



# Identifying combinations of control strategies in dwelling fit-out projects: A latent profile analysis

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## Abstract

Despite a wealth of research examining the interplay between formal and social controls, the results still presented great contradictories thus far. One reason might be that these studies failed to recognize the existence of latent subgroups differing in the configuration of formal and social controls. To bridge this gap in knowledge, this study adopts a configurational approach to analyze how project control strategies configure in unobserved subgroups. A questionnaire-survey of dwelling fit-out projects was undertaken in China. Data was analyzed using latent profile analysis. Three latent subgroups are identified from the dataset. These are high control profile, moderate control profile and behavior-social control profile. It is also found that high control profile is associated with better project outcomes than the other two profiles. This study contributes a configurational approach to the project control literature. Implications for project controls are provided in the end.  
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## 1. Introduction

The control literature presents two broad categories of control strategies: formal control and social control (Das and Teng, 2001; Eisenhardt, 1985). Formal control comprising outcome control and behavior control can be achieved through performance evaluation and rewards (Eisenhardt, 1985). It emphasizes the formal rules and procedures to monitor and reward the pre-specified performance (Das and Teng, 2001). On the other hand, social controls utilize social strategies to minimize the divergence of preferences between parties (Choudhury and Sabherwal, 2003; Das and Teng, 2001; Eisenhardt, 1985).

There exists a wealth of research examining the interplay between formal and social controls (e.g., Gregory et al., 2013; Osipova and Eriksson, 2013). However, the results still presented great controversies. Some reported that formal and social controls substitute each other (e.g., Atkinson et al., 2006). Others ascertained that they might complement each other (e.g., Manu et al., 2015). It was also found that there exists a portfolio of

control strategies (Choudhury and Sabherwal, 2003). Those investigated the control–outcome relationships (i.e., the impact of control strategies on project outcomes) also brought about conflicted results. Some indicated that behavior control could increase project outcomes (e.g., Klein et al., 2006), whereas others presented that the relationships are insignificant (e.g., Tiwana and Keil, 2009).

In order to reconcile the conflicts, studies added factors that may moderate the relationship between formal control, social control and project outcomes (e.g., de Man and Roijackers, 2009; Kim, 2014; Liu, 2015). For example, Liu (2015) identified a moderator of complexity risk and found that in projects with high complexity risks, the effects of behavior and self-control on project outcomes are low, whereas outcome and clan controls are more useful (Liu, 2015).

These studies fall into the group of variable-centered analysis, which focuses the relationship between control strategies as well as their joint impacts (i.e., the interaction effect) on project outcomes. The variable-centered approach has advantages of identifying variance in a variable (i.e., project outcomes) explained by predictor variables (i.e., control strategies)

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(Meyer et al., 2013). It assumes that there exists a homogenous population and the identified relationships, either significant or insignificant, are applicable to the whole population.

However, it might be possible that there exist subpopulations using distinct configurations of project control strategies. Their impacts on project outcomes might also vary across the subpopulations (Wang and Hanges, 2011). To identify the latent subpopulations, a configurational approach is required (Meyer et al., 1993; Short et al., 2008). Distinguished from the variable-centered approach, the configurational approach is able to identify latent subgroups that present distinct combinations of control strategies. This approach has been adopted in research such as governance (Ebers and Oerlemans, 2013), commitment (Meyer et al., 2013), work motivation (Valero and Hirschi, 2016) and leadership (Chou et al., 2015). However, it has been seldom utilized to examine project control strategies thus far.

The questions guiding the research are that: *what are the configurations of control strategies in projects? Whether contractor's opportunistic behaviors and project outcomes are significantly different across subgroups with distinct configurations of control strategies?*

Through a configurational approach, this study aims to determine latent subgroups with distinct configurations of control strategies, and to examine whether contractors' opportunistic behaviors and project outcomes are significantly different across the subgroups. The results would contribute a configurational approach to the literature of interplay between formal and social controls. Understanding the heterogeneous characteristics of the population would be also crucial to the adoption and implementation of control strategies.

The paper is organized as follows. Section two presents a literature review of three control strategies, the relationship between control strategies and the comparison between variable-centered and configurational approaches. It is followed by the research methods of a questionnaire-survey. Results and discussion are shown in sections four and five. Implications for research and practice are presented in the last section.

## 2. Literature review

Three control strategies (i.e., outcome control, behavior control and social control) are elaborated, followed by a review of the interplay between these three strategies and their joint impacts on opportunistic behaviors and project outcomes. As these findings are mainly derived from the variable-centered approach, a comparison between variable-centered and configuration approaches is presented in the end.

### 2.1. Control strategies

There are two broad categories of control strategies: formal control and social control (Das and Teng, 2001; Ning, 2017). Formal control comprises behavior control and outcome control (Eisenhardt, 1985). In behavior control, controller focuses on the process to the goal achievement. Rules and procedures used to achieve desired goals are prepared in detail. Controllers would monitor contreee's behaviors and exercise the reward based on

the degree to which desired procedures are met. Studies found that behavior control is appropriate when behaviors are measurable; controller could easily observe contreee's behaviors and has sufficient knowledge to evaluate the behaviors (Choudhury and Sabherwal, 2003; Kirsch, 1997; Turner and Makhija, 2006).

To implement outcome control, controller focuses on project outcomes (both interim and final) (Choudhury and Sabherwal, 2003). Desired outcomes (e.g., milestones, functional specification and budget) are formally specified. Therefore, contreees could be rewarded or sanctioned for meeting or missing the pre-specified outcomes. Studies found that outcome control would be more appropriate when outcomes are measurable and controller could easily evaluate the project outcomes (Kirsch, 1997; Turner and Makhija, 2006).

It is often recognized that formal controls tend to present a mechanistic view of the control process and they ignore inter-personal mechanisms (Ashford and Tsui, 1991). Relationship built among actors can serve as an informal control tool. Social control could govern transactional behaviors through informal means, such as trust, mutual gain and reciprocity (Larson, 1992; Uzzi, 1997). Parties could promote social controls through joint problem solving, trust and information exchange (Uzzi, 1997).

### 2.2. Relationship between control strategies

#### 2.2.1. Interplay between formal and social controls

Two types of relationships between formal and social controls are identifiable, i.e., substitutes and complements (see a review in Cao and Lumineau, 2015, a summary in Table 1). Substitutes indicate that a low level of formal control requires a high level of social control, vice versa. The reasons for the substituting effect could be manifested by replacing and dampening (Huber et al., 2013). The function of replacing indicates a functional equivalence of each other. The presence of formal controls obviates the need for the other. Dampening occurs when one mechanism undermines the bases or strengths of the other.

The reasons for complements are summarized as compensating and enabling (Huber et al., 2013). Formal control and social control could compensate for the weaknesses of each other. For example, formal control seems robust to volatility but not to ambiguity, whereas social control is more effective to cope with ambiguity but not with volatility (Carson et al., 2006). Formal control and social control enable each other since one could create conditions that facilitate the other (Huber et al., 2013).

#### 2.2.2. Contingency approach

An increasing number of research found that both substitutes and complements are possible, depending on certain circumstances (e.g., Costa and Bijlsma-Frankema, 2007; Srivastava and Teo, 2012). This brings about a contingency approach. Transaction characteristics have been taken as a contingency factor. For example, the level of risk would influence the interplay between formal and social controls (de Man and Roijackers, 2009; Kim, 2014). In high risk situation, formal

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