Ethnographic Theory-Building Research in Construction

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Abstract: Traditional construction research methods have enabled focused but narrow advances in our understanding of industry phenomena. While contributing new insight, these methods are often not adequate to enable understanding of the complex interactions that lead to many of the industry’s pervasive social and technical problems. One means of addressing these limitations is for the construction research community to complement prevalent quantitative and case study methodologies with qualitative theory-building methodologies, specifically ethnographic studies or those based on detailed and long-term observation of project environments. This paper identifies the critical need for theory-building methods and their methodological conventions, challenges, and opportunities. Specifically, the paper focuses on data collection in ethnographic studies and analysis of that data through the use of grounded theory. Through better understanding and more widespread use of theory-building methods, the construction research community can provide a needed complement to the current prevailing methods and greatly aid the maturation of our important field.

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Introduction

Ineffective communication between project team members, lack of trust, inadequate adoption of new technologies, and inability to effectively integrate specialty contractors and consultants into a coherent and functional project team are some of the most critical issues affecting all aspects of the construction industry today. In large part, these challenges continue in the construction industry despite extensive construction research into their various aspects. This journal attests to the volume of this type of research. No matter the research subject—whether it is a new construction method, scheduling advances, lean construction, project delivery, information technology changes, or contracting techniques—the same inherent technical and social-technical issues abound. We argue that this is because construction research has been primarily focused on research methods that attempt to simplify phenomena so that singular components can be observed, described, modeled, and predicted while controlling for extraneous variables. Although all research methods have their limitations, simplifying constantly along the same lines leads to inherent biases.

Ethnographic theory-building research is one type of method that offers the construction research community a complementary means of understanding phenomena observed in industry. Ethnographic studies involve long-term and extensive involvement with project team environments so that the details of social and technical issues can be fully observed. The data can then be analyzed through methods such as grounded theory to develop theories that explain behaviors observed in project teams. These overarching theories produced through these methods can link several existing areas of research and create sets of targeted new research questions that can be explored using more traditional methods. The following sections of this paper outline the opportunities, methodological conventions, and challenges in using these data collection and analysis methods. Specifically, the first section focuses on data collection in ethnographic studies and the following sections of this paper outline the opportunities, methodological conventions, and challenges in using these data collection and analysis methods. Specifically, the first section focuses on data collection in ethnographic studies, the following section shifts to how that data are analyzed through the use of grounded theory to build constructs and theories and finally how these methods can aid in the advancement of construction research.

To tie these concepts more directly to capital projects, examples from a 3-year ethnographic field study of a $100 million cancer institute project and a $220 million children’s hospital project are used (Phelps 2008). Ethnographic studies have been used in construction in the past but the roots of these methods lie in anthropology, and so it is important to address in this paper how these methods embrace the construction issues facing construction researchers. The children’s hospital study began with the intent of understanding how sustainable design and construction features could be more effectively implemented into complex healthcare projects. The immersive nature of the study enabled the researchers to expose fundamental issues that were not well understood by the project team or the literature. The research linked several previously disparate areas of research to create a theory that helps to understand how project teams adopt sustainability information in extremely complex projects.

Methodological Characteristics of Ethnographic Theory-Building Research

The most important thing to understand at the outset about ethnographic theory-building research is how it contrasts with current research methods commonly employed in construction. The top half of Fig. 1 shows how construction research is typically designed and performed. In this approach, the researcher uses literature to first develop a model (e.g., by defining a specific

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“We’re supposed to be getting the details for ‘Mike’s nuts’ any day now so you should be able to start after the framing is up next week.” “Mike’s nuts” is a term that the contractors use to refer to the two oval shaped skylights in the lobby of the project named in honor of the junior architect. The term has a commonly understood meaning among the contractors in terms of its reference to a given section of the project (explicit meaning). However, the term also gives a subtle poke at the design professionals (who are unaware of the reference) and creates a vernacular among construction personnel that strengthens their association with each other (tacit meaning). This example also speaks to a larger issue of respect or lack of respect between design or office personnel and field construction personnel. The foremen’s meetings usually consist of individuals from 25 different specialty contractors. Although the meetings are open to anyone, the design professionals do not usually attend. Those that do attend are well respected by the foremen and have no difficulty getting the foremen to make changes to their work. Those that do not attend the weekly meetings, which also include a select few specialty contractors, are often the subject of jokes and sarcastic remarks. These elusive individuals also have a much harder time getting the rest of the contractors to accept changes that they need to make. As this example illustrates, the richness of the data collected in ethnographic studies allows for insight into implicit or tacit information. This information provides useful insight into the interrelation of trust, learning, and project performance that would not be available through more traditional means of construction data collection.

