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Abductive Grounded Theory: a worked example of a study in construction management

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ABSTRACT

Grounded Theory, now more than 50 years old, is a qualitative research approach widely employed in the social and human science studies to develop theories with a high degree of conceptuality. For construction management research, given the nature of this applied sub-discipline of management, a paradigmatic shift in Grounded Theory is needed, from classical positivism to pragmatism. Abductive Grounded Theory is posited as the way to achieve this shift in research methodology. The proposition is explored through a worked example, using Early Contractor Involvement research as a case study to demonstrate the research process. The data analysis process of open coding, axial coding and selective coding is described, together with the process of matching complementary prospect theory to explain the interdependencies between theoretical categories. The issues of validity and reliability are addressed. Of particular importance is the faithfulness to the original analytical coding process and then abduction of existing theories from salient literature to explain the relationships amongst emergent concepts. The findings show that, while the development of the research question is initially influenced by the review of literature, there is no deliberate effort to direct or force the collected information towards any set of pre-defined concepts. The study shows promising potential for using Abductive Grounded Theory to develop conceptual and instrumental theories in construction management research.

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Introduction

Since the development of Grounded Theory, this research approach has gained popularity by scholars in anthropology, sociology, health care and other fields in the social science (Bowen 2006). The unique methodological elements of Grounded Theory such as constant comparison, theoretical sampling and systematic analytical process, make this methodology different and somewhat distinctive from other qualitative research methodologies (Dunne 2011). The core characteristics of Grounded Theory, in which the theoretical patterns, themes and categories of analysis emerge directly out of the data rather than being forced on them prior to data collection and analysis (Patton 1980), attract researchers in other domains. The field of construction management (CM) has also embraced Grounded Theory and researchers in this field have used Grounded Theory for their research and publications in prominent journals (e.g. Loosemore 1999, Dainty *et al.* 2000, Hunter *et al.* 2005, Green *et al.* 2009). However, despite the frequency with use of the term “Grounded Theory” in studies in CM, there are few instances of genuine application (Bryman 2003). One reason for this relates to the different

requirements for production of knowledge in the CM domain. Grounded Theory is generally regarded as a methodology to generate abstract theoretical categories while CM research in many respects is oriented towards a balance between conceptual knowledge, which contributes to the understanding of the general concepts, and instrumental knowledge that responds to short-term problem solving (Green *et al.* 2009). Gibbons *et al.* (1994) emphasize the importance of production of knowledge in modern social science studies to serve the needs of both academics and practitioners. In essence, theory in the context of CM research needs to be developed by cooperation between practitioners and academic researchers to reflect on the challenges that the construction sector faces (Green *et al.* 2009).

Another reason for the dearth of evidence for application of Grounded Theory is in part due to the fact that few practical examples of Grounded Theory are presented in the CM literature. Fewer still provide productive discussion to illustrate the application of Grounded Theory in detail (Jia *et al.* 2017).

At the heart of Grounded Theory is the systematic analytical procedure consisting of formal and prescriptive

routines for analyzing data. Researchers engaged in Grounded Theory need to adhere to the key rules, going from open coding to more abstract or categorical codes and eventually to conceptual or theoretical code, in order to generate the fundamental outcomes of successful grounded research (Suddaby 2006).

We argue that for conducting a Grounded Theory adequately, especially for novice researchers, the researcher should be equipped with the knowledge of the theoretical essence of the methodology together with the technical skills of mechanical application of analytical techniques.

Addressing the above issues, the aim of this paper is to introduce an alternative variation of Grounded Theory, labelled “Abductive Grounded Theory” and demonstrate it in the field of CM research. We also present a detailed description of the coding process of a worked example in CM to show the systematic analytical procedure embedded in the proposed Abductive Grounded Theory. This paper strives to connect CM researchers with a useful methodology and to increase the quality of Grounded Theory research published in CM literature.

Grounded theory

Founded on the seminal book “*The Discovery of Grounded Theory*”, Grounded Theory was developed by sociologists Barney G. Glaser and Anselm L. Strauss (Glaser and Strauss 1967) to advocate the practicality of developing theories from research grounded in data rather than deducing testable hypotheses from existing theories. They proposed Grounded Theory, as a systematic process of qualitative analysis with its own logic structure, to construct abstract theoretical explanations of social phenomena (Charmaz 2014). They further redefined qualitative research principles towards a “good science” in which the realities of qualitative research fit the complexities of social phenomena (Corbin and Strauss 1990). Although the latter have claimed that Grounded Theory has not changed from its original interpretation introduced in 1967, the theory has undergone diverse and somewhat fractured variations.

“Glaserian” and “Straussian” Grounded Theory are variations that share the same philosophical stance that the theory should emerge by itself from data. The difference between them lies in beliefs about, and approaches to, analysis. Heath and Cowley (2004) point out that the main source of divergence here is methodological rather than ontological or epistemological. The core of the conflict between the views of Glaser and those of Strauss is whether or not verification should be an outcome of Grounded Theory analysis (Heath and Cowley 2004). Strauss’s version emphasizes that induction, deduction and verification are absolutely essential (Corbin and Strauss 2014), while Glaser believes that Grounded Theory is inductive only (Glaser

and Strauss 1967). Influenced by this ideological split, the “Straussian” approach accepts that one must form the hypothesis prior to the commencement of the research, whereas Glaser argues that the research problem should initially be dealt with minimally or with almost no prior conceptualization or constructs in the researcher’s mind (Locke 2001). Hunter *et al.* (2005), however, argue that adopting either approach depends on the nature of the research problem and the particular style of the researcher. To be fair, Glaser and Strauss (1967), in their original statement of the method, also invited their readers to use Grounded Theory strategies flexibly in their own way.

How then, can Grounded Theory be relevant to, and useful for, research in an applied discipline such as management?

Grounded Theory in management research

Application of any precisely delineated and prescribed Grounded Theory in the field of organization and management research has been reported as difficult and bewildering (e.g. Locke 2001, Goulding 2002, Bryman 2003). It is possible that the nature of organizational and management research – standing outside of the established norm of positivism – requires more formal, step-by-step procedure for generating theory from empirical data rather than producing results by trusting in an uncertain creative process inherent in pure Grounded Theory. In addition, the amenability of classic Grounded Theory leads the process to become overcomplicated, due to the sheer diversity of the research realms (Partington 2000). While Corbin and Strauss (2014) aimed to provide a universal process to fulfill qualitative researchers’ requirements in all social science disciplines, other authors have emphasized the importance of considering the research context and data sources when using Grounded Theory (Orton 1997, Green *et al.* 2009). In responding to the challenges in applying Grounded Theory in the context of organization and management research, several attempts have been made to create remodelled versions of Grounded Theory, to simplify the method and make it appropriate for studies within these domains (Goulding 2002, Fendt and Sachs 2008). Variations of Grounded Theory address organizational and management research inquiries with their own philosophical stances and methodological procedures.

For instance, Partington (2002) entails the development of research questions and a theoretical perspective through pre-conception and *forcing* the research to fit into the areas with which the researcher is concerned, instead of waiting for the real concerns of the research participants to emerge. He also preselects and applies specific theoretical codes *onto* the data, rather than relying on the theoretical codes emerging *from* the data (Holton 2008). This

departure from the original principles of classic Grounded Theory implies the embrace of this qualitative methodology by researchers in diverse social science fields simply in order to accommodate their research requirements. Many Grounded Theory proponents in other disciplines have invited researchers to use the theoretical tenets of Grounded Theory for their research (e.g. Glaser and Strauss 1967, Charmaz 2000, Locke 2001). Bryant and Charmaz (2007, p. 17) state that: *“researchers need to be familiar with Grounded Theory Method, in all its major forms, in order to be able to understand how they might adapt it in use or revise it into new forms and variations”*. Locke (2001) supports this point of view and invites researchers to adopt a theoretical perspective of Grounded Theory to orient their own study.

Is this evolution of Grounded Theory useful for the studies in CM?

