motivation				xx	
lack of responsible knowledgeable personnel		xxxxxx			
lack of autonomy		xx			
lack of decentralization		xx			
clear and accurate O & M's not obtained	xxxxxx				
preparing and coordinating as-built drawings with the subcontractors	xxxxxx				
delay in transfer of documents		xxx			

Table 4.12 continued					
psychological feeling				x	
project type					x
lack of proactive behavior/pursuing people for information			x		
lack of effort	x	x	x	x	x
lack of interest	x	x	x	x	x

To recognize the relative impact of organizational behavior factors, these factors were plotted against data obtained from the interviews. The number of interviewees who mentioned a particular factor is depicted here. Eleven interviewees indicated role stress and role overload in their responses. Similarly, responses of all the interviewees were plotted to identify organizational factors which have the most and the least impact on closeout. It was found that role stress which includes role conflict and ambiguity, and role overload had higher impacts, impact of incentives were relatively low, and the role of interpersonal relations and job context had very low impact on project closeout. This is depicted through a pareto chart shown in Fig 4.2

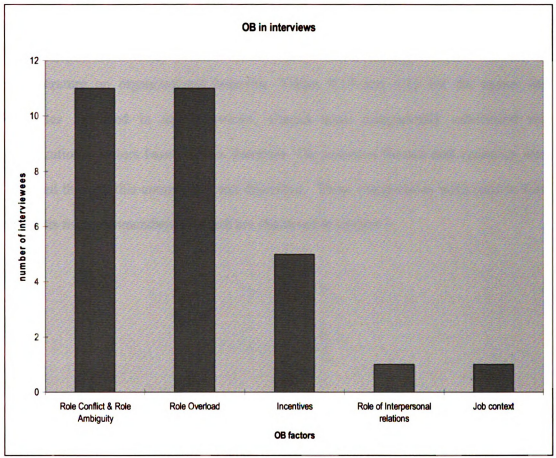

Fig 4.2 Relative impact of OB factors

The organizational factors indicated above are considered to be antecedents or precursors of burnout in the literature. Burnout is characterized by emotional exhaustion, depersonalization, and diminished personal accomplishment which results in lack of effort and lack of interest during the project closeout phase. The recommendations that are developed in this chapter may be considered to alleviate burnout of people in organizations. To assess the importance of these recommendations, further feedback was obtained from contractors through proof of concept interviews, which are discussed in chapter 5.

4.13 Chapter Summary

This chapter presents the interview responses and their analyses in the context of the literature on organizational behavior. Tables 4.10 and 4.11 list the causes and strategies indicated in the interviews. Causes were categorically subdivided into organizational factors based on the literature. The common themes and variances were obtained through this comparison and described. These comparisons were used to form the basis for recommendations which are discussed in chapter 5.

CHAPTER 5

RECOMMENDATIONS

5. RECOMMENDATIONS

5.1 Introduction

Chapter 4 recognized the impact of organizational behavior on construction project closeout by analyzing data related to causes and strategies. Recommendations that evolved from that analysis are outlined in this chapter.

5.2 Recommendations for contractors

Based on the antecedents of burnout suggested in the literature, the following recommendations were grouped into role conflict, role ambiguity, job context, role overload, and role of interpersonal relations. Though incentives are considered to be one of the antecedents of burnout, conflicting opinions existed between the literature and data obtained from interviews. Hence it was difficult to ascertain the impact of incentives and to develop recommendations for them in this study.

5.2.1 Role conflict, role ambiguity and job context

The literature indicates role conflict occurs when expectations communicated by a sender and those perceived by a receiver are incompatible. Role ambiguity is a result of lack of clarity and poor performance. Figure 5.1 includes recommendations relating to the above two factors in the context of construction project closeout.

1. Conduct closeout meetings in the presence of all necessary personnel to discuss specific goals and to assign roles and responsibilities. The studies on goal setting theory indicate that setting specific goals increase performance and that difficult goal if accepted results in a better performance.
2. Expectations should be clearly articulated. All project personnel should ensure that the expectations communicated by the sender and those perceived by the receiver are compatible.
3. A well defined process for closeout should be laid out. This process should outline steps and activities that are required in order to closeout a project effectively.
4. Create "organizational commitment" to achieve the goals set out for effective closeout. The literature indicates that this can be achieved through feedback, task complexity and employee motivation. The employee's performance record is tracked, to see how effective they have been in attaining the goals. Without proper feedback channels it is impossible to adapt or adjust to the required behavior. When goals are established at a management level and thereafter solely laid down, employee motivation with regard to achieving these goals is rather suppressed. Thereby to facilitate motivation, employees should not only be allowed to participate in goal setting process but goals have to be challenging as well.
5. Set priorities among goals with the help of checklists. The literature indicates that having checklists prevent personnel from working on other items and also alleviates the strain on project budget.
6. The project requirements should be project specific and not boilerplate.

Fig 5.1 Recommendations relating to role conflict and role ambiguity

5.2.2 Role overload

Role overload occurs when there is resource scarcity or when the work cannot be completed within the allotted time. The following figure includes recommendations relating to role overload in the context of construction project closeout.

7. A closeout team that is aware of project details and has sufficient knowledge should be assigned to close projects. The project details should be made aware to this team through a common database which shares pertinent project information. Since the focus shifts to a new project after substantial completion, the closeout team can ensure that the project is closed out completely to owner's satisfaction.

8. Enough resources should be allotted to complete closeout activities within the given time. The interviews indicated that there is a lack of resources in terms of labor during closeout. This results in an extension of the closeout time.

9. Empower frontline personnel with decision making authority so that less time is spent in getting approvals from higher levels in the organization.

Fig 5.2 Recommendations relating to role overload

5.2.3 Role of interpersonal relations

The role of interpersonal relations indicates that there may be a potential for strain when there is constant contact with people or there is an increase in demand on personal resources due to an increase in the number of projects. Closeout interviews indicated that there was a potential for strain when pursuing people for information which was often time consuming and required resources.

10. The closeout documents should be submitted in a timely manner. It is evident from the interviews that more personnel time is spent pursuing people for documents.

11. An open line of communication between the project participants should be ensured for quick and easy resolution of problems.

Fig 5.3 Recommendations relating to role of interpersonal relations

5.3 Proof of concept

In order to conduct "proof of concept" interviews, a proof of concept package which consisted of a consent letter, brief introduction to the purpose of these interviews, summary of the research and its findings, and questions for validation were sent to the

MSU IRB for approval. Fig 5.4a and 5.4b present snapshots of the proof of concept package. Upon receiving approval from the IRB, interviewees of the MSU study were contacted through phone and e-mail to validate the suggested recommendations. The purpose of these interviews was to obtain feedback from contractors regarding the usefulness of the suggested recommendations. Eight questions relating to the practicality of implementing these recommendations in their organization, barriers to implementation, and importance with respect to a particular organizational factor were included. Upon their agreement to participate in the interview, each interviewee was sent a proof of concept package through e-mail. Appendix IV includes the entire "proof of concept" package sent to contractors for their review and their responses to the interview questions.

Introduction

The purpose of this research is to determine the influence of organizational behavior on construction project closeout. The output of this research is a set of recommendations which were developed based on goal-setting theory of organizational behavior to aid contractors and subcontractors during construction closeout process. The recommendations developed through this research are validated here by conducting follow-up interviews with all contractors and subcontractors who were interviewed as part of an ongoing Michigan State University study entitled "Assessment and Improvement of Construction Project Closeout and Vendor Performance Evaluation Methods." The purpose of the Michigan State University (MSU) study is to develop guidelines and recommendations for improving practices to reduce time and cost of construction closeout within a university construction context.

This validation process consists of 8 questions relating to the recommendations developed by

Fig 5.4a Snapshot of "Proof of Concept" package from Appendix IV

Participant Consent Form
Influence of Organizational Behavior on Construction Project Closeout

Researcher – Surabhi Rao
Adviser – Professor Tim Mrozowski, AIA
School of Planning, Design, and Construction

This is a Masters thesis currently being conducted under the direction of Professor Tim Mrozowski of the School of Planning Design and Construction at Michigan State University (MSU). It determines the influence of organizational behavior on construction project closeout. Recommendations were developed by comparing previous literature to the data collected in the MSU study entitled "Assessment and Improvement of Construction Project Closeout and Vendor Performance Evaluation Methods". To validate these recommendations the researcher is interviewing contractors and subcontractors who were involved in the ongoing MSU closeout study. As an experienced industry participant, your input with respect to these recommendations will be very useful to fulfill the objectives of this research

As a participant in this research, you will be asked a series of closed and open ended questions relating to organizational behavior and construction closeout. Your participation is voluntary and you

Fig 5.4b Snapshot of "Proof of Concept" consent form from Appendix IV

5.4 Proof of concept responses

Feedback was obtained from three contractors through phone interviews and a fourth interview was conducted face to face. Fig 5.4c shows a snapshot of the proof of concept responses which were summarized in an Excel® spreadsheet. The first question addressed the ease with which the developed recommendations could be understood. All contractors indicated that the recommendations were clear and concise and were easily understandable. Contractors were asked to rate the recommendations relating to each organizational behavior factor. Recommendations relating to role conflict and role ambiguity were considered to be very important by all contractors whereas recommendations relating to role overload, and role of interpersonal relations were considered less important. Contractors further stressed that problems relating to role overload and role of interpersonal relations could be alleviated if importance was given to

recommendations relating to role conflict and ambiguity at the onset of the project. This was consistent with data obtained from previous interviews of all contractors, subcontractors, the closeout workshop and the literature.

Proof of Concept Responses		
lo.	Questions	Responses
1	How well do you understand these recommendations for project closeout described in this research?	very well
		very well
		fairly well
		very well
2	What are the barriers for implementation of these recommendations during project closeout in your organization?	The recommendation relating to using a different team (recommendation 7)was tried out at the organization. But one of the problems faced was the closeout team was not familiar with the owner or trade contractors. Also, when the project staff realised that there was a closeout team they were not interested in clean up of items. It was not a good financial model or a good business model for performance
		1. Cost for additional resources 2. Failure to recognize the true workload involved due to past practices that underdeliver or hide the effort
		Even though formal procedures are developed

Fig 5.4c Snapshot of "Proof of Concept" responses from Appendix IV

The second question related to barriers for implementation of the developed recommendations. Interviewees indicated that though all the recommendations were important, recommendation 7 under role overload relating to use of a different team for closeout was difficult to implement since this team would not be familiar to the owner, trade contractors or other project participants. Further, it was indicated that when project staff realized that there was a closeout team they were not interested in clean up of items. Cost for additional resources, failure to recognize the true workload involved due to past

practices that under delivered or hid the effort, use of closeout documents by subcontractors as a bargaining tool were other barriers indicated by contractors.

The third question addressed other organizational behavior factors that influence closeout. The interviewees responded that communication and leadership were other factors that should be considered during closeout. One of them indicated that recommendations relating to role conflict and role ambiguity also highlighted the importance of communication between project participants. In terms of leadership, it was indicated that personnel at a higher level have to take the lead during planning stages in order to drive the closeout process.