Uses of Ethnographic Research Methods

Although used rarely in construction research, ethnographic data collection methods have enjoyed more widespread and influential use in the social sciences, organizational sciences, and information sciences. Ethnographic research has been effective in sociological research to understand issues such as the formation and organization of gangs (Whyte 1993) and the treatment of skid row men by the jail and legal system in the 1960s (Spradley 1970). In the study of organizational behavior and management, ethnography has been used in numerous top business journal publications regarding studies in the following: the evolution of structure and organization of gangs (Gregory 1983); cultural conflicts in multicultural organizations (Barker 1993); norms developed by bill collectors regarding expression of emotions to debtors (Sutton 1991); barriers and opportunities that knowledge creates regarding innovation in new product development (Carlile 2002); cultural conflicts in multicultural organizations (Gregory 1983); and risk and blame in disaster sense making (Gephart 1993). Ethnography has been extensively used in the information sciences to understand collaborative information behavior and computer-supported cooperative work (e.g., McDonald and Ackerman 1998; Orlikowski 1992; Reddy et al. 2001). In construction research, there has also been a number of innovative researchers used ethnographic methods (Table 1).

Conventions of Ethnographic Data Collection

The overall goal of ethnographic methods is to collect the “richest possible data” (Lofland and Lofland 1995). Richness of data comes from observing behavior in many different manifestations, such as data collected through interviews, team discussions, incidental conversations, observations, documents, and nonverbal...
communication (Ball and Ormerod 2000). Specific data sources are outlined in Table 2. As can be seen, these data collection techniques are not foreign to construction research and are directly employable in our field.

Using a combination of techniques allows for data from one technique to further support or enrich data collected from other techniques to create a rich description of the technical and social processes that occur within the project team. By collecting data from both the systems level and individual level, the interactions between the various parts of the system can be analyzed in a more holistic way. Additionally, the use of multiple data collection methods (e.g., formal interviews, contextual conversations, and observation) allows for the comparison of rational, instinctual, and unconscious behaviors to develop a comprehensive description required to understand the phenomena (Denzin 1978).

Our healthcare project field study involved over 1,000 hrs of on-site observation of individual and collaborative activities, attendance of over 150 coordination meetings, semistructured interviews with 12 key project team members, collection and review of 3,000+ pages of meeting notes, plans, and other written artifacts, and review of web-based project management systems. These were conducted over a 3-year period. This diversity of data allowed us to consider data that were formally captured in the project documentation, data from conversations between individuals, and data regarding behaviors that could only be captured through observation. In addition to gathering this data, it was also necessary to gain trust of the individuals involved with the field study. Trust reduces the risk of short-term variations in behavior by field study participants due to the presence of an outside observer, such as the Hawthorne effect (Landsberger 1958). This was achieved through long-term involvement with the project and having casual private discussions with project team members to gain their individual perspective on conflicts or other issues that emerged during meetings or other project team interactions.

**Challenges of Ethnographic Data Collection**

Ethnography faces the same challenges as other data collection methods, however, the means by which those challenges are ad-

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dressed differ due to the nature of ethnography. Specifically, the major challenges are (1) maintaining consistency, rigor, and respect of these methods among researchers that may not be familiar with these methods and (2) demonstrating validity and reliability of the data.

**Rigor in Data Collection**

In terms of maintaining rigor and respect for ethnographic methods, one of the pioneers in healthcare informatics ethnography, Forsythe (1999), outlined common misconceptions that outsiders have regarding ethnography. Her main points are that: (1) ethnography is not a haphazard method of simply writing about one’s observations; (2) ethnography is actually quite counterintuitive because it requires researchers to explore issues that insiders take for granted such as implicit constructs and tacit knowledge; and (3) methodological rigor is essential to collecting and interpreting information from explicit (i.e., verbal) and implicit (e.g., behavioral and nonverbal) sources to create empirically grounded theories.

Among the ethnographic studies cited in Table 1 concerning construction research, many of the studies that did not make use of social scientists seasoned in ethnography suffered from lack of methodological rigor. The common flaws in these studies were the following: deriving conclusions from limited time at the setting (e.g., only a few meetings); stopping the analysis at open coding; and primarily focusing on the ethnographic interview rather than a spectrum of collection techniques. Of the studies that provided strong “grounded” theories, there is a need to outline and perform follow-on research to test and strengthen the theories.