Grounded Theory in CM

In the field of construction management, some researchers are skeptical about the value of theory in the CM research (e.g. Koskela 2008) whilst others (e.g. Green and Schweber 2008) argue against the notion. Similarly, there are disagreement between theorists in the CM who strive to offer “grand” theories to explain the relationships between highly abstract elements (e.g. Moffat and Kohler 2008) and those who believe in contextualized theorizing (Green *et al.* 2009). We argue that, while the role of theory should be acknowledged, CM seems not to need “grand” or “broad-range theories” to discover overarching independent variables that would determine the essential features of the social structure sufficiently to permit analysis of all social phenomena (Boudon 1991). Rather, in CM such theories have to address specific phenomena or concepts to reflect practical problems grounded in empirical data collected from the field within construction practices (Jia *et al.* 2017). In other words, the specific local-level problems inherent within the discipline of construction management demand theories associated with problems and practices pertinent to their particular contexts; whereas in grand theories high levels of abstraction in findings are seen as a hindrance to resonating the theory with stakeholder knowledge and requirements. This view is supported by Green and Schweber (2008) who propose the idea of middle-range theorizing (as developed by Merton (1967)) for many qualitative studies within the construction management environment, and contend that the aim of middle-range theory, as opposed to broad-range theory, is *“to develop a form of theorizing that focuses on the area between abstract grand theorizing and atheoretical local descriptions and which directly engages with the concerns of practitioners”* (p. 651).

Scholars who support the need for theory in the field of CM have borrowed key principles of Grounded Theory in attempts to develop theories grounded in empirical data drawn from construction practice. They have undertaken their own variations to the orthodox interpretation of Grounded Theory, adopting a variety of philosophical positions, by developing their own techniques for building theories. For example, Jia *et al.* (2017) conducted their study to develop a theoretical perspective from data to explain safety-related behaviours influenced by multiple levels of systemic contexts. They designed their research process based on the propositions of Corbin and Strauss (2014) and then utilized the analytical tenet of Glaser and Strauss (1967) for conceptualizing their research findings and subsequent theory generation. Similarly, Graham and Thomas (2008) adopted Straussian Grounded theory for its systematic analytical procedures to develop an integrated model of Knowledge Management (KM) for a leading Irish construction organizations while they posited their research paradigm within a constructivist approach. In a research aiming to clarify the distinctiveness of crisis management in a construction context, Loosemore (1999) conducted a content data analysis and used Grounded Theory to develop and refine propositions derived from his literature review.

Do these adaptations of Grounded Theory warrant a shift in theoretical stance?

The impetus for a paradigm shift

“Research paradigm” refers to the philosophical dimensions of the pure and social sciences that represent a basic set of beliefs that guides action (Guba and Lincoln 1994). According to Jonker and Pennink (2010), a research paradigm is a set of fundamental assumptions and beliefs (generally accepted by scientists) that addresses the way the researcher perceives the world. Since a research paradigm substantially influences how researchers undertake a social study in terms of the way they frame and understand social phenomena, and determines whether their aim of research is to test or generate theory, it is important to initially define the research paradigm to be applied in carrying out research (Creswell 2008, Lewis *et al.* 2009).

Researchers who adopt a positivist stance look at the social sciences through a natural science lens that uses observation and reason as a means of understanding behaviour – explanation proceeds by way of scientific description (O’leary 2004). Ontologically, the key idea of positivism is that the social world exists externally, and that its properties should be measured through objective methods (Easterby-Smith *et al.* 2008). Epistemologically, the acceptable knowledge in positivism is generated by developing numeric measurements through a scientific

approach (Wahyuni 2012). The adoption of positivism as the dominant research paradigm in CM studies has received various criticisms for its inability to build a solid theoretical foundation and clear epistemological position, causing over-simplification of the nature of problems. Generally, the aim of research in the context of CM is to deal with complex problems where there are few simple solutions to offer. Positivism fails to address the relativity of the world and complexity of the reality (Bredillet 2008) for construction management research.

In contrast, *interpretivism* believes that reality is not simple and cannot be clearly explained, described or translated by researcher straightforwardly into the research report, and that it is rather constructed through communication, interaction and practice (Tracy 2012). Ontologically, interpretivists refute objectivism and a single truth. They believe reality is constructed by social actors and peoples' perceptions of it. Hence it is subjective. Epistemologically, interpretivists try to understand the real meanings of social phenomena using a narrative form of analysis to describe specifics and highly detailed accounts of a particular social reality being studied (Neuman and Neuman 2006). In recent years, interpretive research has become increasingly recognized within the CM research community. It is frequently seen in CM literature, whereby researchers formulate their concepts or theories using empirical observation and then contextualize the emergent themes and categories (Schweber 2015). However, an important criticism of the interpretivist paradigm relates to lack of capacity for generalization; the formulated theory cannot be applied universally.

We emphasize that instead of joining the ontological and epistemological war between positivist and interpretivist in CM research, the focus should be upon the interplay between knowledge and action, and researchers need to *intervene* in the world rather than merely observing it (Goldkuhl 2012). Thus, we may argue that studies in the field of CM need a paradigm shift towards pragmatism to respond to the purpose of the research which, more often than not, is generally about investigating how people deal with the situations in question and what is to be inferred by their actions (Schutt 2011). In pragmatism, the emphasis is on *what works best* to address the research problem under investigation and what methods enable the researcher to understand the social reality better (Wahyuni 2012). Pragmatist research is thus concerned about the value of the philosophical assumptions, methodology, or information in the sense that these are instrumental in producing desired or predicted outcomes (Goles and Hirschheim 2000). Nevertheless, such value varies according to the researcher's beliefs, assumptions and interpretation of the world.

What then, might pragmatism in CM research involve?

Combining abductive reasoning with Grounded Theory

Given that many construction management processes are not substantially different from general management processes (Bresnen and Marshall 2001), but tend to use more specific terminology, the methodological deviations from the classic Grounded Theory in the CM domain are characterized by many similarities with research in organization and management. For example, they share a shift in epistemological position from positivism to interpretivism, or to pragmatist epistemology. In essence, positivists believe that there is only one method to best understand the reality; whereas interpretivists see reality as a dynamic construct perceived and evolved by the interplay between people which cannot be tested with certainty (Loosemore 1999).

Järvensivu and Törnroos (2010) contend that positivists usually adopt *deductive* research processes, wherein a hypothesis is derived from existing theories to be empirically tested or validated against collected data. As a result, studies in the field of CM have been predominantly conducted deductively to test *a priori* hypotheses or theories, rather than to deliver a new, tentative hypothesis to explain a particular observed phenomenon.

The important criticism of deductive approaches is that they lead to disengagement between researchers and research subjects (Green *et al.* 2009). This divorce creates a restricted relationship and sequence between the generated theory and empirical data, and impedes the development of a theory to reflect the social reality of the context in which the investigative study is located (Bell and Bryman 2007). In contrast, an inductive approach moves from a collection of empirical observations (data) to developing theory that may explain them (Spens and Kovács 2006) through interaction between the researcher and the participants in the research process. The integration of the researcher and participants is seen as an integral part of the inductive approach. However, the research conducted inductively is unlikely to build an instrumental theory based on the empirical data, without acknowledging the existing theories (Green *et al.* 2009). We suggest that the necessary bridge may be found in *abduction*.

The variation of Grounded Theory we propose is a transformation from the positivist Corbin and Strauss (2014) model into a pragmatist procedure which is directly applicable to the development of theories in CM domain. While this approach follows the original analytical procedure of the Straussian version, the theory is developed from *abduction* of existing theories to explain the relationships between emergent theoretical categories and articulate a coherent argument (Dick 2007). Abductive reasoning, introduced by Peirce (1955), refers to the process of

studying facts or results as starting point to formulate a theory to explain those facts. The provided explanations of facts are developed based on one single experience or observation which functions as an initiative to connect with other experiences and observations in an attempt to develop a hypothesis (Richardson and Kramer 2006; Shank 1998). Instead of testing theory *per se*, abduction links the idea of hypothesis to ordinary experience in order to explain the ordinary circumstances and their *status quo* (Shank 1998). An abductive approach lies in the iterative dialogue between data and a combination of existing theories or propositions (Van Maanen *et al.* 2007). Coffey and Atkinson (1996) acknowledge the importance of combining abductive reasoning with Grounded Theory as the heart of grounded theorizing.