When contractors were asked how helpful these recommendations were to their organization they indicated that they have implemented some of the recommendation but there was no formalized process. Even if there was a process, these recommendations reinforced the importance of closeout process.

Some additional comments the interviewees made included all parties should came together early on in the project to discuss roles and responsibilities, and a knowledgeable person with decision making authority should be assigned to close projects effectively.

5.5 Chapter Summary

This chapter presents the recommendations for contractors and considers feedback obtained for validation through proof of concept interviews.

CHAPTER 6

SUMMARY AND CONCLUSIONS

6. SUMMARY AND CONCLUSIONS

6.1 Introduction

Chapter 4 included analysis of data and recommendations were presented in chapter 5. This chapter summarizes the contents of this thesis and reiterates the goals and objectives of this research. It also presents contributions of the research, areas for future research, research limitations, and conclusions.

6.2 Research objectives

The overall goal of this research was to determine the influence of organizational behavior on construction project closeout. To achieve this goal, the objectives outlined in this research were:

1. Identification of factors related to organizational behavior in the interviews by comparing the literature with the interview responses.

The researcher analyzed the data based on the concepts of Grounded Theory proposed by Glaser and Strauss (Glaser, 1992; Strauss, 1987). The factors related to organizational behavior were identified in the closeout data and compared to the literature. This was useful in identifying and understanding common causes for slow closeout in organizational behavior terms.

2. Development of recommendations to contractors and subcontractors based on motivation theories of organizational behavior.

Motivation theories were used in previous research in the field of athletics and medicine to prevent burnout. Similarly, to alleviate the causes which are considered to be antecedents of burnout, goal-setting theory relating to motivation was adopted and used to identify closeout strategies suggested in the data. Recommendations were developed based on this comparison to mitigate the effects of burnout.

3. Validation of these recommendations by conducting proof of concept interviews.

Contractors who reviewed the recommendations developed by the researcher indicated that these recommendations reinforced the opinion that closeout is a very important phase and that importance should be given to this phase in order to maintain good relations and to leave a good lasting impression with the owner.

6.3 Research contributions

Project closeout is an important phase in the lifecycle of a project but this phase is often overlooked and according to the literature was considered to be the one in which customers were least satisfied. The reasons cited for this dissatisfaction were many but in this research, the researcher explored the effects of antecedents of burnout on closeout. The antecedents of burnout included role conflict, role ambiguity, role of interpersonal relations, job context, and incentives. By identifying and comparing each antecedent of burnout in the literature with closeout data, the causes were understood. Subsequently,

recommendations were developed based on goal-setting theory of motivation. The following are the contributions of this research:

1. Literature review identified previous research in sports, medicine, and teaching that linked burnout and motivation. This researcher identified organizational behavior factors related to burnout that influence the construction closeout process.
2. Applied Grounded Theory to analyze information rich data.
3. Developed recommendations to contractors and subcontractors based on motivation theory of organizational behavior to mitigate the effects of burnout components on closeout.
4. Identified antecedents of burnout that impact construction project closeout.
5. Conducted proof of concept interviews which indicated that problems which arise during closeout can be alleviated by placing importance to recommendations relating to role conflict and role ambiguity.

6.4 Research limitations

The target group was limited to commercial contractors and subcontractors in the Mid-Michigan area. Though only a limited number of interviews were conducted, this was an information rich study and while it is possible that a greater number of interviews could have led to different results there was no indication of that in this research. The quality of information is directly dependent on the knowledge of interviewees. In this case, since highly experienced interviewees participated, the researcher is fairly confident about the responses.

Another limitation is that the research focused on project closeout and not on other phases in the lifecycle of a project.

6.5 Areas of Future Research

This research focused on organizational behavior factors that were considered to be the antecedents of burnout. Future research could include other organizational factors that were not explored in this study.

Goal-setting theory of motivation was used to develop recommendations to mitigate the effects of antecedents of burnout. Other areas of organizational behavior could be explored to alleviate the effects of burnout.

Project closeout which is only one of the phases in the lifecycle of a project was investigated. Future research may be expanded to include the entire lifecycle of a project.

This was an exploratory research which mainly used qualitative methods of Grounded Theory for data analysis. A quantitative method of data analysis could be used in the future research to assess the extent of impact of burnout on construction closeout. Data obtained from the interviews of eight contractors and four subcontractors along with attendees of COAA closeout workshop were analyzed in this study. Future research could include a larger sample study for greater accuracy.

6.6 Research conclusions

Based on the research conducted on both organizational behavior and project closeout, the researcher concludes that organizational behavior has an impact on project closeout. This was determined by comparing the burnout factors categorized in the

closeout data to the literature on organizational behavior using Grounded Theory for qualitative analysis. It was evident that antecedents of burnout which include role ambiguity, role conflict, role overload, and role of interpersonal relations were prevalent among contractors and subcontractors during the project closeout phase. The negative influences of these factors could be alleviated by implementing the recommendations developed from goal-setting theory of motivation. Use of Grounded Theory was found to be helpful. The researcher believes that in the absence of application of Grounded Theory, recommendation 5 relating to priorities among goals would not have emerged. Also, recommendation 4 relating to organizational behavior would have been absent without use of Grounded Theory.

Proof of concept interviews conducted to validate the recommendations developed in this research indicated that role conflict and role ambiguity had relatively more impact; and further, problems caused due to role overload and role of interpersonal could be prevented if importance was given to these recommendations at the onset of a project.

APPENDIX I

CONTRACTOR INTERVIEWS

Feedback from Contractors		
Sl No.	**Questions**	**Responses**
	Organization structure and Project Management	
C1	What is the title of your position within your firm?	Project Manager
		Vice President for Central MI region, Project Manager
		Vice President
		1 President and 2 Project Managers
		President
		A 5 member team attended the interview, their positions were: Project manager, Field Engineer, Accountant, VP-Health Facilities Group, VP- Higher Education
		Project Director and Accountant.
		Project Director
C2	What are the types and ranges of projects your firm is typically involved with?	Types of projects include mainly institutional namely state work like prisons and offices, hospitals, schools, universities, massive utility projects, infrastructure, waste water and fresh water, pump and booster, self performed heavy concrete, site concrete range of projects include 30,000 to $23 million projects target is $5million to $50 million
		Instituitional, Historic preservation, State projects, Independent, Hospitality, K-12. Project values from 5 to 100 Million Dollars.
		All types of construction and renovation projects like schools, banks, universities, community colleges, dorms, manufacturing etc. The project amount ranges from $ 500k to 13 million.
		Higher Education, K-12, Grad schools, Infrastructure, City Halls, Municipal projects, Restoration projects. The project value ranges from $13-20 million
		We do hospitals , Institutions, school works, we work for CMs. Our projects range from $10000-$4-5million. At MSU we have done works ransing $150k-$250k.
		Higher Education (Univ. and Colleges), Health Facilities, Sports Facilities, Energy Environmental, K-12, Automotive, Industrial, National level projects, Program management. The project value ranges from $15million to $500million
		Broad Range of projects. our project rangesare from $5mill-100mill. With universities we do smaller dollar value projects.
		We do Hotel, Resorts, Institutional, K-12, commercial (everything except residential), cost-wise from 5 to 200 million.

Sl No.	Questions	Responses
C3	Describe your firms primary delivery method (i.e. design build, construction manager, ...)	the firm's primary delivery method is GC, hard-bid design-build and CM used for some private clients
		70% of prjects are done as CM at risk. Other delivery methods used are GC, Design-build, and CM at Agency
		General Contracting
		General Contracting
		General Contractor or a trade contractor to CM. But we don't think CM adds any value to the project.
		80% of our dollar value comes from CM at risk, rest 20% comes from GC delivery method
		70% CM, 30% GC, we occassionally do D/B also.
		We do mostly CMAR (construction managers at risk) or Agency, around 5 % of general contracting and a very small % of design build. We have not done any self performance since the last 5 years.
	Closeout Processes	
C4	What is your company's definition of construction project closeout?	defined by the specifications and the documentation also varies with owners and designers
		encompasses process from permitting, certificate of completion
		construction completion substantial completion final completion
		Construction completion is when the tradesmen complete the installation
		the contract requirements are also broken down into manageable parts
		When the work meets all project requirements as mentioned in the contract documents, final invoice is submitted; final payment is being released. Warranties are provided.
		When the owner starts using the facility, All O&Ms are handed out.
		We expect to be clear with subs on all payments, sworn statements, all documents are submitted. As-builts are submitted and expect a final payment from the owner.
		Getting good set of As-builts, O&Ms, TAB reports, Guarantees, getting WBE & MBE verification, and receiving final payment.
		Gathering and completion of punchlists, Paperwork approval, handing final invoice, getting final payment, owner occupancy of the buildings. We consider all these factors as a part of construction closeout
		Closeout for us is divided in two categories. Field closeouts involve completing of punchlists. Financial closeout involves Issuing of warranties, waivers, bonds (builder's risk) etc.
		Our definition of a project closeout would be when the owner has received all required documents and we have received our final payment. We normally deliver 2 catagories of documents to the owner. The financial, like the guarantees, waivers, sureties and work related like O&M manuals, As-builts.

Sl No.	Questions	Responses
C5	When do you begin to consider the project closeout phase?	as soon as the contract is let
		From Pre-Construction Stage. Owner's criteria for closeout is established. Followup at each stage of %age completion.
		We consider it at the beginning, we set C/O process and give it to subs
		We start considering at 50-60% completion stage, beign asking subs for closeout documents. We do that because interest wanes out towards the end. As-builts are the last thing that come in. Documentation is a big deal for subs.
		At MSU we begin considering it when final change orders are coming in, we try to get subs to get things early. MSU is notoriously slow with change orders, CPA takes 5-6 months to process changes. but their process has improved since project reps have come in.
		Technically, we mention it at post bid interview/meeting, and include it in contract. Physically we consider it at 75% stage of project; we send c/o reminders to subs. Get O&M manuals when the equipment arrives.
		We think about it from day 1. We give our documents to subs at start of the contract.
		We begin to consider a closeout at the submittal of the shop drawing phase.
C6	Are disagreements over achieving substantial completion common among large owners? How are these conflicts usually resolved?	Yes, the disagreements are common State of Michigan requires O & M manuals before substantial completion but it is rarely submitted before Substatntial completion since it is difficult to get this information by the contractors from the subs negotiated to suit owner's needs and atleast a temporary certificate of occupancy is almost always required
		Very rarely; AIA has a good description of S.C. stage. A temporary CO is issued at S.C. stage.
		No, AIA contractual terms dictate.
		No
		Disagreements happen over Mechanical and electrical items, schedules for long lead time items are unrealistic at MSU which cause problems.
		No, rarely have disagreements over Substantial completion as it is usually well defined by the owner (State). Sometimes there is a discussion required regarding extended warranties for ajor equipments which need startup before final completion of project. Phased turnovers become challenging because expectations of closeout change.
		Disagreements occur only with individual owners who are not knowledgable about the process. We resolve it by refering to AIA document.
		Not normally but if there is then its mostly about warranties and mechanical equipment which is triggered at the substantial completion stage.