**Validity and Reliability**

The other major challenge in ethnography is demonstrating both validity and reliability of the data from a single site, e.g., a single construction project. Whereas validity is concerned with the data collected being accurate and meaningful, reliability (or generalizability) is concerned that the data collected and insights garnered have broader application than just at the field study site. Often validity and reliability are in tension with each other, e.g., one detailed case study for validity versus broad multiple case studies for reliability and the design of the research must address this tension early.

Validity is crucial because it is what gives the data its relevance and meaning. Golden-Biddle and Locke (1993) described validity in terms of three factors: authenticity, plausibility, and criticality. Authenticity convinces readers that the researcher was indeed part of the culture by using features such as vignettes and in vivo codes (e.g., slang and industry-specific terms). Plausibility allows readers to accept the findings by having them “make sense” to them. Finally, criticality further convinces readers by causing them to reexamine their own assumptions that they had possibly taken for granted. Developing a “grounded theory,” by its nature, provides significant opportunity to validate the researcher’s understanding of observations and implications. New observations either provide validation of the researcher’s understanding or present inconsistencies that challenge it. Although validation occurs naturally in the ethnographic research process, Creswell (2003) outlined additional strategies for validating data and constructs: (1) triangulation using different data sources; (2) member checking to determine the accuracy of findings; (3) use of a rich thick description to convey findings; (4) clarify the researcher’s bias through self-reflection; (5) present discrepancies that run counter to themes; (6) spend significant time in the field; (7) peer debriefing to enhance accuracy; and (8) use an external auditor to review the project.

Reliability (i.e., generalizability) is also critical because it provides stability and consistency of results under similar conditions. This is a particularly important issue for construction ethnographic studies given that the research is often conducted on a single site but needs to generate concepts that are applicable to the understanding of other sites (e.g., commercial office buildings and residential construction). The three main types of reliability are reliability of data using the same method for collection, reliability of data over time, and reliability of data during similar points in time (Kirk and Miller 1986). As with validity, the richness of the data provides an ideal environment for understanding the same phenomenon by different means (i.e., triangulation). Triangulation can be accomplished through different means, specifically (1) corroboration of observations at different times, in different spaces, or of different persons; (2) having multiple researchers in the same investigation; (3) arriving at the same interpretation of the phenomenon through different theoretical schemes; or (4) using more than one method to gather data (Denzin 1978).

**Validity and Reliability in Single Site Studies**

It is important to understand that a single site can accomplish adequate validity and reliability. This is particularly important for construction research given the size and length of projects often provides practical limits on the number of studies that can be included in the research. For an in-depth field study, a single site may not provide a conflict between validity and reliability if both issues are addressed through the richness of the data. Validity requires that the researcher provide enough detail to convince others that the population has been sufficiently understood. Reliability also requires significant detail but its purpose is to provide enough context and nuance that others will understand what aspects of the unique situation are generalizable to similar situations.

Although field notes were only one method of data collection used in our field study, they serve as a useful illustration of how rich descriptions can provide both validity and reliability. The following field note excerpt is taken from one of the building envelope design coordination meetings (Phelps 2008):

“In the previous review meeting, the building envelope consultant had suggested that the concrete curb at the base of the curtain wall be made taller so that it extend a few inches above the level of the exterior pavers. Instead, the project team decided to keep the curb at the original height but use redundant seals—a sheet metal sill pan at the exterior face of the curtain wall and another seal from the bottom of the curtain wall sill to the plaza deck waterproofing membrane that turns up onto the top of the concrete curb (see D.34 in the curtain wall shop drawings). There was concern on whether the sealant would adhere to the plaza deck membrane. During this discussion, the construction manager (CM) kept saying that the sealant was fine and kept referring to the results of an adhesion test that had been performed. He seemed to think that the test was between [Sealant A] and [Product B] (which he thought was the uncured neoprene flashing for the plaza deck waterproofing system but is actually the protection layer). Finally, the consultant asked if the CM had the test report on file somewhere. The CM went to his desk and brought the test report back to the meeting, the building envelope consultant looked at it and realized that first of all the test was for the sealant...
adhesion to the air and vapor barrier and that the results said that the sealant only adhered with a 1/2 bond line under static weather seal applications (i.e., only works for thick joints that see no movement). So, the adhesion test actually means nothing regarding the conditions addressed in this specific detail.”

