

O.R. Applications

# Comparing multi-dimensional contingency fit to financial performance of organizations

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## Abstract

In theory, it is widely accepted that an organization's optimal structure is contingent upon various situational factors such as market conditions, nature of work and properties of technology. In practice, providing practical advice based on this understanding has been difficult. This paper demonstrates that it is possible to find a correlation between financial performance, as measured by growth in Return on Assets, and degree of compliance with the recommendations of the contingency theory model known as Interaction Value Analysis (IVA). IVA is based on an abstract theoretical representation of organizational work as a series of value-adding interactions among rational value-maximizing agents. Six different dimensions of an organization's situation are represented as parameters of the equation that sums up the value added by all interactions within the organization. This "Multi-dimensional" approach is contrasted with the "Multi-contingency" model, which aggregates the effects of multiple contingent-design rules without considering how the rules overlap or otherwise influence one another. The success of the six-parameter IVA model in partially predicting financial performance is an inducement to expand IVA to include more of the parameters included in the Multi-contingency model.

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## 1. Introduction

Every business needs to keep up with change. In particular, organizational changes inside the business are recognized as a necessary response to external changes (Davidow, 1992; Zuboff, 1988; Hammer and Champy, 1993). In popular business literature, "good" changes in organizational structure are often portrayed as universal imperatives: decentralize decisions, empower employees, focus on the customer. Less often, the required changes are described as one-dimensional responses to an external stimulus. For example, we often hear "Decentralize when things are uncertain and centralize when faced with static conditions." or "Increase customer choice when technology makes it cheap to do so, manage expectations when

technology offers huge economies of scale." or "Innovate until you have a legitimate monopoly position, then focus on defending the monopoly and maximizing revenue." The general principle is that the correct way to change an organization for better performance is *contingent* on external or internal factor, hence the name "Contingency Theory" (CT).

Many such factors have been studied by Contingency Theory, mostly in isolation. It is still not entirely clear how multiple factors in combination affect the ideal prescription for organizational change (Donaldson, 2001). Burton and Obel (1998) developed the "Multi-contingency" model, a classification of different one-dimensional CT models encoded into an inference engine to combine their prescriptions. Another possible approach is to admit ignorance and try a large number of different change prescriptions in parallel, then ruthlessly prune any projects or departments that did not meet objective performance

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criteria (Brown and Eisenhadrd, 2004). A third approach, pioneered by Huberman and Hogg (1995) and developed by Nasrallah et al. (2003), is to build an abstract model of an organization into which multiple dimensions of environmental effects can be incorporated. The cross-interactions of different factors are handled within the equations of the “Multi-dimensional” model, which Nasrallah et al. (2003) named “Interaction Value Analysis” (IVA).

One-dimensional contingency models are usually supported by one or more sources of empirical data. The multi-contingency model of Burton and Obel (1998) was initially developed out of different single-contingency models, and hence derived what validity it had from the empirical research of the single-contingency models that went into it. It was only several years after its introduction that its overall prescriptions were compared to direct performance of an organization (Burton et al., 2002).

Before the research herein reported, IVA had derived what validity it claimed from the similarity of its recommendations to those of the multi-contingency model of Burton and Obel (1998). Section 2 summarizes prior work leading up to these two models. Section 3 describes in some detail the first stand-alone validation exercise carried out on IVA. A sample of 23 companies whose financial records are published were evaluated for degree of adherence to the normative advice of the IVA model using directed interviews with top management. The analysis in Section 4 indicate that the IVA model can indeed stand on its own when validated against financial performance data of different companies, as long as the companies do not differ in ways not factored into the IVA model. This conclusion and other implications of the results are described in Section 5. Finally, a surprising outcome of applying the multi-contingency model of Burton and Obel (1998) to the same data set is described in Section 6, and some speculation is offered regarding its causes.

## 2. Background

### 2.1. Contingent organization design

Contingent Organization Design (Lawrence and Lorsch, 1967; Mintzberg, 1983; Donaldson, 2001), also referred to as Contingency Theory (CT), is the view that some organizational forms and features are preferable to others in certain situations, but the same forms and features may be counterproductive in different situations.

The distinction between “exploration” and “exploitation” modes for organizational work is one famous example of a CT rule (Miles and Snow, 1978). Greater individual freedom can be superior for exploring new markets, but tighter control of the work environment allows more efficient exploitation of existing markets. Another example of a one-dimensional contingency theory regards the distinction between a functional hierarchy and a divisional one (Burton and Obel, 1980). Compartmentalization along functional lines is supposed to be advisable for work per-

formed with decomposable technology, but groupings based on products or markets are better when the technology is only partly decomposable. Burton and Obel (1980) showed that this correlation can be generated from a computational simulation.

Although Donaldson (2001) promotes CT ever widely accepted alternate explanations of organizational behavior, such as institutional theory, CT is widely critiqued (Schoonhoven, 1981; Clayman, 1994) for its use of subjective measures and for its lack of clarity about the causation mechanisms which link the situational factors to the recommended structure. These causation mechanisms may be classified into three categories:

- (1) *Complex agents*: organizations are mostly influenced by complex psychological and social properties of the human beings who constitute them (Schein, 1992; Weick, 2001). This argument is irrefutable for some types of organizations but not necessarily for others, such as routine technical work.
- (2) *Complex systems*: having thousands of independent actors gives rise to other phenomena regardless of the type of actor. The increasingly popular agent-based models of human social behavior (Rivkin and Siggelkow, 2003; McKelvey, 1999; Levitt et al., 1999) usefully replicate behavior that emerges from the complexity of large systems.
- (3) *Dynamic systems*: Some CT rules may be due to tractable properties of information flow. One example is a simple balancing of demand and capacity for information processing (Nadler and Tushman, 1988). Other examples include various network formation models that evolve over time to reflect organizational learning (Burt, 1992; Banks and Carley, 1996; Carley and Krackhardt, 1996).

One response to all these critiques is to build a model that allows the results of multiple rules to be deterministically combined by an inference engine and see how much of actual organizational behavior is explained that way.

### 2.2. The “Organizational Consultant” (OrgCon) multi-contingency model

Multi-contingency theory is a synthesis between different single-purpose theories, advanced by many researchers to account for their empirical observations (Burton and Obel, 1998). Combining many single-factor theories is one way to demonstrate that apparently complex behavior can be explained by simple rules. The Organizational Consultant (OrgCon) expert system of Burton and Obel (1998) has been shown to be a reasonable predictor of financial performance in one regional survey study (Burton et al., 2002).

However, nothing in the OrgCon model guarantees that the individual rules that form the basis of the model are all equally valid, or sufficiently distinct from each other, or

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