Kelle (1995, p. 34) also points out how abduction in grounded theorizing could help:

... to explain new and surprising empirical data through the elaboration, modification, or combination of pre-existing concepts. Within this context, the theoretical knowledge and pre-conceptions of the researcher must not be omitted ... theoretical knowledge and pre-conceptions serve as heuristic tools for the construction of concepts which are elaborated and modified on the basis of empirical data.

Using abduction in CM research may offer immediate promise in accommodating the need for newer paradigms and paradigm shifts towards pragmatism. However, instead of replacing the existing research models in use, what is needed is new tools for research that allow researchers to progress abductively (Shank 1998). Nevertheless, the idea of abduction and the use of existing theories in development of new theory is not especially new (*c.f.* Partington 2000, Dubois and Gadde 2002, Mensah 2016). Nor is the use of abductive reasoning in Grounded Theory methodology (*c.f.* Green *et al.* 2009; Richardson and Kramer 2006).

What is new about our proposal is the incorporation of an abductive research approach into Grounded Theory in CM research, and the dynamic position of abduction in the development of middle range theories and thereby explicating the theoretical relationship between emergent categories of concepts.

Application of the systematic analytical procedure of Grounded Theory assists in attaining theoretical saturation of the concepts and evolving the research question throughout the research process. Abducting existing theories helps to explain and describe the interdependencies between the concepts. Combining the abduction approach with Grounded Theory modifies the conventional Straussian Grounded Theory analytical process (from induction, deduction and verification) by adding the abduction to the process. However, the position of abduction in the process will vary and will depend upon the amount and quality of the collected data and emerging conceptual categories. The search for the “best explanation” begins parallel to the analytical process, but when and at what point the complementary theory is recovered is guided by the empirical findings.

Figure 1 illustrates the process of the proposed Abductive Grounded Theory research approach.

The first dotted circle represents the iterative process of “sensitizing concept”. Investigation of a research question is informed by rounds of review of the substantive literature related to the phenomenon under investigation. This review is a necessary step in providing a direction for initial interview questions formulation. The thick arrow represents the flow of interview questions development. The second dotted circle shows the iterative process of “data collection and analytical procedure”. Data for the research can come from various sources and data collection procedure can be interviews and observations based. Grounded theory has interrelated processes for data collection and

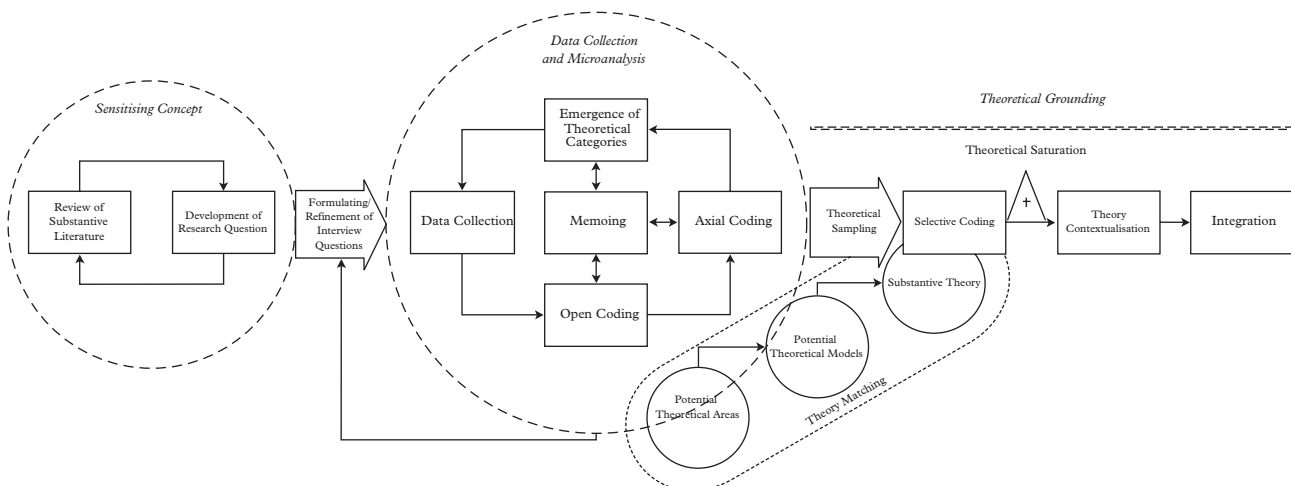


Figure 1. Abductive Grounded Theory Process.

analysis. The thin arrows represent the dynamics of data collection, open coding, selecting coding and emergence of categories. The *memoing*, positioned in the centre of the process, emphasizes the constant communication between memos and the perceived concepts at each stage of the analysis from the first coding sessions towards the end of the analysis. The back loop to the interview questions formulation demonstrates the refinement of interview protocols to incorporate relevant issues into the next set of interviews and observations. The theory matching begins during the data analysis and it is displayed by a dotted oval consisting of three main stages of the process of theory abduction. The theory matching process continues through the theoretical sampling and selective coding, where representativeness and consistency are achieved, until the *theoretical saturation* of categories. This process is labelled "Theoretical Grounding" as the relationships amongst categories are grounded within the abducted theory. The last two steps are contextualizing the theory and integration which are essentially related to the refinement and modification of the theory within the context of the carried out study.

Before proceeding to present a worked example, the issue of validity and reliability must be addressed.

Validity and reliability

Healy and Perry (2000) emphasize that the quality of scientific research has to be judged within the terms of the paradigm in which that research study has been conducted. For example, the merit of qualitative studies should not be judged by the canons or standards used to judge quantitative studies (Guba and Lincoln 1994). Merriam (1995, p. 52) states that *"more commonly, writers make the case that qualitative research is based on different assumptions regarding reality thus demanding different conceptualizations of validity and reliability"*.

Amongst interpretivism researchers, credibility, transferability, dependability and conformability are the criteria by which the quality of research is evaluated (Thomas and Magilvy 2011). Merriam (1995, p. 53), however, argues that despite the use of a different nomenclature by qualitative researchers, *"notions of validity and reliability need to be grounded in the worldview of qualitative research"*.

The quality of the research should be ensured by examining against validity criteria. To ensure the rigour of the research, three major aspects of validity: internal validity; reliability and external validity, need to be challenged. Internal validity is concerned with the reality, and how research findings are congruous with the reality. Reliability in a qualitative study focuses on the results of the study to be consistent with the data collected, and external validity

examines the extent to which the findings can be applied to other situations.

The case study as a worked example

The case study presented is a research project in the context of construction management which adopted Abductive Grounded Theory as its methodology. The emphasis here will not be on the research findings of the project; but rather upon demonstrating the research process and supporting techniques.

Background

The aim of the research project was to develop a theoretical model for clients to investigate Early Contractor Involvement (ECI) as an alternative procurement method for a construction project. ECI is an evolving concept that strives to involve the contractor at the early stage of the project - normally soon after the feasibility planning approval process is completed, but sometimes even earlier at the outset of conceptual development. Due to an increasing focus on the front-end stages of projects in recent years (as an attempt to shorten delivery times), a number of relationship-based project procurement (RBPP) forms have been developed that introduce the project delivery contractor's expertise and advice much earlier into the construction project cycle (Walker and Lloyd-Walker 2015). The underlying idea is to achieve innovative delivery solutions, better project control and savings in time and money by including contractors in early stages of the project development process (Nijsten *et al.* 2008). ECI, as practiced in Australia, is a two-stage contractual model in which the client appoints design and construction professionals early in the project development through a non-price based selection process. The appointed contractor assists in planning, assessing constructability, and developing the target cost in conjunction with the client. Innovative construction is thereby encouraged. The target cost is agreed before construction, and detailed arrangements for the distribution of potential extra costs or savings are determined (Mosey 2009). Comparing ECI to other collaborative delivery systems, it is similar to a project alliance during the first stage and a conventional Design and Construct (D&C) contract during the second stage (Swainston 2006).