This excerpt provides useful insight as to how information is used or misused within project teams and how those behaviors can influence trust and future interactions between project team members (this interaction was of major importance to the research model developed by us). The richness of the description gives enough detail that readers have confidence that the observer accurately captured the discussion (i.e., validity) but it also provides enough context that the situation can be generalized to other similar situations (i.e., this could easily happen on any other construction project). To further establish validity and reliability, the field study also looked at four different scopes throughout the entire delivery process (i.e., building envelope, MEP, infection control risk assessment, and commissioning) to essentially create a sample of four. The repeated observation of certain phenomena during multiple meetings during each of the phases for each of these scopes provided a level of reliability in the data collection and also helped to explain anomalies.

Method of Analysis: Grounded Theory

Once ethnographic data have been collected, it requires analysis in order to develop theoretical constructs. One method of analysis that can be used is grounded theory, i.e., the systematic development of theory from the data through inductive and deductive thinking. Grounded theory specifically stresses: (1) the importance of long-term field studies to discover what is really going on; (2) the existence of complexity and variability in human action; (3) a realization that people act based on meaning and that the meaning is defined and redefined through interaction; (4) a sensitivity to the importance of the evolving and unfolding nature of events (i.e., process); and (5) an awareness of the interrelationship between conditions (i.e., structure), action (i.e., process), and consequences (Strauss and Corbin 1998).

To better understand grounded theory, it is useful to contrast it with other methodologies. In quantitative studies, researchers isolate certain variables by use of controls to create repeatable conditions. Those controlled conditions are used to provide data that either proves or disproves a prefigured hypothesis. Although these methods enable greater understanding of phenomena in controlled environments, they negate certain aspects that make up the full “reality” surrounding construction industry phenomena. These include situations where emotions, subconscious thought processes, or complex interrelationships are involved.

Even qualitative research methods that are intended to capture broad information and insights can be inadequate to describe some complex social or sociotechnical phenomena. Questionnaires and surveys only provide a characterization of one point in time and do not capture how attitudes and values might change over time. Surveys have the additional limitations of requiring respondents to fit their answers within a limited range of answers. Observations of subjects in lab studies or other “artificial” environment do not include all of the factors present in the subject’s natural environment that may be critical to the behavior of the subjects. Even short-term observations of case studies do not provide enough context to understand the social and sociotechnical components of observed phenomena.

In some instances the nature of the research problem requires understanding phenomena in their full complexity, e.g., complex social and sociotechnical phenomena regarding trust in teams, information sharing behaviors, or obstacles to innovation. Theories related to such topics need to be derived from observation of the phenomena in their natural setting. Construction consists of projects that involve some of the most complex technical systems that must be designed and constructed by numerous specialized people in social systems that we know as project teams. The emergent nature of this research method allows the findings to be continuously developed, refined, and linked until a grounded theory is built. Because these theories emerge from data collection of a social environment in its full reality, they result in insight and understanding that would not be possible through other means.

In the healthcare project field study, initial observations identified problems with incorporating innovation into projects that were inherently complex. Subsequent observations identified the root causes of these problems, e.g., ineffective management of existing information, lack of trust between project team members, and aversion to learning. Additional data collection led to greater understanding of each of these issues and the development of constructs that link them to create a theoretical construct regarding the cyclical nature of how information sharing behaviors affect the development of trust and learning within project teams.

Uses of Grounded Theory

Grounded theory allows researchers to study phenomena such as: (1) behaviors that arise due to social conditions; (2) behaviors that are not directed toward the attainment of organizational or managerial goals; and (3) cognitive activities such as problem solving and other team-oriented activities that otherwise would not be possible due to methodological limitations (Ball and Ormerod 2000). This process of analysis relies on the researcher’s ability to interpret the data, view social phenomena holistically, and use complex reasoning that is multifaceted, iterative, and simultaneous (Creswell 2003). Table 3 provides a comparison of various types of methodologies.

While all of the methods described in Table 3 are valuable for various purposes, there is a need for complementary methods that allow for analysis of the full complexity present on construction projects (Raftery et al. 1997). The following sections outline the methodological conventions and challenges of using grounded theory.

Conventions of Grounded Theory

Grounded theory enables researchers to understand complex social and sociotechnical phenomena because the iterative nature of the analysis allows for continuous focusing and refinement of data collection. Coding and the ethnographic interview are the two prevalent techniques for ordering, refining, and linking data into a theory.

Coding

In addition to the richness of the data, the real value of ethnographic data is illustrated through coding. Coding is the process of microanalysis that examines and interprets data at a minute
level (e.g., at the word or phrase level). Open coding, axial coding, and selective coding are sequential methods of coding that build upon each other to develop a theory.