Sl No.	Questions	Responses
C7	Can you outline for us the basic steps and activities in the project closeout process? Are these project closeout activities identified in the construction schedule?	the basic steps include -Collect O & M manuals after submittals are complete which is usually afet 50% of project duration -collect test reports -a second set of shop drawings for the owner are maintained for closeout all the above items are identified in the schedule using primavera. A submittal log is issued at the beginning of the project. Finish milestones like Construction completion, testing and balancing, permitting, O & M also identified for projects It is issued with each subcontract and mentioned in the project meeting
		We put closeout as a line item in construction schedule. After submittals are approved the O&M manials are asked for. Locations are identified to place stock. Warranty letters are mailed. Training documents are prepared.
		Review specifications, Identify subcontractors and give them the list. They are sometimes identified in schedule as several line items.
		We put "closeout" on the schedule but donot itemize it, we put 7% on it in schdule of values. We start faxing the requirements to subs at 60-80% of the project and withold the last cheque. Documents required by MSU are As-builts, O&Ms, Warranties, Materials as built list. For certain mechanical equipment the O&M goes straight to MSU which is cumbersome for us to manage.
		The basic steps involved are assembling documents, getting change orders approved, process final billing. We have a line item for closeout in the schedule.
		We have an actual process flowchart but not specifically mentioned in the schedule. It is our standard process. We put an expected timeline of closeout at start, later on we break out the closeout activities. We assign them monetary values in the schedule of values.
		we see the manual early on, at 50% project completion we have project c/o meeting where we identify c/o requirements, we recommend subs to identify line itmes of c/o for as-builts, O&M, warranties. State of Michigan requires C/O docs to be presented as line items in SOV.
		we identify project closeout in schedule giving it more depth. We also have kick-off meetings during which we identify the closeout procedure. 90 days prior to the substantial completion we send out letters to parties reminding them about submittals and documents. For technical specifications we maintain logs and we have our own set of front end documents that as CM we put together what format and how many we want.

Sl No.	Questions	Responses
C8	Based on statistical data or from your experience, what is the usual time associated with closeout of projects?	No statistical data and the time for closeout varies with owner State of Michigan has liquidated damages for both substantial completion and final completion Most owners mention both the substantial completion and final completion dates Liquidated damages may help with the final completion since it encourages contractors to protect ask for time on the change order
		30-60 days from final stage of completion. Sometimes it is 60-90 days.
		30-60 days.
		Usually its 6 months, but it varies with project. Waivers take time, if they can be done at time of O&M then the process could be faster. MSU issues a lot of change orders at the end which costs a lot of time. This results in delays amending the subs contract who in turn hold on to O&Ms before they get the full payment. At MSU the documents exchange a lot of hands which takes a lot of time. Issues like prevailing wage compliances are not processed timely so they hold checks at the end which squeezes us.
		We try to get it done in 30 days time which is achieved for 75% of the projects. otherwise it takes around 45-60 days from substantial completion.
		30 days to 1 year. On an average its 3 months.
		For Financial closeout it takes 30 days on an average. Total closeout takes 90-120 days depending on the owner type. We payout the subs within 30 days of receiving the final payment.
		closeout starts upon substantial completion when documents begin to get gathered and payments are made. An overall of 90 to 270 days approximately.
C9	Does your organization evaluate project closeout for various projects?	No formal process but informally there is an effort to find ways to make closeout better
		the closeout is tracked in senior management; financially and operationally.
		Yes
		We don't have any formal process. It's a watch dog system; we have learned from experience.
		No, we discuss it informally and keep records for last 5 years of work
		We ask the owner to evaluate us, and closeout is a part of the evaluation.
		Yes, but only with large owners. We do it for financial end of closeout. We do field closeout evaluation only for problem projects. We send out questionnaires to the owner and discuss it in financial meetings with different accountants in the firm
		Yes, we do post-mortem on projects in form of periodic reports. In addition to that we have the ISO annual meetings which review the data annually.
C10	Does your organization have a project closeout checklist for various projects depending on the size? If so can we obtain a copy of this checklist?	No, the checklist for a project varies with the owner's process

Sl No.	Questions	Responses
		yes we use a closeout log which is both generic and project specific. Yes you can have the copy of the log.
		Yes, but it changes from job to job. We took MSU's list and adapted from it.
		The C/O checklist varies from project. The specifications outline the requirements, we print out the sub lists and start asking them
		No, we use the checklist used by MSU for their projects. for other projects we use the checklist supplied by architects.
		Yes, yes we will give you a copy of the checklist.
		Yes
		Yes, we posses a standard format. We could give it to you but you may not publish it in your report.
C11	What project management software is currently being used by the organization? How have they impacted project closeout?	"Masterbuilder" is currently being used and pleased with its perdormance. It is used only for transmittal tracking
		Developed custom process using 'viewpoint' program. It is an integrated document tracking software which takes inputs of financial documents, payroll, change orders, submittals,and RFI. Helps in the closeout process by verification of documents and minimizes the unknowns and claims.
		We use Microsoft Project, also use excel based program for estimating. It helps in tracking and accountability.
		We use Timberline for Project management. IT helps controlling all the submittals.
		Primavera-Expedition; using it for 20 years. It helps tracking documents status tremendously. We also use microsoft project.
		We use ProLog for tracking documents, it is web based therefore all information is put on project websites which can be accessed by different project teams especially when they are not local teams.

Sl No.	Questions	Responses
		We use CMIC which integrates accounting with project management. Enterprise software is used for tracking logs and other documents. We are not sure how they have impacted project closeout.
		Prolog has a helpful impact in managing projects. We use it in form of an accesible webpage, for example the RFI logs can be used by contractors and shop logs are for read only purpose by contractors.
C12	What is the targeted duration for completion of your portion of the project closeout process?	30 to 60 days between substantial to final completion but internally the company aims for 30 days
		30-60 days.
		As a trade contractor we aim to have C/O documents before project is done. As GC we expect it within 30 days from the sub.
		2-4 weeks is ideal for us.
		30 days
		45 days for a project value of $50-75 million. For a project of $100 million and above we set a time frame of 6 months.
		90 days
		90 to 270 days
C13	Do incentives exist within your firm to quickly and effectively closeout a project?	No incentives but just keeping one's job and people trying their best
		The personnel get to keep their job.
		We have pension, profit sharing; so everyone has a stake.
		Get to keep our jobs.
		the quicker we get done the more money we make, we give bonuses for effective management.
		No incentives, cash flow is important. Life gets easier if we get quick closeout.
		No
		No
C14	Are you aware of any published industry average rates for project closeout process times?	No
		No
		No.
		No
		No
		No
		No
		No
C15	Is Project Closeout perceived as a problem by the contractors? If so, why?	Yes,absolutely the closeout phase gets frustrating since the specifications are not well written and are mostly boilerplate, owners and architects do not put in enough work to create the list, owners ask for O & M manuals for items which do not have one on every project a list is sent to the owner extrapolated from the specification but doesn't work well and is mostly in owner's control in case of warranties there is a disagreement between the owner and the sub regarding the warranty period

Sl No.	Questions	Responses
		Not a problem with us. Have alleviated problems as much as possible. Have placed a priority on this issue and look at it right from the start of the project. The only problem with it is that it is looked at as an added scope.
		Its not a problem for us as a GC. But we have observed that the subs don't read and often miss things like attic stock.
		Yeah sometimes, but its considered part of the job. Smaller subs cause problems because they don't understand closeout.
		Yes, biggest problem at MSU is that they point out mistakes in work long after they should have done.
		We look at it as a challenge, lots of money is involved so we have to get through it. A lot of it depends on the structure and process of the subs.
		Everybody perceives it as a headache. We try to make it easy by getting warranties prepared beforehand.
		Yes, because they are not sure what they want and they do not seem to care even if its just the matter of giving a document for the relaese of the payment. One reason could be that they are not staffed properly.
C16	What costs, if any, are associated with the project closeout process?	closeout process requires a significant amount of PM and administrator's time. In terms of hours 120 to 160 hours for project administrator and 40 to 80 hours for project manager It is job specific-for a $13 million project, approximately 6000 to 7000 is spent in closeout documentation also leads to loss of productivity pursuing these documents from the subcontractors
		It ties up the resources, which are non-compensable. It affects release of retention money (which is more of a problem for sub-contractors). The labor and other services are also tied up.
		Staff time, Calls, Compiling Documents. For Subs delay of final payment is a problem, also affects the contractors who are tardy with submittals.
		12-15% on overheads (G&A). Shipping, binders, materials, Administration time.
		Around $600. other indirect costs include waiting for the money after we closeout completely.
		If the Closeout process drags, it has financial implications. Costs entail administrative time.
		Mostly Time and administrative costs. Affects D&B ratings sometimes when the subs complain for non-payment for over 90 days. Titular companies require waivers to be furnished which take time.
		We have not tried tracking it yet. It depends on the size of the project. It may include administrative costs, lost opportunity to collect payments and cost of manpower used in collecting data and final pay.
C17	What are the most difficult or time consuming steps in the project closeout process? Why?	pursuing people for information, researching items that are unique, mispecified item and extra extension of warranty period, atypical items are time consuming

Sl No.	Questions	Responses
		getting and reviewing O&M manuals, preparing and coordinating As-built dwgs with subs. Since there is no dollar value attached to these documents therefore the contractors are not financially motivated.
		Having subs read and understand specifications. There is always one who doesn't follow.
		Getting CCDs processed, Documentation, getting as-builts.
		Having to do it. Calling subs and suppliers and getting info from them.
		Getting punchlist that is agreeable to everyone. Cleaning up outstanding disagreements, getting change orders resolved. We try to get punchlists performed by all trade craftsman as soon as possible. (eg. Get all masonry punchlist work before painter arrives).
		Getting correct and complete O&M and As-builts. And financial closeout.
		collecting and organizing the data.
C18	What are some project factors that can impact the success of the project closeout process? (e.g., dollar value of the contract, new vs renovation, source of funds, project delivery system, etc.)	Individual GC's PM heavily influence the sucess of the project by working with subs and not losing them by asking for things that cannot be given, by understanding the process , by providing a specific list of things that subs must provide without passing the entire responsibility to the subs owners should be reasonable in their requirements Design-build works better to facilitate speedy closeout, With CM, it may help a little because they may make a list but CM avoids risk In renovation, it depends on the scope of the project
		Dollar value of project doesn't affect much. No difference either in new or renovation project. Source of funds have impact at times for example the state funded projects are difficult to finish. The most important factor is project delivery system; CM and D/B systems helpbecause of early interaction with the owner. the GC delivery system causes problems.
		Type of owner as not all owners are knowledgable about maintenance. Subs that don't comply. In MSU the documents touch too many hands which is a problem
		Renovation projects take more time because more CCDs are issued.
		Longer projects cause problems.phasing of projects cause problems, new projects generate more punchlists so they cause more problems compared to renovation. When the premises are partially occuped then the damage due to their use also cause problems.