As with similar procurement options, ECI needs to be selected for a project with appropriate characteristics such as project type, scale, risk factors, etc. The problem, unlike more established procurement methods such as Design, Bid and Build (DBB), Design and Construct (D&C) is that there is currently no pragmatic procurement selection

model to evaluate the appropriateness of using ECI for a project.

The main objectives of the research were to explore the circumstances under which ECI is suitable for a project and to develop strategies to evaluate ECI in an appropriate situation to ensure the achievement of best value.

It is essential for clients to ensure that their internal capabilities have reached an adequate level of maturity to support an ECI approach. The research is largely qualitative, involving in-depth investigation of ECI utilization practices in Australia by public and private sector clients. Since no theory of ECI existed, a Grounded Theory approach seemed necessary.

Research method

The choice of research method is highly influenced by the strategy adopted for conducting the research. As a result, interview is one of the advocated data collection techniques for a Grounded Theory research approach. Furthermore, this study intended to describe the conditions and challenges for client organizations in choosing ECI for a project. Interviews could document individual attitudes, feelings, beliefs, experiences and reactions. The primary data collection was therefore based on semi-structured interviews with senior managers and key players of client organizations involved in ECI projects. A formal, structured data collection instrument was inappropriate, given the lack of theoretical justification and the absence of previous similar research to provide survey question validity. Semi-structured interviews enable the researcher to compare the contents of different interviews with one another. More importantly, interviewees may follow their own notions of what is important about the topic. The researcher, besides facilitating the progress of the interview, is also able to probe or ask more detailed follow-up questions about respondents' situations rather than adhering only to a more formally-structured guide.

Data collection

Grounded Theory does not prescribe any limits on how many interviews should be conducted in the research process (Suddaby 2006). Rather, the number of interviews depends on achieving a point of theoretical *saturation* where no new data results are likely to emerge from additional data collection: "One keeps on collecting data until one receives only already known statements" (Hjørland and Seldén 2005: 124).

The research design involved interviewing professional practitioners at a senior management level in four Australian local government organizations and in one

prominent Australian private professional consultancy organization.

The local government organizations had each adopted a type of ECI, either as a delivery system or as a contracting model, for completed projects or for projects in progress at the time of interview. The private professional consultancy organization was a leading advisor, facilitator and coach offering its services to both public and private clients for the establishment and delivery of collaborative forms of procurement.

All interviewees had been involved in ECI projects and had played significant roles in the project procurement process; they thus had the potential to provide high quality, reliable data with validity deriving from deep insights from different perspectives into the research problem being explored. Data cross-comparisons provided a measure of external validity, together with the researchers' own understanding of ECI and building procurement generally.

Research question development

According to Corbin and Strauss (2014), it is not usually easy for researchers to begin gathering data without some conception of what it is that they are going to study. Furthermore, from an empirical point of view, conducting an early literature review before commencing data collection and analysis is compelling. Without reviewing literature in the substantive area, the right choice of methodology and rationale for the study is not convincing (McGhee *et al.* 2007). The literature review helps to develop a generalized sense of reference termed "sensitizing concepts" (Blumer 1954).

The major concepts in developing the research question derived from analysis of the mainstream literature on (1) ECI and (2) procurement selection models. For formulating the research question, it was important to explore the definition of ECI, its perceived structure as practiced in the industry and the process for selecting an ECI for a project at hand, in order to understand the current knowledge of the ECI and highlight pertinent lacunae in existing knowledge. This review led to the formation of the research question, which was formulated as: "How, and under what circumstances, should ECI be adopted for procuring a construction project?"

Instrument design and interview administration process

Guided by the research question, an initial interview data schedule (protocol) consisting of the core categories was developed. In addition to the leading categories, connecting questions were also included to integrate sections in

order to find links between the emerging categories essential for generating a theory.

Subject matter experts were interviewed who were instrumental at the senior level, who had been involved in the procurement selection phase. These are the holders of the most reliable data about the decision-making process that leads to the selection of ECI.

Every effort was made to let the participants speak as much as they could without interruption in order to give them opportunity to answer what was important to them. Where the respondents were reticent or perfunctory in their responses, the researchers rephrased or restructured the specific topic in an effort to elicit fuller responses. The in-depth interviewing technique enabled detailed discussion of the issues tackled in the research.

Interviews ranged from 60–90 minutes and all interviews were recorded as digital audio files. These were subsequently transcribed to text format.

Analysis of the interviews began immediately after completion of each interview, in order to identify individual concepts and categories. According to Dunne (2011), Grounded Theory requires that data collection and analysis occur concurrently, rather than in a linear sequence which is usual in the other strategies of inquiry. They are separated in this paper only in the interests of clarity.

Data analysis commenced at the completion of the first interview. Thus, while the early interviews were informed by the initial literature review, the line of questioning evolved in subsequent interviews based on the concepts and categories emerging from the analysis of the previous interviews. The questions continued to evolve in subsequent interviews on a basis of the refinement of the concepts and categories shaped during the analysis. This process was guided by the “constant comparison” of participants’ responses considered as one of the core Grounded Theory analytical tenets highlighted by Suddaby (2006) in order to attain theoretical saturation of the concepts under exploration.

Data analysis

The thematic analysis was carried out using the latest version of the QSR Nvivo qualitative data analysis toolkit to organize and assist with the analysis of content from interviews. Thematic analysis involves “coding” data (i.e. identifying and assigning categories to the data) at progressive levels of detail (Vaismoradi *et al.* 2016)

Coding procedure

Data analysis was associated with the micro-analysis and consisted of open, axial and selective coding. Micro-analysis is a qualitative analytical tool that involves substantially

different perspectives on data. It demonstrates that analysis is not a structured, static or rigid process, rather it is a free flowing and creative one letting the data speak for itself (Corbin and Strauss 2014). However, even free-flowing analysis requires some level of organization to assist comprehension, and coding was undertaken.

Open coding

The coding process was broken down into a series of activities. Although the breaking down of an analytical process is an artificial task, it was essential in order for the researchers to understand the logic that lay behind the analysis. The term “open coding” refers to the process where the text is opened up to expose the thoughts, ideas and meanings contained in the transcribed interview data in an attempt to uncover, name and develop concepts (Corbin and Strauss 2014) for which the interviewee may not have been consciously aware in offering their verbatim responses. This is an iterative process of analysis consisting of reading and re-reading, and creating the extensive memos that leads to identifying, naming, exploring and describing the emerging concepts and categories. During open coding, the collected data were broken down to discrete parts (phrases, words) and closely examined and compared to other parts to find similarities and differences (Corbin and Strauss 2014). It is essentially a simultaneous process of organizing and conceptualizing and can be carried out manually, or more frequently in contemporary research, using the capture, ideation, comparison and organizing capacity of a computer application such as NVivo.

Memos were written accordingly whilst reviewing the transcribed data to reflect on the perceived meaning of what the respondent had indicated in the conducted interviews. This process helps to validate the data.

Each part (term, phrase and sentence) was then given a name that represented its underlying concept. The name was chosen according to the meaning or imagery perceived by the researcher when examining the data comparatively; or taken directly from the words of respondents themselves, referred to as “in vivo codes” (Glaser and Strauss 1967). As the analysis was proceeding, any newly identified concepts from subsequent interviews were compared to the ones that had been already labelled. If they shared common characteristics, the same label was assigned to that concept, or a new one created.

Although the development of the research question was influenced by the prior review of literature, no deliberate effort was made to direct or force the information provided by the interviewees towards any set of pre-defined codes. Rather, all answers to questions were carefully reviewed and analysed to form the concepts from the participants’ responses. Subsequently, an appropriate label

was assigned to the identified concept on which the open coding was based. During open coding, many different categories were identified. Some of these pertained to a phenomenon while others referred to conditions, actions and interactions, or consequences. The labels placed on categories were carefully selected by the researcher to distinguish them, in a manner as close as possible to that recommended by Corbin and Strauss (2014). Table 1 provides an example of the open coding process.