Open coding is an analytical process used to identify concepts, their properties, and dimensions that inform the data (Strauss and Corbin 1998, p. 101). Data are “opened” by breaking it down into discrete incidents or ideas and categorizing them based on their meaning so that additional incidents can be grouped based on those categories.

Once the data has been opened, it needs to be realigned through axial coding based on its properties and dimensions. Axial coding is the process of relating categories to their subcategories to form more complete and precise explanations of phenomena (Strauss and Corbin 1998, p. 124). Using these conceptualizations of the observed incidents, researchers can begin to discover relationships among categories (e.g., why, how come, where, when, how, or with what results). These relationships elucidate the interaction between structure (i.e., why) and process (i.e., how) for a given phenomenon and serve as the basis for developing an overarching paradigm. The critical components needed to develop a paradigm include the conditions, the actions/interactions, and the consequences. Conditions are sets of events that act as catalysts (i.e., causal), moderators (i.e., intervening), or mediators (i.e., contextual) for a phenomenon. Actions and interactions demonstrate how an individual responds to conditions. They can be either strategic actions (i.e., purposeful) or routine actions (i.e., habituated) and may or may not be coordinated with other actions (i.e., interactions). Last, consequences are responses to a situation that may affect the phenomenon.

After the data and relationships between the data have been further explained, the theory can be integrated and refined through selective coding processes. Explained phenomena are integrated into a theory by identifying a central theme and relating the other observed phenomena to the central theme. From this descriptive knowledge, an ethnographer identifies domains in a given culture (i.e., open coding) and asks follow-up structural questions that clarify how informants organize knowledge (i.e., axial coding). The refined domains can then be used to create a taxonomy of the domain and its subsets. Following the development of a taxonomy, further follow-up questions can be used to systematically develop characteristics and meaning for each component and outline relationships between components to create a complete paradigm (i.e., selective coding). Because this

### Ethnographic Interview

In addition to coding through microanalysis, coding can also be accomplished through the “ethnographic interview.” Ethnographic interviews go beyond traditional interviews in that they are not only used to collect data but also to begin ordering and categorizing that data. Interviewers use descriptive questions to draw out from the subjects (i.e., informants) explicit and implicit cultural knowledge rather than asking specific questions. This style of “tell me about...” questioning allows informants to speak in their own terms about issues that are pertinent to them. From this descriptive knowledge, an ethnographer identifies domains in a given culture (i.e., open coding) and asks follow-up structural questions that clarify how informants organize knowledge (i.e., axial coding). The refined domains can then be used to create a taxonomy of the domain and its subsets. Following the development of a taxonomy, further follow-up questions can be used to systematically develop characteristics and meaning for each component and outline relationships between components to create a complete paradigm (i.e., selective coding). Because this

![Fig. 2. Hierarchy of ambiguity (Phelps 2008)](image-url)
interviewing technique requires significant skill on the part of the interviewer, construction researchers may be well served to team with social scientists in cases where this technique is used.

Challenges with Grounded Theory

Although they lack the statistical rigor of more quantitative studies, theories built using qualitative methods need to demonstrate their strength by providing empirical grounding. Empirical grounding ensures that enough detail has been provided and that, given similar sets of conditions and similar processes, will be observed and explained by the theory. It allows for future studies to validate and build upon the original study. The critical questions that researchers need to address consist of (Strauss and Corbin 1998, p. 270) the following:

- Are concepts generated? What are their sources?
- Are concepts systematically related?
- Are there many conceptual linkages and are the categories well developed? Do categories have conceptual density (e.g., many properties and dimensional variations)?
- Is variation built into the theory (e.g., the study of multiple phenomena)?
- Are conditions under which variation can be found built into the study and explained? For example, economic factors, policies, regulations, social movements, trends, culture, social values, etc.
- Has process been taken into account?
- Do the theoretical findings seem significant, and to what extent?
- Does the theory stand the test of time and become part of the professional groups?

Regarding the healthcare field study, there were two means of providing empirical grounding. The first was through an internal process of validation where the researchers asked the critical questions listed above regarding the constructs that emerged. The second was through external validation from presentations of the research findings to the field study participants and nonrelated industry members to gain their thoughts regarding the empirical grounding of the constructs.