Sl No.	Questions	Responses
		Diligence is important. Smaller projects may be harder to closeout because personnel are working on multiple projects.
		Project staffing is critical for the success because the Project engineer and trailer cannot do all the stuff together. New projects are easier than renovation projects because of fewer changes. CM might go quicker because they are properly staffed.
		The factors that may impact the success of the project closeout are: *communication, *tracking the closeout, *choice of materials and methods, *new vs renovation project.
C19	Typically, how long after you have completed your last closeout/project paperwork/item does it take to receive final payment from owner?	varies, with MSU it takes 45 to 60 days State of Michigan- 15 to 30 days private clients- 30 days public agency- 30 to 60 days
		By contract within 60 days which is generally done. However problem is reaching the last paperwork/item stage. Its typically 30-60 days after the resolution of all change orders.
		6months-1year in case of MSU which is terrible. State of Michigan clears payment in 60 days.
		Within 30 days. MSU requires Pollution control insurance policy which they dint inform on time. This costed us timely payment. They should mention C/O expectations at a kickoff meeting.
		30 days at best and 60 days at worst.
		30-45 days. At MSU the documents touch too many hands which wastes a lot of time. They have a tendency to lose documents. Interim payment is a problem with MSU as they don't process it on time. They don't as-built material list as a requirement in front end documents. other universities have stricter and clear requirements setup. Documentation required is a moving target.
		45 days. It takes 20 more days if audited for all the draws.
		45 to 365 days, varies
C20	Generally, which project parties are most responsible for closeout delays?	owners and architects on front end through the specifications mechanical, electrical, roofing, coating, any major manufacturer, subs generally are co-operative but the source of problems are more with the distributors and manufacturers who really force the parties to conform to the manaufacturer's process
		Owners, resolving financial claims is not an issue though. Its only the scope and resolution of change orders.
		Telecommunication and mechanical contractors generally cause most delays. In MSU, someone is always late in progress meetings. They hold sidebar conversations too which is annoying.
		At MSU it's the CCDs which take maximum time. Generally it's the mechanical and electrical contractors. State of Michigan with owner supplied equipment costed us a lot of time. Architectural reviews.

Sl No.	Questions	Responses
		Electrical, Plumbers. Parties like Siemens don't care about timely completion
		All parties say A/E, Owner, CM, Contractors are equally responsible. MSU shops don't affect much.
		The Project Management side of things causes maximum delays, Architects do take long times. The PM for any party if not communicating well with his own office causes problem. MSU has had instances of losing documents within EAS. The CPA informed very late on builder's risk insurance which caused us problems.
		Subcontractors, Specialty contractors and MEP cause the maximum amount of closeout delays.
C21	Are performance records of specialty contractors your firm works with formally maintained? If so, what metrics are tracked? How do these records affect contractor selection?	informally,the contractors know the strength and weaknesses of each of the subs and looks for advantages nd disasvantages in each,the contractors also know the working style of each of the them (benefit Vs Cost analysis)
		yes, a rating form is in place called 'trade contractor performance questionnaire'. Which is subjectively filled by the PM or superintendent or both. The questionnaire acts as a factor in selection of the contractor in future projects.
		Yes we have ISO certified evaluation form, wherein we look for trend of bad subs. We have manager meetings to evaluate subs.
		We are a small firm, have a staff scheduling meeting every Thursday where we schedule work for next week. We mentally take notes of staff performance, talk about subs performance.
		We have an informal "crap list" in our office for people who don't perform well.
		Yes, in a subcontractor database if the project value is more than $50K. Evaluation done by field team. If a contractor gets 3 no's then their record goes to process improvement team who decide if to keep them for future projects.
		Yes. We track their bonding capacities, and we maintain a database which can be accessed by anyone across the board.
		Yes, we do collect data to track performance of specialty contractor. We have FTC (failure to comply) forms which allow us to report and record the problems on site and give contractors time-frame to correct it. This form also ensures safety and quality in performance of work.

Sl No.	Questions	Responses
	Project Closeout Improvements	
C22	Have you drawn any conclusions with respect to the dominant causes of slow project closeout process times (punch list, quality of design documents, etc.)? What are they?	clear closeout items at the front end in case of O & M and warranties making sure the information is accurate owner and A/E should prepare a list of specific technical requirements from the specifications contractor needs to take initiative on punchlist very low productive work on punchlist need contractor's "work to complete list" to be ongoing and contractors need to take ownership owners should ask for things that is really needed with respect to the project
		staffing decisions of contractors play critical role (we do err soemtimes). The contract documents arent an issue. The design documents, if poor, may cause lots of changes which take "eye of the ball".
		Some people haven't been trained or they don't know. When we work with MSU students we make sure we make them understand the process.
		Preparation of As-builts, approval of CCDs, self performed punch lists are dominant causes of slow project c/o. We think a single point contact with authority can greatly help in expediting the process.
		when the work is slow it is mainly due to contract document conflicts, plans and specifications collide
		Diligence is the most important thing.
		Collection of paperwork takes maximum time. Design docs also cause problems if they lead to many change orders.
		*Lack of effort *lack of interest *If technical specifications do not clearly specify the requirement of document then it takes time to turnover the documents, in addition to that Architects take long to approve punchlists.
C23	In your opinion, what are the main causes of slow completion of punch list items or end of project administrative tasks such as record documents, turning over operation and maintenance manuals etc. by contractors?	punchlist takes a long time with almost no production in punchlists since subs put in small crew on work record documents are not a problem since they are collected as work progresses MEP generally good on keeping as-builts up to date record documents too loosely defined and varies, sometimes include change orders, bulletins, RFI quotes etc expectations and definitions should be clear
		If the partnering agreement between client, contractor & sub-contractor is not good then it affects the closeout process. It is also important to give a pre punch list to the sub-contractor before they are offset.

Sl No.	Questions	Responses
		Transfer of documents from too many hands. Lots of times architects don't know what they are looking for. MSU takes a lot of time tranfer documents into right hands. We would like to have maintenance people sign-off on documents.
		Mostly mechanical subs cause delays chasing their suppliers and coordinate with their stuff. Generally speaking the subs don't coordinate timely.
		Arguments in punchlists by people who move in or check them late. Partial occupancy of premises also cause trouble.
		Contractors donot want to perform punchlists unless they have entire punchlists in hand. Change order finalizations take time. Paperwork takes time incase the main guy is taken off the project. Sometimes end user/owner who is reviewing is not knowledgable about the documents.
		Main cause of the slow completion is that the project team's focus shifts to the next project by that stage.
		*getting people together *identifying who will organize a walk through with the parties to check the punchlist items
C24	Do you feel that owners' contract documents adequately describe the project closeout procedures? How could this be improved?	No the owner's contract documents should be clear and specific to the project and not boilerplate
		Yes
		Yes, it does. We would appreciate if a date is given for closeout document handover. MSU dates are ridiculous especially for remodel projects where it takes too long to get a CCD. The prject representatives should carry a pad of CCDs and issue quickly.
		Specific to MSU , they could give us a project specific checklist instead of issuing a generic checklist. Probably, introduction of separate division of Closeout could help.
		Yes, at MSU they are consistent with their request, with years of experience with them we know what they want.
		with MSU they don't clearly specify as built material list as a requirement in front end documents. More teamwork is required in that aspect.
		No, we would like to see them in detail by division wise. We don't want to see generalised statements.
		varies with owners. MSU is very inconsistent on identifying the closeout documents. Instead of giving the list at the end, they must give it with the contract documents.
C25	Do contract clauses have an impact on overall project closeout? (Please give an example)	yes in terms of motivation State of Michigan does not hold retainage but has a closeout line in the documents with a total of 6% held back (2% for as-builts, 2% for code certification and 2% for O & M)
		Yes. Substantial and final completion liquidated damages elevate the significance of closeout. They work good from risk management perspective, but bad for partnerships. MSU has final completion clause but no damages associated with it.

Sl No.	Questions	Responses
		Yes, we have a 72 hour clause where if the sub doesn't comply then we do it ourselves and back charge the subcontractor.
		We are obligated to closeout the project no matter what clauses are there in the contract.
		No
		No, it is a clear understanding of expectations.
		Putting definite timelines for Substantial Completion and Final Completion might draw attention of contractors. (MSU does it).
		More often than contract clauses, the management aspects have a greater impact over the overall project closeout.
C26	Does retainage, or the threat of holding retainage, affect the project closeout process?	yes, refer C25
		Yes, works as financial motivation. It's a flowdown clause so wont pay the subs. However retainage should not be kept for closeout documents. Insteead they should be included as line items in schedule of values.
		No
		Retainage is a non-issue for us, but it affects the subs.
		Retainage more than 5% is a pain. It does pushes some subs.
		Is it not a big motivator. The owners just use it as a hammer.
		Yes
		Yes, to an extent, witholding retainage may affect the porject closeout.
C27	In your opinion, what motivates contractors to work for timely project closeout?	not paying liquidated damages, getting money in the bank, providing good service to the client, future work with the owne and customer service
		Money
		They get paid quickly.
		Holding back retainage on subs motivates them to work faster. We personally don't like to see pile up in the books so we try to finish quickly. Holding back our retainage has some minor issues with bonding companies as they tend to observe the clash flow and our exposure in the market, so the bonding capacity decreases for that portion of time.
		Money
		Money, prospect of future work
		Quicker payment, prospect of future work.
		final payment
C28	Do you have any opinion or analysis on whether the project delivery methods such as design-build, construction management, general contracting influences project closeout times?	Design-build and CM is better in general
		Yes the affect. In the order of 1. Design-build, 2. Construction management, 3. General contracting. The level of control is more and at an early stage in first 2 delivery systems.
		No

Sl No.	Questions	Responses
		GC system is better than CM as it does no extra benefit to the owner. For us Design-build is the best method as "we get to drive the bus". We make technically practical designs and our submittals are more seamless.
		Design build is the best. CM is no use for project amounts below $50million
		GC closes out faster because more money is at stake
		Maybe GC has a longer lead time because of less staffing than CM.
		CM affects the PCO times most. This method of delivery is most favorable to the owner.
C29	Has your organization been involved with projects which have used commissioning services? How does the commissioning process impact project closeout time?	not really applicable because of limited experience, also depends on the quality of the commissioning agent
		Yes. The commissioning process delays the closeout process at times because a lot of commissioning stuff is dependent on weather conditions.eg. Boiler testing.
		Yes, it makes the closeout process easier.
		we have provided commissioning services in UofM projects. It is very helpful as the preformat closeout for us.
		No
		Yes, commissioning helps, because things are in place at an early stage. Equipments are brought in early and so is commissioning agent. Plus there are very few repair calls.
		Yes, it helps closeout because things go hand in hand from the start.
		Yes. Commissioning services shorten punchlists and minimizes closeout times.
C30	If you have used partnering agreements on projects, has project closeout been mentioned or highlighted in these sessions? Has it been effective in condensing the project closeout time?	Yes project closeout is mentioned in partnering agreements yes, it has been effective in condensing the project closeout time when it is established and and mutually agreed upon
		Yes, have done partnering agreements but don't remember mentioning closeout. Yes it helps.
		Yes, but it doesn't have any substantial impact on closeout process.
		No we havent used any partnering agreements.
		No
		have used it in health care projects, but closeout wasn't highlighted in partnering.
		Yes, but we havent seen any effect one way or another on c/o. But partnering did affect resolving disputes better, so in a way could affect c/o better.
		Yes we hahve used but not sure if that affects the PCO.