Axial coding

After categories had been identified, they were assigned their related sub-categories, according to their meanings, to form more precise and complete explanations about the phenomena at hand. This process is termed “axial coding” because it is undertaken around the axis of a category, linking categories in accordance with their core meanings (Corbin and Strauss 2014). During open coding, an overall sense of the data was perceived and the initial categories at dimensional levels were formed. The axial and open coding proceeded together naturally until a saturation point was thought to have been reached for each category. This resulted in the initial categories being identified as a framework in which to develop the axial coding structure. These categories include Selection criteria, Selection practices, Enabling factors, Inhibiting factors.

The emerging connections between categories and subcategories were identified and validated through continuous comparisons of data, incident to incident, through which the theoretical saturation of each category was achieved, and the axial coding structure was developed. Saturation is more a matter of reaching the point where any new emerging concepts would entail extending the scope of research rather than adding to the existing explanation. Or, upon reflection, the additional concepts may be subsumed into existing categories.

In addition to high-level categories of identification that emerge from the data, lower-level open codes are identified under the overall categories, and then sorted and organized into meaningful sub-categories. For example, under the overall category of “*Selection Criteria*”, the following codes emerged that represented the open codes: Uncertainty, Risk, Having formal contact, Opportunity for Innovation, Constructability, Culture of organization, Complexity, Collaborative behaviour, Political influences, Regulation influences.

The open codes were also grouped into meaningful sub-categories to provide an understanding of dimensions relating to the identified higher-level category. In the coding example above, this resulted in segregating codes into the four following sub-categories: *Project Characteristics*, *Client's Objectives*, *External Environments*,

and *Internal Environments*. Table 2 shows this process and demonstrates the open codes, related sub-categories and conceptual meaning of each category.

Selective coding and theory matching

Once the major categories were identified, they were integrated to form a larger theoretical scheme so that the research findings could convey what the research was about. Corbin and Strauss (2014) define selective coding as the process of integrating and refining categories towards forming the theory.

After identification of the core categories, supporting categories were integrated through revisiting and re-viewing the data. Task iteration, carried out reflectively, is an important aspect of this method.

Through this process of selective coding, parallel to shaping the conceptual categories, the search for a matching theory commenced and continued, one that might best explain the interdependencies between categories that had been empirically formed. In particular, the complementary theory should serve to explain how clients opt for selecting an ECI in situations where other procurement methods can also fulfill the procurement selection criteria.

This search required exploring the theoretical foundations and behavioural models of decision-making to yield a better understanding of ECI selection decisions. What was ultimately found, after a considerable period of reflection and analysis of existing theories and models, was the construct of *prospect*.

The theory of prospect (Kahneman and Tversky 1979) was developed for selecting ECI after an intensive review of the data and literature. Once the theme appeared in the participants' description as to how and why they select an ECI, it was developed as the central core category that could explain the diverse variations and exhibit explanatory power.

Theory development

The results of the NVivo analysis for the research project led to the development of a theory to explicate the ECI selection process. While the responses of the interviews helped to identify the phenomena that emerged in exploring the ECI selection process, this component of the findings failed to address the question as to why clients opt for ECI amongst other procurement alternatives and an array of methods associated with them. Several alternative delivery methods (or slight variations of them) can respond to the ECI selection criteria. Therefore, although the selection criteria were necessary for selecting an ECI, they were not seen as sufficient to fully influence a decision leading the client to opt for ECI. In addition, when participants werew

Table 1. An example of the analytic process of open coding.

Interview notes		Open codes		Memos
<p>Question: What are the main characteristics of ECI? What type of projects is best suited to an ECI?</p> <p>Answer: The main characteristics, or why you would do an ECI contract is when you have a project that you have a fairly good idea of what the scope is, what you want to achieve, you have reasonable understanding – or very good understanding, rather – of your constraints, particularly from your stakeholders, but there is still a lot of room for innovation in the Design and Construction stage. Even though you might have the scope reasonably well-defined, how to go about designing that road and constructing that road is pretty much up for grabs. That's when I would tend to use an Early Contractor Involvement project.</p> <p>Question: How is an ECI selected for a project?</p> <p>Answer: We're looking at a whole range of characteristics; and then, by looking at that range of characteristics, we'll start doing some sort of multi-criteria assessment, if you have a risky project which lends itself to a lot of innovation, is clearly defined, we've got a fairly good idea what the stakeholders need and there's a good market which is available to do the works, then we'd likely choose an ECI. So, it just depends on the project and you would look at the characteristics. It's very much a subjective process, but you look at the characteristics, you use your experience based on your knowledge of how you delivered projects in the past and you say, on balance, on those issues, that would be the best way to deliver that project.</p>	<p>Awareness of scope</p> <p>Uncertainty</p> <p>Opportunity for innovation</p>	<p>Memo1: The client needs to have good understanding of the project scope and objectives to select an ECI project. The high level of uncertainty has to be in the nature of project not due to the lack of knowledge</p> <p>Memo2: Even though the scope is well-defined, there should be still room for creative ideas of contractor in the design and construction stage of the project in order to benefit from the early contractor involvement</p> <p>Memo3: In selection of ECI all criteria are taken into account through a multi-criteria assessment. The selection is based on a trade-off between defined criteria and based on the whole range of characteristics</p> <p>Memo4: The selection process largely relies on individual experience. This experience is mainly earned from the experience attained from previous projects as to how they were delivered in the past and whether or not they were successful</p>		

Table 2. An example of the analytic process of axial coding- category of 'Selection Criteria'.

Sub-category	Codes	Definition
Project characteristics	<ul style="list-style-type: none"> • Uncertainty • Risk • Size of project • Complexity • Time 	Some projects can benefit from the ECI the most. These projects are to be recognized by evaluating certain criteria related to the characteristics pertaining to the nature of project
Client's objectives	<ul style="list-style-type: none"> • Having formal contract • Constructability • Innovation • Value for money • Collaborative behaviour • Design variations 	Needs and expectations of the clients are also a set of criteria that should be considered in the selection of ECI
External environments	<ul style="list-style-type: none"> • Nature of contractor • Market situations • Stakeholders impact • Political influences • Regulation influences • Local community influences 	There are some factors which are influenced by the environment outside of the project and the parties who are directly involved
Internal environments	<ul style="list-style-type: none"> • In-house resource availability • Source of funding • Skills and competency • Culture of organization 	These criteria represent the limitations or opportunities that the client owns and can be seen as influencing factors in selection of ECI

asked about the core differences between ECI and other relationship-based procurement methods, the majority stated that most collaborative methods are fundamentally similar. The remaining interviewees offered no reasons. This shows that even if ECI is selected intuitively; there should be other incentives or convincing attractions for decision makers to adopt ECI.

More often than not, if external rules and political influences do not dictate the choice of a particular delivery system, clients tend to use the procurement method that they are more familiar (and comfortable) with – one where they have been satisfied with the outcomes on previous projects (Love *et al.* 2008; Mosey 2009). However, in selecting ECI, it was not always the case. For instance, clients with a successful track record in utilizing traditional procurement methods or alliancing as a more modern delivery system have also decided to adopt an ECI approach for their projects. Traditional or familiar practices may influence the selection of ECI most, but not all of the time.

In the case study, through the theory matching process, and following the emergence of the construct, *prospect* theory was found to be persuasive as a basis for explicating the emergent findings.

Prospect theory was introduced by Kahneman and Tversky (1979) as a descriptive model of decision-making under risk and uncertainty that explicitly incorporates irrational behaviour in an empirically realistic manner (Kahneman 2003). In other words, the theory explains the economic behaviour in a way that is less reliant upon rational assumptions.

Building on prospect theory, Tversky and Simonson (1993) note that preferences between two options are often affected by the availability of an intermediate third option. In other words, a choice between extreme options is considered less attractive than a choice between moderate options.

It is easy to see how this might play out in a choice between traditional procurement methods, where one party is assumed to bear all the risks, and Alliances in which parties share the liability of the risks. The choice of ECI as a more moderate procurement choice in this situation might prevail. This explanation is in line with Edwards (2009, p. 4) who argues that the creation of ECI is a response to the need for contracting strategies *"that follow a collaborative approach without moving radically from the traditional forms of contract"*.