The strengths of ethnography and grounded theory rely on effective collection of rich data and systematic processing of data to develop empirically grounded theories. The conventions detailed above provide the structure for researchers to perform the academically significant and methodologically rigorous research needed to improve our understanding of complex phenomena in construction.

Opportunities for Ethnographic Theory-Building Methods

Ethnographic theory-building methods provide significant opportunities for the construction research community to address issues that in the past have been neglected due to methodological limitations. The major areas include: (1) understanding of social processes; (2) understanding the interaction between social and technical processes; (3) providing a direct link between academia and industry; and (4) linking related research areas into overarching paradigms.

Construction, by its nature, is both social and technical. However, to date, the overwhelming majority of the research has focused on the technical aspects. Ethnographic theory-building methods provide an opportunity to address this deficiency by obtaining intricate details about phenomena such as feelings, thought processes, and emotions that are difficult to extract or learn through more conventional construction research methods. These methods allow the construction research community to develop theories related to trust, commitment, perceptions of fairness, conflict, information behavior, and other sociotechnical issues. They also provide a methodological bridge with other social science fields such as sociology, organizational theory, information sciences, and organizational behavior. By aligning with social sciences in addition to more technical academic fields, the construction research community has an opportunity to pursue translational research that makes use of theories and methodologies that have been already extensively researched and proven in more established academic fields.

Because the resulting theories emerge from observations of a natural setting, ethnographic studies facilitate closer links between industry and academia. Ethnographic theory building requires close interaction with industry because industry is the subject of analysis, and there is no other way of doing this type of research than immersion in industry often for a long period of time. Other research might be accomplished by other means and may in fact require separation between the research and industry, e.g., testing a new fire repellent material must be done in a controlled, safe, and isolated environment rather than on an existing or newly constructed facility. The benefit of ethnographic theory-building research, thus, is to hold the research to the “flame” of industry often at many points throughout the research process and therefore helps to lower the barrier between research and industry. The resulting close partnerships between industry and academic programs is likely to mutually strengthen and provide greater interaction and awareness of what is happening in each.

Another way in which ethnographic theory-building research can benefit construction research is by linking existing research efforts into broader-level integrated paradigms. These paradigms can act as roadmaps for comprehensive research programs that address complex interrelated problems that for a single researcher would be too overwhelming to address. By providing the overarching structure for coordinated research, these paradigms can identify critical gaps in the research and unify related sectors of the academic construction community to create powerful theories that fully understand the industry and have the potential to fundamentally and holistically change the way that the construction industry functions.

Path Forward

In today’s ever-changing information-heavy environment, there are numerous phenomena that need to be studied to enable the construction industry to effectively function in the future. These include information flow and integration throughout the delivery process, performance effects of innovative delivery methods, and the social and technical factors affecting communication, productivity, and the implementation of innovation. Ethnographic theory-building methods provide a tremendous opportunity for construction research to address these issues in their full complexity by providing a methodology to study complex issues closer to their entirety rather than in parts using conventional construction research methods. This is particularly appropriate for research that aims to engage sociotechnical issues in construction such as implementing new scheduling methods and evaluating alternative
contracting incentives on project performance and worker productivity issues.

The use of ethnographic theory-building methods provides great opportunities for the construction research community to understand complex phenomena. In order to capitalize on these opportunities, there are a few measures that the construction research community can take. First, construction researchers can begin partnering with social scientists in business schools, sociology programs, and information system programs. These academic communities are already well versed in ethnography and grounded theory methods. Equally, construction researchers can begin training themselves in these techniques. Second, academics can also begin to develop longer-term partnerships with the construction industry to gain much needed access to projects for data collection as well as test beds for applied theory.

Finally, ethnographic theory-building research methods are meant to complement, rather than replace, the traditionally more quantitative methods used in construction research. These quantitative methods are not well suited to address the detailed nuances of cause and effect relationships that require strict controls and measured variables. However, the research outcomes of ethnographic studies and theory-building methods can be employed to provide structure for more focused and quantitative studies to fill in missing details. Construction is a sociotechnical science that requires the use of empirical methods to quantifiably simplify reality in order to model and predict its processes and phenomena. However, without an equal emphasis on social, behavioral, and cultural factors to build a rigorous understanding of these phenomena, the results from empirical and quantitative studies alone will be chronically deficient. Striking this balance can be accomplished through pursuing an agenda of a more integrative intuitive synthesizing of research and appropriate methodologies that take place in natural settings. Through these complementary strategies the construction research community can organize and address the complex pervasive sociotechnical issues that plague our industry today and position our field to realize the full significance and power of its potential.

References