Sl No.	Questions	Responses
C31	In your opinion, are the items identified by owner personnel on the punchlist usually reasonable?	the identified in the punchlist by the owner are not reasonable but the items identified by the A/E are usually reasonable skilled trades may sometimes ask for items which are not really in the contract documents which results in change of scope ' wish list' also the plans and specifications are not reviewed properly before construction
		Yes, most of the times.
		Yes, we usually self punch and then go to the owner and punch as we go along.
		Yes, it is fairly reasonably at MSU, the church projects are painful because there are more than no. of people required to check punchlist with us.
		Usually they are reasonable but not always. End of project changes by end users do cause problems.
		99% of the time.
		Yes, mostly owner defers it to the architect.
		Yes
C32	Based on your work with other large owners, what organizational traits influence timely and effective project closeout?	No discernable differences
		Decentralized and autonomy of the project representative help in running the project quicker. The most knowledgable individual is best able to handle situation. In MSU, the different source of funding and shops affects the project reps' ability to closeout. The BMS is worst; works directly with siemens. keyshop, telecomm landscaping are other problem makers. problems arise when there is a gap between activities.
		Strong desire to get the job done
		certain qualities that we think are important in organizations are maintaining teamwork emphasis which comes with knowledge and experience, personality combination, no fingerpointing, single point contact with the authority.
		Speed of document flow is important. All organizations are same with respect to closeout.
		Having clear expectations, having important people active in the process. Good control of the process
		Heirarchical structure of the organisation. No. of approval levels make a difference (we expect less levels).
		Having an owner's representative who is knowledgable, responsible and has enough authority and accountability to make decisions is a strong factor.

Sl No.	Questions	Responses
C33	Describe effective project closeout techniques performed by subcontractors or vendors you have observed.	vendor must be proactive and take control of the process rather than waiting for the process by sending O & M and other documents as soon as they can. vendors are better than subs at closeout
		Sub-contractors' own understanding of close-out importance easies out the job. Not aware of the techniques used by them
		Developing relationships with people, they then know what to expect.
		Haven't seen any.
		All of them have ups and downs. Multiple people doing as-builts cause problems. Changing PM during job cause problems.
		Some of them step-up and do it on time.
		Vendors who keep O&M, As-builts up to date are better. Individuals who are proactive make the big difference.
		Some of them are very organized and that helps. They set a timeline and back it with proper staff to meet the deadline.
C34	What incentives or measures have you seen used on projects (or department) that can help lead to quickly closeout a project? If none exist, what incentives do you feel would be effective?	withholding payment is one of the incentives
		if closeout documents are allowed to be included as line items in schedule of values, that would help.
		Pay quickly is the best incentive. We try to shame people if they don't do the job; make subs call each other.
		We like to tell people that they have done a good job and appreciate it, Intra-office competition to step up the speed is a good measure. We would appreciate acknowledgement from MSU in form of certificate if closeout project on time.
		Experienced and effective people who are organised should handle the stage.
		Havent seen any financial incentives. Having right people on the side who push the prcess is what matters the most.
		We havent observed any incentives. Quicker release of retention money or reduction in retention percentage could work as an incentive.
		The most important thing for the contractor and the subs would be to deliver the as builts on time and for the owner to release final payment on time.

Sl No.	Questions	Responses
	Closeout and Michigan State University (MSU)	
C35	Please describe your company's role and involvement in the project closeout process on MSU projects.	GC is in control and is at the apex in the process
		no answer.
		We try to get the job done quickly and get paid.
		discussed already
		CCD's take time to process, we start doing it when last CCDs start coming in.
		Answered in C36 and C37
		Our role with MSU is to get the documents that you need as quickly as possible. MSU audits prevailing wage rate audits regularly which is good.
		Overseeing the process
C36	Please comment on effectiveness of MSU's project closeout process?	final change orders are big,usually delay closeout since the project can't be closed without it project closeout list for project rep is helpful but the boilerplate is not project specific closeout items should be defined upfront
		MSU is more thorough as compared to other owners and universities. They cover all bases.
		Lots of people are looking over the process which is unneccessary. It takes a long lead time. The documents sit on project reps or architect's desk for long time. State of michigan puts As-builts, O&Ms and Cert. Of Occupancy as line items for 2% under schedule of values.
		CCDs take lots of time. Documents exchange many hands.
		They are consistent with their requirements.
		They should come up with clear expectations, identify the authority from their side. On MSU part, getting their whole team on same page is important. Their physical plant self performed work takes a lot of time. The student reps only add an extra layer and thus more time. R: Landscaping should be included in contract; not in shop.
		Its effective, but could be more so if communicated earlier. They could communicate expectations at kickoff meetings. Training might be a good idea. And single point of contact would help.
		MSU is poorly effective, they sometimes lose documents (such as invoice, insurance certificates). Therefore, we may have to pay the subs from our pockets resulting in less competitive bids from subs.

Sl No.	Questions	Responses
C37	Is the length of the project closeout process at MSU comparable to other projects your firm encounters? Do unique conditions exist at MSU that either shorten or extend the project closeout phase?	Yes, fairly typical except for the change order
		yes, very typical. No special conditions exist.
		No. They take too long to issue a change order and do final billing. For a comparison scale they take 5 times more time than state of michigan to do final billing.
		State of Michigan is worse because of lots of hands and bureaucratic system, UofM does it quick as they carry a hammer on closeout documents. MSU delays a lot when it comes to CCDs, it extends to the point of being abusive. Change orders at UofM are quick, they use labor rate sheets for pricing subs.
		MSU is more stringent with requirements. Sparrow hospitals are a bit lax. But their change order process is too drawn out.
		We had a lengthy closeout process. Had lots of changes at the end of our project with liquidated damages clause hanging at our head.
		Yes, but MSU has the potential to go faster.
		No. MSU has a long pay out process. In other aspects all owners take alomost the same time.
C38	Do you consider MSU to be a reasonable customer with respect to project closeout requests?	Yes
		yes, they are easier than some other clients. They specify it too early and don't vary from project to project.
		Yes
		Yes, they don't request waivers till the end.
		In general, Yes.
		Yes, but they need to be more clear.
		Yes
		Yes
C39	What impact do the design/construction standards of Michigan State University or its administrative processes have on project closeout process times? Explain.	design/construction standards does not impact much
		Inconsistency in construction manual requires changes at times. If standards arent upto date then 'unwritten standards' apply. Earlier involvement of shops and trades in the process is required.
		It makes it easier as we can see the updates on the website.
		CCDs are a big issue, there should be more people involved upfront. A single point contact works better.
		Green book gives us sets of guidelines which eliminate arguments.
		Standards are not out of line. Administrative tasks take more time and cause problems. EAS should improve their own understanding of their requirements.
		Ones that are better spelled out to last detail would help closing out better.
		They do not have any specific required standards mentioned in the list, its mostly general inclusive of the documents required in the project closeout.

Sl No.	Questions	Responses
C40	Do MSU (or other owner) "front end documents" adequately address project closeout requirements and process?	No the front end documents are too boilerplate and are not project specific
		Yes
		Yes
		No, we expect a clearly defined closeout checklist.
		Yes
		No, expectations are not clearly communicated.
		Yes, but it depends on owners. MSU is particularly good.
		It requires improvement. They should update and publish the forms regularly.
C41	If you provide construction services for universities or other large public sector owners, what aspects of their project closeout management processes which should be considered for adoption by Michigan State University? Explain.	Not aware of any
		None
		They should consider involving fewer people in the review process.
		Uof M's labor rate sheets and project billing rate sheets help in streamlining the process.
		MSU's system is laborious but consistent, but their Change order processing takes time.
		UM understands project requirements better than MSU. MSU held all contingency outside of contact, we would like to control construction contingency to better manage the contract, would not have to wait for MSU issued change orders.
		None.
		Not sure of any. Fewer people handle the documents.
C42	What suggestions do you have regarding project closeout that might be helpful in improving MSU closeout processes?	upfront expectations for items to be submitted and should be explicitly stated
		Should define const. closeout activities and define responsibilites for contractors. Should minimize late scope changes and let the contractors finish out. If closed out once, then MSU should issue new contract for any work on same project.
		Need change orders quicker to c/o projects. would like to do a job with no change orders.
		There should be one point of contact. A customised closeout checklist. CCD process times should be quicker. They should have additional backup for a change request from a student (students need more oversight).
		Should track paper work effecitively; quit losing them. Consistency among project reps would help a lot (each of them have their own tracking system)

Sl No.	Questions	Responses
		They should handle change orders better and timely. Should understand project requirement better. Define responsibilities better. They have a lumpsum mentality (refer to contingency comment in C41).
		If there is a way to shift responsibilities to PM or Project Rep like getting approvals then that would help. Standardizing procedures across the MSU PMs can help things quicker.
		Identifying who is responsible for closeout process. Important to discuss their shortcomings.
	Any other comments you would like to add?	disincentives(punishment) does not really work since contractors are skilled at defending themselves and also the contractors devote a lot of resources communications, documents and the requirements must be clear
		None
		Need Standardized c/o meetings. Relay expectations with GCs and other people, regular exchange with vendors; that will streamline processes.
		Simplification and standardization of processes would help
		When someone goes on vacations, the process gets stuck. They should notify absences.
		Follow up with discussions

APPENDIX II

SUBCONTRACTOR INTERVIEWS

Feedback from Subcontractors		
Sl No.	**Questions**	**Responses**
	Organization structure and Project Management	
C1	What is the title of your position within your firm?	Project Manager
		president
		Project Manager/Estimator
		Project Manager/Estimator and Executive Vice President
C2	What are the types and ranges of projects your firm is typically involved with?	all sizes of commercial construction and small industrial
		commercial and industrial
		MSU, schools, commercial, pump station
		All MSU Projects, Hospitals, Power House, Auto Buildings, Excavation work, Steam work or Underground work. (Largest firm in MI)
C3	Describe your firms primary delivery method (i.e. design build, construction manager, ...)	hard bid "plans and specs"
		design-build, construction manager, GM (bids and specs)
		design-build, CM, GC
		Our method of project delivery is General Contractor, Design Build and as trade contractor on CM projects.
	Closeout Processes	
C4	What is your company's definition of construction project closeout?	O & M manuals, as-builts, punchlist mainly constitute project closeout
		final documents to be turned in at the end of the project
		transfer information to owners, mainly consists of as-builts, warranties, O & M. People usually tend to move on to the next job and closeout should be thought about midway through the project
		We consider a project to have closed out when the owner has obtained a reviewable, accessible set of drawings and data that helps them to maintain documents, install or order new parts. We also help MSU with their commissioning and supply them with an O&M manual.