Recognizing the influence of prospect in the case study research was complicated by the way in which it was manifested in different contexts. Clearly, the underlying characteristics inherent in the nature of the ECI process, such as the combination of integration and segregation (i.e. relational and traditional contracting), propose distinctive advantages that attract clients, even though they may not be the essential criteria for the project. However, there were instances in which clients preferred the use of ECI over the other alternatives in an effort to gain tangible benefits pertinent to the financial and technical aspects of the project. In other circumstances, intangible benefits such as establishing trust-based working relationships were the drivers for clients to choose ECI; while for some

clients both tangible and intangible benefits were the motivation.

Although prospect became the substantial concept that was incorporated through all of the participants descriptions in some manner and form, it was identified as being limited, based upon the identified selection criteria to adopt a procurement system. In other words, prospect was never mentioned as the sole means by which decisions were actually influenced. However, while the influence of prospect was inferior, awareness of it as a concept was constantly present.

In the context of the case study, the concept of prospect was similar to the main concept of the original prospect theory. Nevertheless, prospect theory *per se* focuses mainly upon the economic analysis of the decision-making, which fundamentally relies on the mathematical calculation of probabilities and consequences of risks. While this case study employs the theory for explaining the selection of ECI, the application of the theory in the case study is limited to essential features pertinent to the purpose, whereby the axioms of prospect theory can explicate the choice of ECI by clients. Using just the parts of a theory needed for developing a middle range theory is supported by Bailey (1991, p. 39) as one of the strategies that can be adopted for the construction of a theory: *"The divisive strategy proceeds by examining a theory more general than the one desired, and dividing it, or utilizing just the portions needed for the less general theory, or scaling it down in whatever manner"*.

Therefore, prospect theory was used to explain how the offered prospects might influence the procurement decisions towards the choice of ECI when the situation is characterized by risk and uncertainty. Figure 2 illustrates the process undertaken during the coding procedure to match prospect theory as an influence in the decision to choose ECI.

Control as the potential gain in utilizing an ECI

The insights gained within the analysis process for the case study indicated that the creation of prospect was the result of several of the innate characteristics of the capacity of ECI to moderate risk and uncertainty for clients.

Several authors such as Rahman and Kumaraswamy (2002); Eriksson and Pesämaa (2007); Walker and Lloyd-Walker (2015) have investigated procurement and inter-organizational relationships in construction through the notion of Transaction Cost Economy (TCE) as developed by Coase (1937).

Under TCE theory, the client's decision for selection of ECI is also well supported by the assumptions and conceptual arguments of the governance mechanism (Eriksson and Laan 2007). The decision to adopt ECI is made in a

condition when the project characteristics include fairly high complexity with prediction of noticeable alterations occurring during the delivery process. For example, this might be represented by a project where an existing hospital building is to be converted to a large number of luxury apartments.

In the beginning of the project, the client is not able to fully measure goal attainment, and does not know all the appropriate actions required to achieve the goal. In such circumstances, the early collaboration of the contractor in the design development is advocated (Walker and Rowlinson 2008) in order to obtain the advantages and synergies of cooperative relationships through the early establishment of trust (Aulakh *et al.* 1996). However, when project complexity is not too high, and it is anticipated that the uncertainty associated with the project can be managed successfully, clients are more likely to choose more conventional procurement method. It enables them to gain greater control over the target price and the entire contractual process in order to absorb uncertainty and avert dependency risks (Emsley and Kidon 2007). Gaining control over the entire project process, therefore, is found as a key factor that moderates an ECI procurement approach amongst the alternative extreme methods that focus solely on either transfer of risks to one party or sharing them between project participants. To fully understand the concept of control in the ECI process for the case study, it was further investigated from the TCE perspective within three main governance mechanisms of price certainty, contract formalization and trust (Eriksson and Laan 2007).

When the uncertainty associated with the project, coupled with the lack of necessary knowledge of the clients to achieve their goal, engenders difficulty in defining scope, *social control* through facilitating trust and commitment is the most efficient instrument (Das 2001).

If the client is able to define the project scope and possesses sufficient knowledge and skills to employ appropriate methods to achieve the goal, the use of a formal contract with more comprehensive contractual specifications and managerial arrangements, is favourable (Das 2001). Greater control over process is obtained when the transaction is governed by authority (Hennart 1993). Therefore, clients intend to gain *process control* when the project and the target price are governed by a standardized or formal contract (Eriksson and Laan 2007).

Finally, in projects where the scope can be specified and the target goal can be defined, but the client has limited knowledge to monitor the transformation process, measuring and monitoring the results or outcomes produced by the contractor can ensure the attainment of the client goals (Aulakh *et al.* 1996; Das 2001). In this situation, Eriksson (2006) pointed out that clients are more likely to

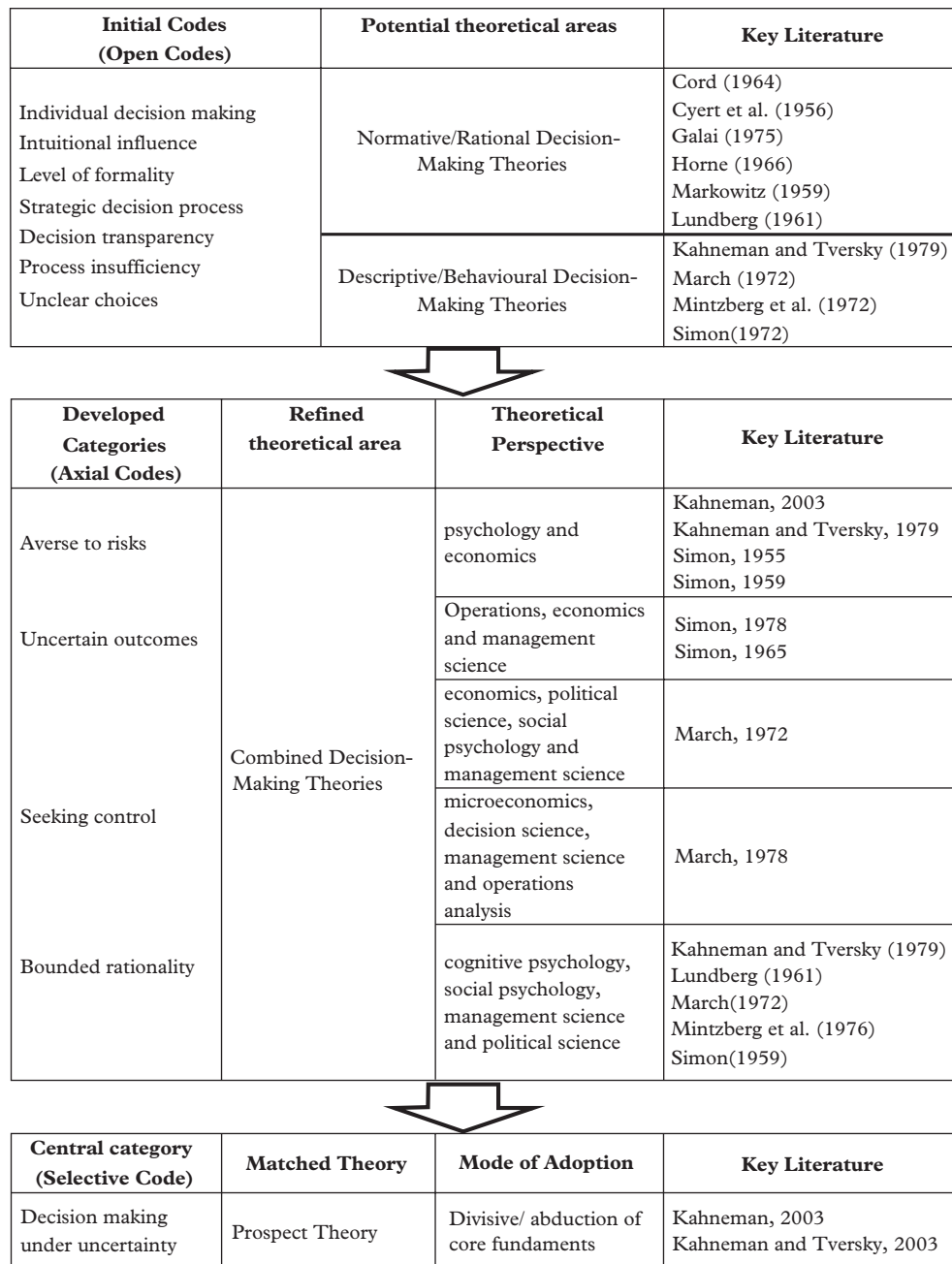


Figure 2. ECI selection theory matching steps.

utilize a strategy that gives them greater control over the price as this is more closely related to the *output control*.

