

# The Optimal Control Bargain: A Simulation Model of Complex Control Systems

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## **Overview**

This paper investigates how managers develop and implement complex control systems. Within, I present several hypotheses which integrate and extend current independent conceptualizations of organizational control. I use a simulation-based model to test several control-related hypotheses. Results of this study provide support for the newly emerging “broader” perspective on organizational control research and outline how managers can improve organizational performance by simultaneously addressing diverse elements of their control systems.

## **Theory**

As organizations adapt to the pressures of an increasingly competitive global marketplace, managers are replacing their rudimentary command-and-control techniques with complex control and coordination strategies. While scholars agree that control is a central component of organization theory, they are unable to fully understand and explain these increasingly dynamic forms of control.

This is largely due to the fact that organizational control research has been compromised by several theoretical and empirical deficiencies (Cardinal, Sitkin, and Long, 2000). First, individual control studies have investigated primarily the application of singular forms of control. Second, researchers investigating various facets of organizational control have never developed a common, integrated conceptual consensus. Third, control studies are generally too static and have evaluated controls only at specific points in time.

For example, transaction cost theory (Ouchi, 1980; Williamson, 1975) and agency theory (Eisenhardt, 1989) outline alternative mechanisms for directing boundedly rational, self-interested and opportunistic employees. While anecdotal and emerging theoretical work has suggested that managers utilize both approaches in their control initiatives, little is known about how managers concurrently apply both transaction-based and agency-based controls. Because we have yet to develop an integrated conceptual framework, researchers possess a relatively limited understanding of how these fundamental elements of control are combined within complex organizational systems.

This paper increases our understanding of organizational control by integrating the transaction-based concept of *control systems* with the agency-based concept of *control targets*. After describing these concepts, I discuss the theoretical and empirical bases for integrating them.

## **Control Systems**

In an effort to minimize transactions costs in environments where actors pursue different goals, and individual performance cannot be perfectly rewarded, managers implement three types of control systems: the market, the bureaucratic, and the clan (Ouchi, 1980). Within *market*

*control systems*, managers contract with and monitor employees. Managers within *bureaucratic control systems* apply formal control mechanisms such as rules and regulations through specialization and hierarchies. Managers within *clan control systems* direct employees using common values, traditions and beliefs.

### **Control Targets**

Research on control targets utilizes the principles of agency theory and examines how managers monitor *control targets* or the three production elements to which individual and groups of controls are applied – inputs, behaviors, and outputs (Ouchi, 1979; Eisenhardt, 1989). Organizations select *input targets* ("input control") to prepare the material and human resource elements of their production processes. Organizations choose *behavior targets* ("behavior control" or "process control"), such as process rules and behavioral norms, to ensure that individuals perform actions in an appropriate manner. Finally, organizations focus on *output targets* (output control) to align the quality and quantity of outputs with preset production standards.

### **Integrating Control Systems and Control Targets**

While both control systems and control targets describe potentially complementary organizational control strategies, few attempts have been made to integrate these concepts. Most notably, a compilation of observations and deductions made by theorists (Eisenhardt, 1989; Ouchi, 1979; Williamson, 1996) suggests that: 1. managers within market control systems tend to focus primarily on output control targets; 2. managers within bureaucratic control systems tend to focus primarily on behavioral control targets; and 3. managers within clan control systems tend to focus primarily on input control targets.

Arguing that this approach is incomplete, this paper adopts the emerging broader perspective on organizational control (Cardinal, et al., 2000). This perspective suggests that, within particular control systems, managers direct both formal(codified) and informal (uncodified) control mechanisms towards multiple control targets simultaneously. In addition, it suggests that, instead of investigating why managers concentrate on singular control targets, scholars should analyze how configurations of multiple forms of control mechanisms affect organizational effectiveness measures.

Within this paper we link this broader perspective to organizational performance and evaluate this general proposition:

*Proposition 1:* Ceteris paribus, organizational performance improves when managers, within particular control systems, apply both formal and informal control mechanisms to appropriate configurations of multiple control targets.

### **The Model and The Study**

I test both the general and specific elements of this broader perspective on organizational control using the commercial software version of the VDT computational discrete event simulation model - VITE' - developed by researchers at the Center for Integrated Facility Engineering at Stanford University. VITE was chosen for this paper because it permits the construction of simulated organizational control environments within which to examine and compare multi-dimensional relationships. I use the VITE' platform to construct, test, and evaluate how various combinations of control systems and control targets differentially affect organizational performance.

To investigate the general proposition put forth by the broader perspective on organizational control, I compare the differential effects produced when managers, operating within various types of control systems, focus on both single and particular combinations of multiple control targets. I use VITE' and the principles of transaction cost theory (Williamson, 1975) to develop three generic control system environments (market, bureaucratic, clan). I also use agency theory principles to separately generate six forms of control mechanisms directed towards production targets (formal, informal; input, behavior, output). Using a generic production process, I evaluate what happens when managers within particular control systems focus on combinations of control targets. Organizational output is evaluated along several performance dimensions (production cost, production cost and production quality).

My evaluation of the general proposition presented above is developed and presented in three steps. First, I determine the overall performance (production cost, production speed, production quality) and general information processing capabilities of each control system (market, bureaucratic, clan). Second, within each control system I first examine effects produced when managers focus on singular organizational targets (formal and informal; input, output and behavioral control). Third, I examine whether and how organizations improve their effectiveness when managers focus mechanisms towards specific combinations of multiple control targets(formal and informal; input, behavior, and/or output). Evidence for the broader perspective on organizational control is indicated when a focus on multiple control targets results in performance improvements.

### **Preliminary Findings**

Preliminary findings indicate support for the broader conception of organizational control. First, control systems possess distinctly different capacities to process information and excel along different performance dimensions. In addition, each control system tends to develop significantly different coordination and control problems. Deficiencies within particular control systems are remedied only when organizations focus on specific combinations of multiple control targets. Specific remedies to each control system's deficiencies varies according to the presence or absence of internal and external environmental contingencies (e.g. environmental uncertainty, task analyzability, and the task knowledge possessed by employees).

### **Discussion, and Conclusion**

The findings of this paper both broaden and deepen our understanding of organizational control. First, this paper evaluates what control targets are most important within particular control system contexts. Second, this paper investigates whether managers can improve their task completion efforts by focusing on multiple control targets over singular control targets. Lastly, the analysis probes further and determines which configurations of control targets are best suited for particular control systems. Findings in this paper support recent work by control theorists who advocate for a broader perspective on organizational control research

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