Sl No.	Questions	Responses
C5	When do you begin to consider the project closeout phase?	project closeout is considered from the very beginning of the project
		1 to 1 1/2 months
		1 Month before completion
		We generally begin to consider a close out from the time when we begin the contract and start to issue purchase orders. We usually provide the schedule of values. Retention % is flexible.
C6	Are disagreements over achieving substantial completion common among large owners? How are these conflicts usually resolved?	yes, there are disagreements over achieving substantial completion the owner always pushes the boundaries with substantial completion though there are defined laws about substantial completion. there is always a grey are about the date of substantial completion warranties and retainage are concern of the contractor
		Yes, conflicts usually resolved through meetings at the closeout phase
		The substantial completion date is part of the contract and usually there aren't any disagreements. The date is achieved by bringing in more manpower and working more hours
		Owner usually expects us to take responsibility of the maintainance therefore there is usually conflicts between the maintainance and warranty of the work. We get the certificate of substantial completion for the work when the individual departments give their approval. For example, Mechanical dept. there is no occupancy w/o permits and therefore no substantial completion.
C7	Can you outline for us the basic steps and activities in the project closeout process? Are these project closeout activities identified in the construction schedule?	as-builts, O & M, punchlist, warranty. Usually not included in the schedule
		punchlist, O & M, Warranty, final payment these mainly derived from the specs and usually not outlined in the construction schedule
		O & M's are obtained from suppliers through e-mail, as-builts obtained from electrucal foreman, warranties begin from the substantial completion date, testing, final electrical certification from the State of Michigan the closeout activities are not outlined in the construction schedule
		*Get the subcontractors and suppliers to provide the information to MSU in the beginning of the project close out. *Helping MESRI to prepare the O&M by providing them with the basic data.*Completeing the as-built material list for MSU and providing all the necessary permits, warranties, records, flushing&testing and forms.
		Comment by personnels of the company WRT to C7: *We prefer Construction Management compared to the General Contractor. CM maintain a submittal log, their process involves more paper work but is more efficient and reliable. General Contractor, they do not have as much paper work, which is good but then its not reliable sometimes. *We also maintain a set of coordination drawings and Supervisor's reference manual on site

Sl No.	Questions	Responses
C8	Based on statistical data or from your experience, what is the usual time associated with closeout of projects?	the time depends on the size of the project. Sometimes, punch list drags and may take months - 6 months. Smaller projects are easier to close and have less problems
		depends on where the project is located. If it is in E. Lansing, usually takes one to two months and if it is a MSU project takes 6 months to a year
		30 to 60 days
		For small jobs it usually takes about 3 to 4 days or a week and for larger jobs it takes about 4 months. But considering total completion including final payment- a small job may also take 60 to 90 days after submittals are completed to gather all parties together, to coordinate various as builts and follow up.
C9	Does your organization evaluate project closeout for various projects?	No
		yes
		No
		Formal evaluation is done by means of the company's Evaluation form and otherwise informally experienced project managers are recruited for the purpose by word of mouth.
C10	Does your organization have a project closeout checklist for various projects depending on the size? If so can we obtain a copy of this checklist?	No formal checklist but information is derived from the specifications
		yes, checklist is provided
		checklist provided
		Yes.
C11	What project management software is currently being used by the organization? How have they impacted project closeout?	do not use any software
		software "Quickpen" is used for Bid, estimating and Design. The software does not have any impact on the closeout phase, it is mainly driven by the contractor
		"Accuvid" is the software cuurently being used for estimation. A 'binder book' is maintained for RFI's, purchase orders, contracts, permits, bulletins, lights, fire alarm, security, log books
		We have been using a Project Management software for the last 14 years which have had a positive impact on the project closeout process.

Sl No.	Questions	Responses
C12	What is the targeted duration for completion of your portion of the project closeout process?	No timeframe, but an effort is made to complete as soon as possible
		The last month- 30 days
		30 to 60 days
		ASAP or probably one week. Realistically it takes 2 to 4 weeks considering substantial completion process and then preparing the as built material list
C13	Do incentives exist within your firm to quickly and effectively closeout a project?	No
		no
		no direct incentives, final retainage which is usually 5 to 10% is the only motivation
		No
C14	Are you aware of any published industry average rates for project closeout process times?	No
		no
		no
		No
C15	Is Project Closeout perceived as a problem by the contractors? If so, why?	Yes, always. Money and time are the issues
		yes, because of the time that it takes between different projects
		yes, It is more a hassle bcause of people moving on to the next job and it would be more easier if it starts midway through the project
		Yes. This process continues to be a moving target even with consistent customers as MSU. Everytime a new process and a new price is added, it becomes an ongoing and continuous process, thereby witholding the final payment of the contractors.
C16	What costs, if any, are associated with the project closeout process?	Typically, hourly labor. Burden is on the salaried people
		1 to 2 % of the project (dollar value)
		No benefits, but there are labor costs
		management cost, clerical cost, delayed final payment and when its more than one project, it adds on to a huge amount.
C17	What are the most difficult or time consuming steps in the project closeout process? Why?	as-builts - since they are not updated regularly.
		commissioning because of the units that have to be brought in together
		all steps need equal attention
		As-built drawings an important part of the closeout process is good but compiling the O&M manual, preparing as-built's material list and gathering the field data takes longer.

Sl No.	Questions	Responses
C18	What are some project factors that can impact the success of the project closeout process? (e.g., dollar value of the contract, new vs renovation, source of funds, project delivery system, etc.)	dollar value of the project does have an impact but not sure about the new vs. renovation. Source of funds do not have much impact and the delivery system might help
		just the people one is working with
		none but then project closeout should be thought of midway through the project
		Dollar value, new vs renovation aspects of the project does not necessarily affect the success of the process but the project delivery method does. A CM method facilitates quick review of the documents because of the log being maintained. The success is also influenced by the level of complication of the project. and the information regarding the required equipment and the tools.
C19	Typically, how long after you have completed your last closeout/project paperwork/item does it take to receive final payment from owner?	final payment is received fairly quickly. On an average 30 days
		varies, some are very quick and some are slow, Sparrow Hospital- quick, MSU-slow
		varies quite often. 60 to 90 days to even a year or two
		min 60 days, approximately for all projects
C20	Generally, which project parties are most responsible for closeout delays?	getting O & M manuals from vendors
		problem are from the subcontractors, they are not on the frontline
		Don't know
		The control contractor by default is mostly responsible for the delays because he is the last one to finish his job.
C21	Are performance records of specialty contractors your firm works with formally maintained? If so, what metrics are tracked? How do these records affect contractor selection?	No, not formally maintained but mainly based on experience
		yes, mostly through insurance, EMR is also made known
		yes based on the date, scheduling and the wait for materials. The data is used as a leverage at the time of selection
		No. we normally give them a review of their work and represent their performance to the owner in our performance evaluation form. Normally, we educate and train our subs to upgrade their performance.

Sl No.	Questions	Responses
	Project Closeout Improvements	
C22	Have you drawn any conclusions with respect to the dominant causes of slow project closeout process times (punch list, quality of design documents, etc.)? What are they?	punchlist and as-built are major factors
		no
		no
		Punchlist takes the longest time (Recommendation: It should be more frequent and periodic, one per month atleast). Too many RFIs(design issues) contributes to the delay in the process. (self derived solution: for steaming projects we prepare punchlists ourselves due to safety issues and for other projects we prepare preliminary punchlists.
C23	In your opinion, what are the main causes of slow completion of punch list items or end of project administrative tasks such as record documents, turning over operation and maintenance manuals etc. by contractors?	punchlist is slow because building is occupied, people have moved on to the next job and should be schedule around the activities within the building. Difficult to mark the concealed parts in the as-built drawings by the end of the project
		causes are with the subcontractors since they are busy with other projects this takes a backseat and closeout not dicussed as much as it should be
		MSU is proactive in the completion of punchlist items
		Any of the trade contractors can cause the delay in the preparation of the punchlist
C24	Do you feel that owners' contract documents adequately describe the project closeout procedures? How could this be improved?	the specifications are pretty clear
		yes
		yes
		MSU's contract documents do. They have defined a checklist, but it includes every single detail of repeated items.(This makes it very time consuming. If they have considered us as prequalified and preferred contractor, they should allow leniency in submittals to that extent that we are efficient in our delivery of work)
C25	Do contract clauses have an impact on overall project closeout? (Please give an example)	only if it is perceived as a threat
		yes
		yes, money plays an important role
		The new MSU contract always include some amount of Killer Clauses, but never mention that the contractor will be notified about the same.(self derived solution: we have a clause that we now include in all our forms that we must the right to review the contract before signing.

Sl No.	Questions	Responses
C26	Does retainage, or the threat of holding retainage, affect the project closeout process?	yes
		No, because still closeout gets done
		yes
		Yes
C27	In your opinion, what motivates contractors to work for timely project closeout?	money
		psychological effect- closing the project in books
		retainage, starting closeout midway through the job
		Money (Final Payment), release of retention. That is where the profits at.
C28	Do you have any opinion or analysis on whether the project delivery methods such as design-build, construction management, general contracting influences project closeout times?	In design-build, the projet seems to go faster, drawings are good and changes are made as the project goes along and punchlist can be created by the organization
		CM is lot slower than GC because it adds one more layer. Design-build is faster
		no
		CM- involves more paper work but more efficient, thorough, more organized due to Log. GC- is more streamlined (less expenditure) but not thorough and they get involved in bid shopping activities.
C29	Has your organization been involved with projects which have used commissioning services? How does the commissioning process impact project closeout time?	no
		Yes, makes the project longer
		not directly but adds more cost to the project and also takes a lot of time and labor
		Yes. Currently the commissioning process is affecting the project closeout time greatly and negatively because the system is not set up very well.
C30	If you have used partnering agreements on projects, has project closeout been mentioned or highlighted in these sessions? Has it been effective in condensing the	Not involved in any partnering projects
		No
		no
		Yes. But its early to tell.
C31	In your opinion, are the items identified by owner personnel on the punchlist usually reasonable?	pretty reasonable but the owners do not get the trades right
		Yes
		90% are reasonable but the rest 10% is not
		Punchlists are done by engineers and reviewed by project representatives. Sometimes its reasonable and sometimes unreasonable.