This is evident that the tenet of ECI that focuses on the three governance mechanisms of price, contract formality and trust together in different stages of the project, increases the possibility for the client to gain greater social, process and output control throughout the project lifespan. Social control is facilitated at the front-end of the project by establishing a collaborative relationship based upon trust and commitment between client and contractor. Process and output controls are enabled during the detailed design and delivery stage by utilizing a traditional

standardized contract. At this stage, the project is governed by a formal contract and a lump sum fixed price may be determined, particularly in a time of economic stability where interest rates are not excessively volatile. The higher level of control, over all stages of the project delivery process, reduces the nature and extent of uncertainty and risks, which makes the ECI more attractive to the client as a more moderate option (under prospect theory) compared to other procurement alternatives. Figure 3 illustrates the primary components that constitute control from a prospect perspective.

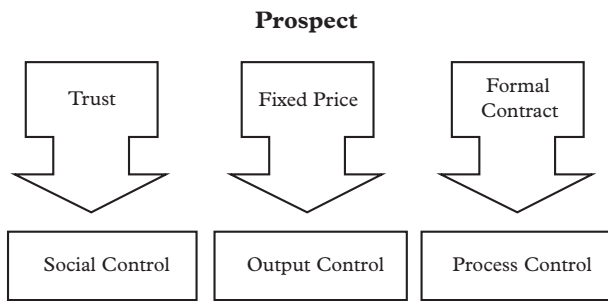


Figure 3. Prospect and attainment of different types of control by using ECI.

Figure 4 shows the contextualized theory of ECI selection. The individual relationships between categories have been explored in detail and then presented as an integrated and consolidated whole.

The decision to select an ECI approach for a project is predominantly guided by the identified selection criteria. The main categories for “Selection Criteria” are shown within the thick boundary and represent the major influences on the decision to adopt ECI. ECI selection criteria

consists of four main categories namely “project characteristics (factors inherent in the technical nature of the project)”, “client’s objectives (client’s priorities)”, “internal environment (factors within the project and involved parties’ environment)”, and “external environment (factors outside the control of the project and the engaged parties)”. This classification also conforms to the underlying themes portrayed by Alhazmi and McCaffer (2000). However, an additional category of “Internal environment” has been identified when clients are considering an ECI for a project that refers to both soft factors relating to the human dimensions and hard aspects relating to the contractual and financial issues.

ECI selection practices are demonstrated as the other identified category in the lower panel of Figure 4. All organizations have their own procedures for procurement selection. The procedure for selecting ECI as a delivery system for a project will also follow these practices. Identified practices in the case study formed the four categories including “Internal manual (organizational guideline)”, “external consultation”, “experts’ judgement” and “systematic process”.

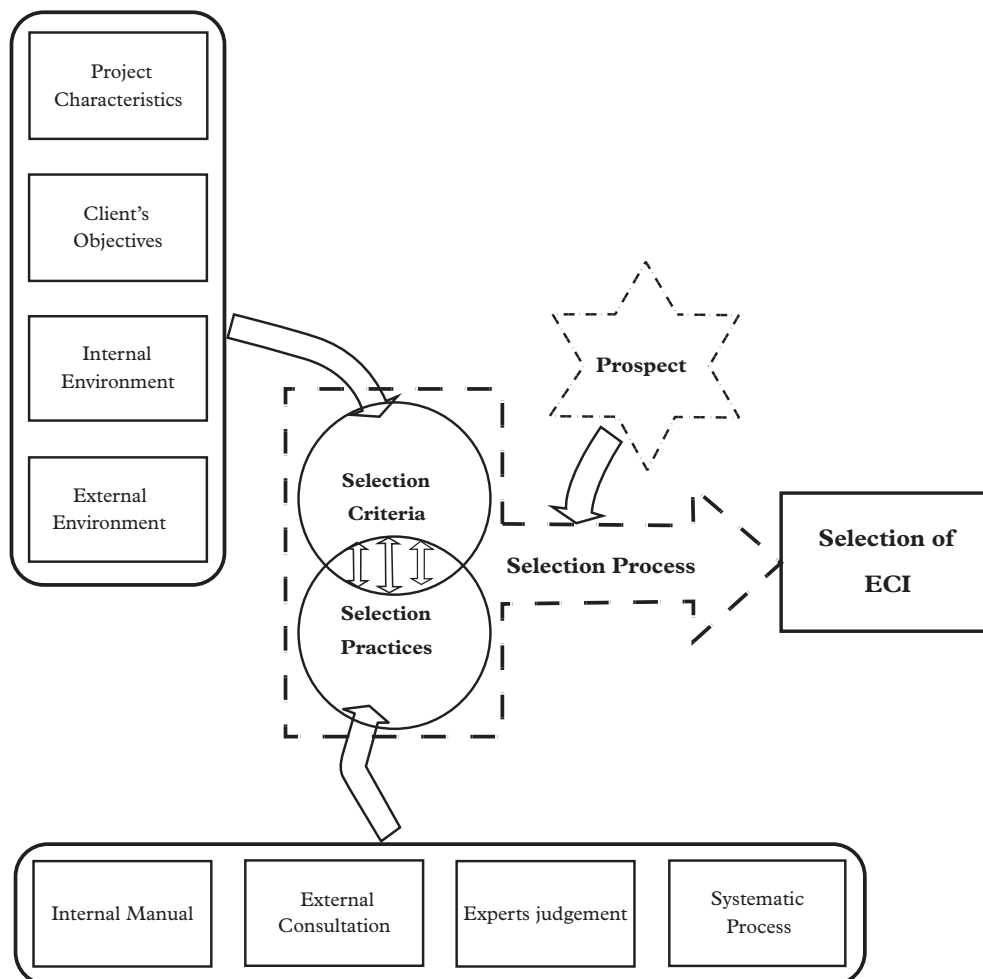


Figure 4. ECI selection process.

These practices are used for formulating the procurement selection criteria, and then comparing the identified criteria against the ECI characteristics, or as a combination of both throughout the process leading to selecting a procurement method. For example, a client may seek “external consultation” (in the form of advice from a lawyer or a professional project management consultant) to formulate the procurement selection criteria. Once the criteria are formulated, the choice would be whether to source the selection process entirely internally or to out-source some or all of the process to obtain expert industry advice to develop the selection process. The construct of “prospect” and its constituents are illustrated in a different style to emphasize the inferior role of prospect in ECI decision making process. While prospect may exert direct influence on the decision; it is not the significant factor *per se* to override other ECI selection criteria on its own. Rather, it can work to mediate or moderate the influence of them in the ECI selection process.

Testing the validity of the Abductive Grounded Theory

The validity of the research in the case study was examined in terms of internal validity, reliability and external validity.

Internal validity was ensured by employment of a number of strategies as advocated by Merriam (1995). These strategies included:

- *Triangulation*: The theory in this study was developed through iterative rounds of revisiting the same data-set to validate the emerging findings while building the entire theory. Corbin and Strauss (2014) point out that one way of validating a theory is to conduct a high-level comparative analysis by going back and comparing the theoretical scheme against the raw data. The analytical process consisted of three microanalysis stages of “open coding”, “axial coding” and “selective coding” to ensure the theoretical triangulation of the interview data.
- *Member checking*: transcription derived from the audio-recorded interviews, was sent back to the interviewee from whom the data was gathered, to check and confirm that the transcription was accurate and plausible. This also allowed participants to review and augment their contributions.
- *Peer/Colleague examination*: findings of this study were constantly checked and examined by experienced research colleagues who were independent from the research project.
- *Statement of researcher biases*: in the preparation of this study, every effort was made to explain the whole process of the research and present the

researchers’ experience, assumptions and biases towards collecting, interpreting and developing the findings.