Sl No.	Questions	Responses
C32	Based on your work with other large owners, what organizational traits influence timely and effective project closeout?	there are no organizational problems from the owner's perspective. If there is a lack of organization it is from the contractor's side.
		training of individuals invlolved in closeout, personality traits
		refer above
		Aggressive project management helps influence timeliness and effectiveness of a project closeout.
C33	Describe effective project closeout techniques performed by subcontractors or vendors you have observed.	training and in case of big equipment the vendors are proactive in sending their O & M manuals. Usually sent before installation or in conjunction with it.
		No set techniques. The specifications are thoroughly looked at in order to obtain items that are required during closeout
		none
		For example, Michigan Supply (piping and fixtures) are very responsive and proactive. They give O&M manuals with submittals and with each revisions they resubmit it.
C34	What incentives or measures have you seen used on projects (or department) that can help lead to quickly closeout a project? If none exist, what incentives do you feel would be effective?	Haven't seen any incentive. Retainage is usually a disincentive
		None but instead of retainage an incentive clause would be helpful
		starting closeout midway through the job
		Asbuilts= 2%, O&M=2%, project closeout and miscellaneous=2%
	Closeout and Michigan State University (MSU)	
C35	Please describe your company's role and involvement in the project closeout process on MSU projects.	mainly involved in producing as-built drawings, O & M manuals, warranty and punchlist
		just participate as per the specifications
		refer the checklist provided. MSU has an as-built material list which is added document compared to others but is not much of a hassle
C36	Please comment on effectiveness of MSU's project closeout process?	pretty minimal involvement with MSU directly involved with the contractor
		slow
		N/A

Sl No.	Questions	Responses
C37	Is the length of the project closeout process at MSU comparable to other projects your firm encounters? Do unique conditions exist at MSU that either shorten or extend the project closeout phase?	Pretty comparable. MSU has an as-built material list which is uncommon compared to others but is not a big hindrance. The time taken for payment is longer
		No- MSU process is longer compared to the others because of the billing process
		yes
		Yes,the project closeout process at MSU is comparable to other projects our firm encounters. The as built material list plus the equipment serial no list contributes to the extention of the closeout period.
C38	Do you consider MSU to be a reasonable customer with respect to project closeout requests?	yes
		yes
		yes
		Yes
C39	What impact do the design/construction standards of Michigan State University or its administrative processes have on project closeout process times? Explain.	MSU requests three O & M manuals which takes a long time but that is typical for an entity-in par with the others
		makes the closeout process longer due to innumerable steps and different levels of hierarchy that is involved like student trainer, inspector, engineer, consultant, admin (Contracts and Grants) whereas outside it is just one person
		none
		It is mostly taken care of by the engineers, therefore we do not have much problem.
C40	Do MSU (or other owner) "front end documents" adequately address project closeout requirements and process?	yes
		yes
		yes
		Yes
C41	If you provide construction services for universities or other large public sector owners, what aspects of their project closeout management processes which should be considered for adoption by Michigan State University? Explain.	No big difference with other large owners. Pretty standard
		not aware of anything different from MSU
		no, nothing more
		Michigan State University should have all its O&M manuals converted to electronic format. They could switch to paperless technology such as BIM and develop a common database that could be accessed by contractors, suppliers and be updated every 6 months.

Sl No.	Questions	Responses
C42	What suggestions do you have regarding project closeout that might be helpful in improving MSU closeout processes?	MSU should not duplicate anything, like O & M manuals which they might have from other projects shouldn't be re-requested
		Only one person should be involved for closeout rather than too may people
		closeout should be considered halfway through the project,through CM
		* There should be a brief meeting before the submittal log is prepared.* MSU should not charge us for the coordination drawings, they may accept electronic copy of the same.* They should have one Project person contact responsible to filter the requests sent to us.* They may extend some amount of leniency to us being preferred and prequalified contractor.* Change orders should be processed more frequently, atleast one per month.
	Any other comments you would like to add?	no
		For larger projects, MSU could perhaps save more time and money by using the list of prequalified contractors. In addition to this, a frequently updated database will halp save time and also serve to be a source of future reference.

APPENDIX III

COAA CLOSEOUT WORKSHOP

COAA Spring 2007 Conference
Project Closeout Workshop- Barn Raising
May 9th 2007

Introduction

Project Closeout workshop was one of the first few sessions in the COAA Spring 2007 conference. 39 attendees were present which included owners from various institutions, each of whom belonged to one of the 9 groups. The presentation included a brief introduction to the research currently being conducted by the CPPAI team at Michigan State University, the literature review till date, barn raising session which included a discussion and sharing of views by various participants about project closeout and finally tabulation of results and conclusion. The barn raising session comprised of three questions where several views of the attendees were shared. The following are the questions that were part of the barn raising session-

1. What are the critical factors that affect the project closeout process? Rate the relative impact that these factors affect the likelihood of project delays

The nine groups present in the closeout workshop session listed several critical factors, out of which the five factors that each group considered to be important were chosen. Some of the critical factors mentioned by the groups included

- Complexity of the project
- Unresolved construction issues
- Never-ending punch list items
- Lack of defined closeout procedure
- Project personnel moving out after substantial completion,
- Commissioning performance issues
- Planning
- Contractual agreements with clearly defined responsibilities
- Management attention
- Choice of contractor
- Money as an incentive/disincentive
- Project manager (owner) limitations in terms of time, knowledge, motivation, incentive
- Contract requirements- link pay with completion
- Pressure is off after substantial completion
- Burn out, project team loss of focus
- Closeout paperwork, record drawings, O & M
- Completion of punchlist and never-ending punchlist
- Building officials-certificate of occupancy
- Fire Marshall
- Final change order/unresolved claims
- A/E electronic as-builts, CM/Sub as-builts
- Delivery method
- Poor trades coordination
- Accounting/funding issues

- Amount of MEP work
- owner defined closeout terms/ expectations
- lingering design issue
- definition of substantial completion
- Audit process (auditors)-identified at the beginning of the project
- Retainage % held
- Scope creep

The attendees of the workshop finally chose five factors which were considered important from the list developed by all the groups put together. The factors in order of importance, chosen by the attendees of the project closeout workshop include-

- Unresolved construction issues (35)
- Lack of defined closeout procedures (25)
- Lack of monetary incentive (21)
- Punch list (19)
- Strength of contract agreement, quality of documents (17)
- Change in project personnel (15)
- PM (Owner limitation) in terms of knowledge, motivation and incentive (11)
- No urgency to final completion (7)
- Audit process identified at the beginning of the project (accounting, funding) (6)
- Burn out (4)

2. What upstream actions during the programming design and construction phases might be taken to reduce the impact of the identified factors on project closeout process?

Some of the upstream actions identified in the workshop session include

- Monthly reviews of pay applications, as-builts and progress photos
- Integrating commissioning into design upfront
- Prepare early handoff from construction to operations
- Percentage or dollar incentive to closeout
- Closeout milestones in documents and schedule
- Program (performance) standards identified early
- Unhurried design process with realistic design schedules
- Educating end-user early in the process
- Include closeout in schedule of values
- List/ spreadsheet/ matrix of all closeout documents and reviewed long before substantial completion
- Identify long lead items
- Closely define problem to be solved at the programming stage
- Identify best team/ delivery method (programming)
- Specifications link payments to architect/ contractor with regular submittals during project (design)
- Clear definition of required documents and processes (design)

- Conduct partnering with team on closeout- include in contract requirements (design)
- Clear definition of MEP coordination/commissioning (design)
- Conduct partnering with team on closeout process (construction)
- Specify/identify closeout documents as required for construction
- Weekly MEP meeting with team on closeout
- Owner, PM performance review to include closeout
- Contract language should be tight and to include specific process, responsibilities and timelines
- Allow adequate time for programming, design, contract document preparation and complete quality control
- Plans and specifications should be tight to include specific process and equipment requirements
- Establish closeout team
- Commissioning agent involved at project conception
- Budget for incentives
- Brainstorm closeout incentives with the team
- Identify closeout activities that could start or be done before closeout like
    - O & M manuals
    - As-builts
    - Partial Commissioning
    - Fire Marshal
- Educate end-users to minimize change orders and delays
- Periodic financial audits- large scale and duration
- Strong adherence to project schedule
- Define owner processes with A/E and Contractor
- Put a process in place
- O & M manuals with submittals
- Create special division 'closeout' in contract
- Fresh person for closeout identified in program phase
- One punch list with all parties represented
- Hold firm on retainage

3. Building on our knowledge of effective contractual systems and team processes, what integrated approach can be developed that leads to better project closeout, hence more successful construction projects?

- Clearly define closeout document
- Contractual understanding by all team members
- Establish role/responsibilities
- Establish accountability
- Implement as contracted
- Periodic reviews/checks
- Contractor writes closeout plan which becomes an addendum to contract- becomes pay item

- Ask contractor and subcontractor for suggestions
- design for closeout by involving operators/ users and starting early
- involving design team throughout
    - quality inspections around closeout
- integrate commissioning- focus project around commissioning with a goal for perfect commissioning
- use of partnering down to the subcontractor and sub-consultant level throughout project life with one common goal or motivation (overall motivation is project success- on time, within budget, quality construction)
    - excellent A/E producer
    - A/E with strong CA personnel
    - CM that executes quality construction
- constructability and maintenance review from project concept
- performance based selection of construction team and design team
- the owner/ architect/ contractor in a co-operative, win-win team contractually bound but operating on exceptional team oriented spirit throughout the project including project closeout
- monetary incentive to contractor, inspector and superintendent for complete documents
- With minimum restrictions, select, develop and nurture project team members and align team member goals with overall project success.

APPENDIX IV

PROOF OF CONCEPT PACKAGE

Introduction

The purpose of this research is to determine the influence of organizational behavior on construction project closeout. The output of this research is a set of recommendations which were developed based on goal-setting theory of organizational behavior to aid contractors and subcontractors during construction closeout process. The recommendations developed through this research are validated here by conducting follow-up interviews with all contractors and subcontractors who were interviewed as part of an ongoing Michigan State University study entitled "Assessment and Improvement of Construction Project Closeout and Vendor Performance Evaluation Methods". The purpose of the Michigan State University (MSU) study is to develop guidelines and recommendations for improving practices to reduce time and cost of construction closeout within a university construction context.

This validation process consists of 8 questions relating to the recommendations developed by the researcher in this research. The questions mainly relate to the practicality of implementing the recommendations in their organization, barriers for such implementation, the importance of these with respect to a particular organizational behavior factor. The responses to these questions will aid the researcher in recognizing the importance of particular recommendations and also help in determining the organizational behavior factor that may impact project closeout the most.

Data obtained from the MSU study was compared to the literature on organizational behavior. Common themes relating to role conflict, role ambiguity, role overload, role of interpersonal relations, incentives, and lack of motivation in the context of project closeout were identified in the data and categorized. These factors are

considered to be the antecedents to burnout in literature. Earlier researches in other fields of study such as sports and medicine have used motivation theories to mitigate the impact of burnout. Similarly, the researcher uses one of the motivation theories namely goal-setting theory in order to develop recommendations to mitigate burnout. By comparing the burnout factors categorized in the data to the literature, causes of slow project closeout relating to organizational behavior was determined. Further, the strategies suggested for effective closeout were compared to goal-setting theory of motivation to develop recommendations which are outlined below.

Role conflict and role ambiguity

In literature, role conflict is said to occur when the expectations communicated by the sender and those perceived by the receiver are incompatible. A lack of clarity in performance of proper tasks results in role ambiguity. The following figure includes recommendations relating to above two factors in the context of construction project closeout.

1. Conduct closeout meetings in the presence of all necessary personnel to discuss specific goals and to assign roles and responsibilities. The studies on goal setting theory indicate that setting specific goals increase performance and that difficult goal if accepted results in a better performance.
2. Expectations should be clearly articulated. All project personnel should ensure that the expectations communicated by the sender and those perceived by the receiver are compatible.
3. A well defined process for closeout should be laid out. This process should outline steps and activities that are required in order to closeout a project effectively.
4. "Organizational commitment" to achieve the goals set for closeout. The literature indicates that this can be achieved through feedback, task complexity and employee motivation. The employee's performance record is kept track of, to see how effective they have been in attaining the goals. Without proper feedback channels it is impossible to adapt or adjust to the required behavior. When goals are established at a management level and thereafter solely laid down, employee motivation with regard to achieving these goals is rather suppressed. Thereby to facilitate motivation, the employees not only need to be allowed to participate in the goal setting process but the goals have to be challenging as well.
5. Set priorities among goals with the help of checklists. The literature indicates that having checklists prevent personnel from working on other items and also alleviates the strain on project budget.
6. The project requirements should be project specific and not boilerplate.

Fig A5.1 Recommendations relating to role conflict and role ambiguity

Role overload

Role overload occurs when there is resource scarcity or when the work cannot be completed within the allotted time. The following figure includes recommendations relating to role overload in the context of construction project closeout.

7. A different team that is aware of project details and has sufficient knowledge should be assigned to close projects. The project details can be made aware to this team by maintaining a common database which shares pertinent project information. Since the focus shifts to a new project after substantial completion, the closeout team can ensure that the project is closed out completely to owner's satisfaction.
8. Enough resources should be allotted to complete closeout activities within the given time. The interviews indicated that there is a lack of resources in terms of labor during closeout. This results in an extension of the closeout time.
9. Empower frontline with decision making authority so that less time is spent in getting approvals from higher levels in the organization.

Fig A5.2 Recommendations relating to role overload

Role of interpersonal relations

Role of interpersonal relations indicates that there may be a potential for strain when there is constant contact with people or there is an increase in demand on personal resources due to an increase in the number of projects. Closeout interviews indicated that there is a potential for strain when pursuing people for information which is often time consuming and requires resources.

10. The closeout documents should be submitted in a timely manner. It is evident from the interviews that more personnel time is spent pursuing people for documents.
11. An open line of communication between the project participants should be ensured for quick and easy resolution of problems.

Fig A5. 3 Recommendations relating to role of interpersonal relations

Questions

How well do you understand these recommendations for project closeout described in this research?

What are the barriers for implementation of these recommendations during project closeout in your organization?

What other organizational factors (other than those indicated in this research) may influence project closeout process?

How helpful were these recommendations to your organization?

Do you have any additional suggestions for improvement?

Rank the importance of recommendations related to role conflict and role ambiguity

- o Very important
- o Important
- o Less Important
- o Not important at all

Rank the importance of recommendations related to role overload

- o Very important
- o Important
- o Less Important
- o Not important at all

Rank the importance of recommendations related to role of interpersonal relations

- o Very important
- o Important
- o Less Important
- o Not important at all

Proof of Concept Responses		
No.	**Questions**	**Responses**
1	How well do you understand these recommendations for project closeout described in this research?	very well
		very well
		fairly well
		very well
2	What are the barriers for implementation of these recommendations during project closeout in your organization?	The recommendation relating to using a different team (recommendation 7)was tried out at the organization. But one of the problems faced was the closeout team was not familiar with the owner or trade contractors. Also, when the project staff realised that there was a closeout team they were not interested in clean up of items. It was not a good financial model or a good business model for performance
		1. Cost for additional resources 2. Failure to recognize the true workload involved due to past practices that underdeliver or hide the effort
		Even though formal procedures are developed in the organization, closeout is at the mercy of subcontractors. Subcontractors don't put a high level of importance to closeout, which is why there is a struggle to get them to accept the formal procedures
		Closeout documents are used as bargaining tool by second and third tier subs to get back the retainage. It is also difficult to use a different team for closeout since the nature of relationship is different as compared to original project team.
3	What other organizational factors (other than those indicated in this research) may influence project closeout process?	Recommendations relating to role conflict and role ambiguity stress the importance of good commmunication. Further these recommendations should be taken into consideration at the onset of the project or even at the planning stage
		None
		somebody needs to take the lead to drive the closeout process
		establishing a timeline for closeout has an impact

No.	Questions	Responses
		Some of the recommendations are being implemented and one of them has been tried out at the organization
		the information is not new but implementation is difficult due to previously noted barriers
		the recommendations are good, it reinforces some of established procedures in the organiation. These recommandations formalize the current process prevalent in the organization. The ISO procedures measure closeout as one of the factors, still working on the process. As mentioned in the recommendations, closeout should be stressed at the kick-off meeting and a checklist that is project specific should identify closeout requirements
4	How helpful were these recommendations to your organization?	Some of the recommendations are in use. They are not formal procedures but best practices
		Key to efficient closeout is conduct meeting early with focus on closeout. It leaves a lasting impression when a project is not closed out properly. Some projects cannot be closed on time because of additional work requested or due to slow change order process times or simply due to owner's desire to keep the project open.
		None
		None
5	Do you have any additional suggestions for improvement?	Assigning knowledgeable personnel with decision making authority may help speed up the process
	Rank the importance of recommendations related to role conflict and role ambiguity	
	Very important	Very important
	Important	Very important
	Less important	Very important
6	Not important at all	
		Very important
		Important
		Less important, the activities are time consuming but they can be minimized if recommendations relating to role conflict and role ambiguity are given importance and expectations are made clear upfront
	Rank the importance of recommendations related to role overload Very important Important Less important	Important
7	Not important at all	

No.	Questions	Responses
		Very important
		Important
	Rank the importance of recommendations related to role of interpersonal relations Very important Important Less important	Less important, clear expectations upfront will improve the rest, so again stress the importance of recommendations relating to role conflict and role ambiguity
		Important
8	Not important at all	

APPENDIX V

CONSENT LETTER

Participant Consent Form
Influence of Organizational Behavior on Construction Project Closeout

Researcher – Surabhi Rao
Adviser – Professor Tim Mrozowski, AIA
School of Planning, Design, and Construction

This is a Masters thesis currently being conducted under the direction of Professor Tim Mrozowski of the School of Planning Design and Construction at Michigan State University (MSU). It determines the influence of organizational behavior on construction project closeout. Recommendations were developed by comparing previous literature to the data collected in the MSU study entitled "Assessment and Improvement of Construction Project Closeout and Vendor Performance Evaluation Methods". To validate these recommendations the researcher is interviewing contractors and subcontractors who were involved in the ongoing MSU closeout study. As an experienced industry participant, your input with respect to these recommendations will be very useful to fulfill the objectives of this research

As a participant in this research, you will be asked a series of closed and open ended questions relating to organizational behavior and construction closeout. Your participation is voluntary and you may choose to terminate your involvement in this study at any time during this project. If you are uncomfortable at any time during the questioning, you may terminate and withdraw from the interview. You may refuse to answer any particular interview question. Your privacy will be protected to the maximum extent allowable by law. If you are employed by a vendor, neither you nor your company will be identified by name in any reporting. The estimated time to complete this interview is approximately 30 minutes. As a participant, you may request a copy of this consent letter for your records.

If you have any questions about this project, you may contact Surabhi Rao or Professor Tim Mrozowski, School of Planning, Design and Construction, Michigan State University at (989)-560-0379. If you have any questions or concerns about your role and rights as a research participant, or would like to register a complaint about this research study, you may contact, anonymously if you wish, Michigan State University Human Research Protection Program at 517-355-2180, fax: (517)-432-4503, or regular e-mail irb@msu.edu, or regular mail at: 202 Olds Hall, MSU, East Lansing, MI 48824.

I voluntarily agree to participate in this study.

Subject Name	*Occupation*	*Signature*	*Date*

Witness Name	*Occupation*	*Signature*	*Date*

Participant Consent Form

Assessment and Improvement of Construction Project Closeout and Vendor Performance Evaluation Methods

Architects, Contractors and Specialty Contractors Interviews

Principal Investigators: Professor Tim Mrozowski, AIA and Tariq S. Abdelhamid, PhD
Research Assistants: Don Schafer, Yash Singh, Surabhi Rao, and Samarth Jain

The Michigan State University Center for Construction Project Performance Assessment and Improvement is conducting a research project to assess construction project closeout processes and vendor performance evaluation methods. The research will benchmark the performance of construction project closeout at institutions of higher education and help identify the causes of closeout process difficulties in order to better streamline it. The research will also explore vendor performance evaluation methods that can be adopted by owners who procure construction projects annually. Funding is being provided by the Michigan State University Office of the Vice President for Finance and Operations.

As part of the research we are interviewing Architects, Contractors and Specialty Contractors who have worked on design and construction projects at Michigan State University and/or who also work with other large owner groups. As an experienced industry participant, your insight into the project close-out process and effective vendor performance evaluation methods along with that of others will be very useful to attaining the aims of this research.

As a participant in this research, you will be asked a series of closed and open ended questions relating to construction closeout in an interview setting. Your participation is voluntary and you may choose to terminate your involvement in this study at any time during this project. If you are uncomfortable at any time during the questioning, you may terminate and withdraw from the interview. You may refuse to answer any particular interview question. Your privacy will be protected to the maximum extent allowable by law. If you are employed by a vendor, neither you nor your company will be identified by name in any reporting. However, your title (e.g. Project Manager) will be reported. If you are employed by a university, your name and title will not be used but the university you work for will be identified. The estimated time to complete this interview is approximately 90-120 minutes. As a participant, you may request a copy of this consent letter for your records.

If you have any questions about this project, you may contact Prof. Tim Mrozowski and/or Dr. Tariq Abdelhamid, School of Planning, Design and Construction, Michigan State University at (517) 432-6188. If you have questions or concerns about your rights as a research participant, please feel free to contact Peter Vasilenko, Ph.D., Director of the Human Subject Protection Programs at Michigan State University: (517) 355-2180, fax: (517) 432-4503, email: irb@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.
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Participant Consent Form

Assessment and Improvement of Construction Project Closeout and Vendor Performance Evaluation Methods

Collaborative Work Session

Principal Investigators: Professor Tim Mrozowski, AIA and Tariq S. Abdelhamid, PhD
Research Assistants: Yash Singh, Surabhi Rao and Don Schafer

The Michigan State University Center for Construction Project Performance Assessment and Improvement is conducting a research project to assess construction project closeout processes and vendor performance evaluation methods. The research will benchmark the performance of construction project closeout at institutions of higher education and help identify the causes of closeout process difficulties in order to better streamline it. The research will also explore vendor performance evaluation methods that can be adopted by owners who procure construction projects annually. Funding is being provided by the Michigan State University Office of the Vice President for Finance and Operations.

As part of the research we are conducting this Collaborative Work Session to gain input and advice from experienced professionals who are involved with capital facility development projects. As an experienced industry participant, your insight into the project close-out process and effective vendor performance evaluation methods along with that of others will be very useful to attaining the aims of this research. Work session responses to a variety of closed and open ended questions will be transferred to Excel Spreadsheets and organized to determine general themes regarding the project close-out process and vendor evaluation methods. Because the data will be collected in a group setting at the Work Session, other participants will hear and discuss responses. Work Session data will not be attributed in reporting to specific individuals and will reported in aggregate form only. The Work Session is expected to last approximately four hours.

Your participation is voluntary and you may choose to terminate your involvement in this study at any time during this project. If you are uncomfortable at any time during the questioning, you may terminate and withdraw from the interview. You may refuse to answer any particular interview question. Your privacy will be protected to the maximum extent allowable by law. If you are employed by a vendor, neither you nor your company will be identified by name in any reporting. However, your title (e.g. Project Manager) will be reported. If you are employed by a university, your name and title will not be used but the university you work for will be identified. As a participant, you may request a copy of this consent letter for your records.

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