- *Engagement in the research situation*: the duration of each interview was long enough to ensure that all interview questions were sufficiently answered through discussion by participants and an in-depth understanding of the phenomenon attained. This is tantamount to intra-participant saturation, which can then be aggregated to represent inter-participant saturation.

Some strategies used to ensure internal validity can also ascertain the reliability of the study as suggested by Merriam (1995). These include triangulation and peer examination. In addition, the process of data collection, derivation of categories and decision making throughout the study was described in detail in the preparation of this study. This contributes to reliability through adherence to process.

Strategies adopted to ensure the external validity of the research included:

- *“Thick” description*: detailed description of the research process throughout the study enables readers to determine how closely this research matches their own situations and if the findings are transferable (Merriam 1995). The details of the conceptualization and formulation of the theory also enables other researchers to follow the analytical process to understand the process logic and confirm the plausibility of the explanation of the phenomenon (Corbin and Strauss 2014).
- *Multi-site design*: the case study questioned various experts from different client organizations within different states in Australia in an attempt to allow the results to be applicable to a greater range of situations (Glaser and Strauss 1967).

Discussion

Using the case of the research into Early Contractor Involvement (ECI) delivery system selection, explicated as a worked example here, the main objective of the research project was to investigate how best value is achieved through the right selection of ECI for a project. Subsequent to an initial review of the literature it was decided that the concept of ECI was sufficiently new to the construction industry to expose a gap in the knowledge about this area. On account of the novelty of ECI, it was thought that Abductive Grounded Theory could provide an efficient means for developing by combining the core principles of Grounded Theory with the abduction

approach. Since this study focused on the process of the selection of ECI, the theory required by this study deviated from a broad range theory generation into a middle range theory development. From this effort, a central conceptual theory of *prospect* was found that could explain relationships amongst the identified categories. The findings support the idea of extremeness aversion rooted in prospect theory. The underlying moderation in the structure of ECI encompasses the dimensions of the ECI decision making process that are associated with the influence of selection processes, as well as identification of the selection criteria. The results indicate that this moderation is resulted by the potential controls clients perceive to gain throughout the ECI lifespan. Trust, established at the front-end of the project, can be seen as a kind of social control mechanism in economic transaction. Control over project process and project output is also predicated when the contract shifts towards formalization with a fixed lump sum price.

All efforts were made to adhere as closely as possible to the principles incorporated in Grounded Theory. The theory development started and overlapped the data collection stage iteratively from different cross-sections until a suitable saturation point was achieved in terms of data collection. Despite the iterated description of themes revealed by the coding of data collected from interview participants, the development of theory progressed around central categories that formulated through considerable rounds of analysis. Whilst attempting the theoretical saturation of categories, a search for matching theory was carried out, drawing upon relative existing theory in literature to provide sufficient explanation to validate the construct.

Although the innate prescriptive analytical process of grounded theory led to systematic theory-matching approach in the advocated method, recovering the theory still depended on the researchers' background and experience to a great extent. The initial categories emerging during open coding and axial coding stages informed the potential areas of the theory, whilst the categories became mature, the search for the matching theory also became more focused until the saturation of theoretical categories. Notwithstanding, mobilizing different theoretical models ultimately was influenced by theoretical sensitivity, academic knowledge and insight into existing theories of the researchers. As a result, it is not unlikely that researchers, based on their characteristics, interrogate emergent findings through different theoretical lenses derived from the literature and utilize varying theoretical frameworks to sufficiently make sense of the relationships between core categories. Even though this may exhibit some diversity in adopted theories and raise some concerns about their structural and contextual fits, alternative interpretations of the findings and unorthodox theoretical insights, would

provide conceptual richness to the research in question. Finally, while we made every effort to pledge allegiance to the core components of Grounded Theory, the influence of pre-existing concepts derived from the literature and the area of our expertise in coding process was inevitable.

Limitations of the worked example

The presented worked example was consciously designed to support the development of theory of how an ECI procurement method should be selected as a delivery system for a construction project. In conducting this study, however, there are limitations that should be acknowledged. First, the scope of this qualitative research is limited due to the resource constraints. All of the research participants performed at the highest managerial level within their organizations. They had full authority in selection of procurement methods for a project. Since this study solely adopted a qualitative methodology - Abductive Grounded Theory in particular-all the responses represent a subjective view of one person reflecting on the individual's view of the reality and interpretation of the facts. For greater objectivity, more diverse audience in different levels of power and authority within the hierarchical organization is needed to gain more insight into the process of selection of ECI from lower ranked insight. Second, this study only focuses on the client organizations as the active members of a project and explores the dimensions of selection of ECI only within that context. Consequently, the development of the theory was based upon the client representatives' point of views. Since the contractors and designers are also main components of a construction project's delivery team, there is a need for future research concentrating on contractor and designer organizations in order to refine, improve and extend the ECI selection model. Finally, development of the ECI selection model merely relied on the theoretical grounds. While the model can be useful to propose effective practices for selecting ECI abstractly, the construction industry needs more tangible and pragmatic tools to implement within their organizations. It is, therefore, recommended to use the presented model as the basis for development of more practical tool. Such work could ultimately result in tool for helping the clients to adopt an ECI by considering all other procurement options before selecting such an approach.

Conclusions

Although Grounded Theory has gained popularity for its ability to enable theory-building directly out of the data, the employment of this methodology in the fields of management and organization is reported as challenging due to different theoretical requirements in these domains, and

few examples can be found. However, the unique characteristics of Grounded Theory, including the structured coding procedure, constant theoretical comparison and grounding the emerging concepts within the data, are attractive enough to encourage researchers in the field of management and organization to take up the challenge.

The methodology outlined in this paper is Abductive Grounded Theory as a qualitative approach for studies in the field of construction management. This has been seen to comprise a combination of Grounded Theory and abductive reasoning which positioned the approach within the pragmatist paradigm. In comparison with the traditional Grounded Theory, the advocated approach incorporates the abduction into the analytical process of induction, deduction and verification in an attempt to develop a theory tailored for CM studies. This is especially pertinent to the development of a theory that is recognized as usable within certain context and limits.

A number of conclusions can be drawn from this paper. Firstly, adherence to the research process prescribed by the Grounded Theory guidelines in developing a parsimonious theory is important. The proposed approach guides the development of the research question by reviewing the substantive literature before initiating the data collection. The analytical procedure predominantly follows the open coding, axial coding and selective coding process as prescribed by Corbin and Strauss (2014) and the search for the matching theory begins parallel to the analytical process.

Secondly, using Abductive Grounded Theory can facilitate the development of a theory by adopting and contextualizing an existing theory rather than generating a completely new theory. It attempts to embed the grounded theory analytical procedure and abductive reasoning within theory development settings and proposes a methodological vehicle to satisfy the basic requirements of CM theoretical models (Cairns 2008, Schweber 2015). This important characteristic can be seen as the main theoretical contribution of this study to more progressive development and consolidation of research in CM field.

This study supports the idea of contextualizing Grounded Theory in other fields of research if the aim of study is developing any types of theories (c.f. Dubois and Gadde 2002, Green *et al.* 2009). However, it should be emphasized that the advocated approach is intended to be considered as an additional form of grounded theory rather than superseding it.

The detailed explanation of the experience earned in this study is intended to help other researchers within the context of CM to make an informed decision on choosing Grounded Theory amongst various qualitative research methodologies. Once adopted, the inheritance to the fundamental principles of Grounded Theory also assists them

to greatly improve the quality and results of their qualitative studies.

Finally, since any forms of Grounded Theory are underused within the context of CM research, it is hoped that the worked example presented is sufficient to illustrate the essence of the approach advocated and demonstrate the analytical process in detail. Since it is believed that learning in CM research society will be improved if more of the analytical processes of studies are revealed to the reader, we hope this paper will instill greater confidence in early-career CM researchers.

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