

**"INTERORGANIZATIONAL RELATIONSHIPS  
AND INFORMATION TECHNOLOGY:  
A CONCEPTUAL SYNTHESIS AND  
A RESEARCH FRAMEWORK"**

by

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## **Interorganizational Relationships and Information Technology: A Conceptual Synthesis and a Research Framework**

### **Abstract**

This paper integrates theoretical concepts from transaction cost economics, organization theory and political economy to develop a conceptual framework to guide research on inter-organizational coordination strategies, particularly those that explicitly leverage IT capabilities. We outline research directions and approaches to bridge the requirements of theory building and theory testing.

## Introduction

A major question among IS practitioners today is: "How best do we leverage information technology (IT) capabilities to restructure business relationships with external partners to obtain firm-level strategic advantage," while a corresponding question for the IS researchers is: "How best to develop a research framework that organizes and guides research efforts as well as offers insights for management practice." Specifically, we are concerned with the phenomenon of inter-organizational coordination that explicitly leverages IT capabilities -- that has been variously described as: 'value-adding partnerships' (Johnston & Lawrence, 1988; Henderson, 1990) 'inter-organizational systems' (Barrett & Konsynski, 1982; Cash & Konsynski, 1985), 'information partnerships' (Konsynski & MacFarlan, 1990) and 'electronic integration' (Venkatraman & Kambil 1991) within a broader continuum of electronic markets and electronic hierarchies (Malone et al., 1987).

From a research perspective, two themes are relevant and important: (a) a general concern with changes in the pattern of relationships among firms, especially the emergence of hybrid forms (Williamson, 1991) or networks (Piore & Sabel, 1984; Powell, 1990); and (b) the specific concern with the role of IT in enabling and facilitating these new forms of relationships. Within the second category, researchers have been more concerned with developing frameworks linking IT and competitive strategy (see for instance: Porter & Millar, 1985; Johnston & Vitale, 1988) or based on new institutional theories (such as: agency and transaction costs) of economics (see for instance, Malone et al, 1986; and Gurbaxani & Whang, 1991)<sup>1</sup>.

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<sup>1</sup> We exclude from our discussion those frameworks that are developed to organize the complexity underlying the linkage between IT and competitive advantage/strategy since they are developed for descriptive validity and managerial guidelines.

However, inter-organizational relationships have had a rich research tradition from an organization theory perspective (see for instance, Hall et al., 1977; Schmidt & Kochan, 1977; Van de Ven, 1976) that has not been well-integrated within the context of emerging IT capabilities. In this paper, we extend the information processing view of organization from an intra-organizational focus (Galbraith, 1977; Daft & Lengel, 1986; Tushman & Nadler, 1978) to an inter-organizational level of analysis. We argue that an information-processing view of inter-organizational coordination provides us with the rationale to integrate the different dominant perspectives applied to IT-mediated relationships.

The paper is divided into three sections. The first reviews the following dominant theoretical perspectives - organization theory; transaction costs economics; and political economy - and develops the logic for the information processing view of inter-organizational coordination. In the second section, we develop the research framework that articulates the fit between uncertainty states and coordination mechanisms as a critical condition for improved performance of the dyadic relationship. The concluding section discusses alternative approaches to employing this framework to bridge the requirements of theory building and theory testing.

## **Dominant Theoretical Perspectives**

### **Organization Theory**

The inter-organizational relations framework (Clark 1965, Evan 1966, Guetzkow 1966) and early marketing channels literature (Etgar, 1976; Hunt & Nevin, 1974) represent the first attempts by researchers to conceptualize the relationship between two or more independent organizations as a separate, and important level of analysis. This level is described in terms of its *structural* characteristics, such as: centralization, formalization, and complexity, (Aiken & Hage, 1968, Paulson, 1971), or its *behavioral or process* characteristics, such as: power, conflict (Gaski, 1984; Marrett, 1971). The relevance of this perspective to

the present context is that IT could potentially affect and be affected by these structural and behavioral characteristics (Markus & Robey, 1988).

While this stream developed some useful insights (see Van de Ven, 1976), a major limitation is that researchers have simply extended or adapted constructs from a within-organization setting to an across-organization level without articulating their distinct role or benefits in the new level of analysis. Further, the empirical work has been predominantly restricted to relationships between public sector organizations (Clark 1965; Schmidt & Kochan, 1977) with the exception of the early literature on marketing channels (Etgar, 1976). In addition, this is weak in terms of clarifying the *determinants* of structural and behavioral characteristics of inter-organizational relations. Despite these limitations, we argue that this perspective, in combination with other perspectives discussed below, could contribute to our understanding of IT-mediated relationships.

### **Transaction Cost Economics**

The second perspective, on the other hand, offers a set of determinants of the [governance] structure of inter-organizational relations. Based on a rational, economic argument, this theory specifies the comparative efficiency of various forms of governance under different conditions (Williamson, 1975, 1985). Briefly, it relates the [governance] structure of a relationship to the presence of transaction-specific assets required to support the transaction, which could be potentially exploited by the other member of the dyad. The core concern, then, is how to develop efficient safeguard strategies, namely, how to "... organize transactions [to] safeguard them against the hazard of opportunism" (Williamson, 1985 p. 32). The relevance of this perspective to the present context has been well articulated by Malone et al. (1986) and Clemons and Row (1988).

The empirical research on this general theoretical perspective has been steadily increasing in recent times. While some studies have provided empirical

support for the relationship between asset specificity and vertical integration (Joskow, 1987; Klein et al., 1978; Masten, 1984; Monteverde & Teece, 1982; Walker & Weber 1984), others have reported the absence of such a relationship (Masten et al., 1989; Klein et al., 1990). The empirical work in the area of IT-mediated patterns of integration and IT-induced asset specificity has been absent with the possible exception of Zaheer and Venkatraman (1993) who found that IT-induced asset specificity does have a significant effect on the degree of electronic integration in the insurance industry.

Nevertheless, this perspective suffers from some limitations (see Robins, 1987; Perrow, 1981). For instance, inter-organizational relationships may serve non-economic purposes in general (Eccles & White, 1988; Granovetter, 1985; Macaulay, 1963) as well as in specific settings like Japan (Aoki, 1988). In addition, it is concerned with discrete and static transactions, while we argue that the entire *relationship* embedded in its history and anticipated future may need to be recognized.

### **Political Economy**

The third perspective (Benson, 1975; Zald, 1970) reflects a holistic approach, with an explicit recognition of the economic and political dimensions of the dyad. More specifically, it is concerned with (1) the external forces, (2) the internal organizational dimensions, and (3) their interaction as they influence the nature of the relationship within the dyad. The external forces, i.e., the prevailing and prospective environment within which the dyad operates, affect and are themselves shaped by the internal structure and processes of the relationship through adaptation and interaction (Aldrich, 1979; Pfeffer & Salancik, 1978).

Internal dimensions shape the governance structure of the dyad - which may range from a market-like relationship with an independent firm, to a hierarchy-like relationship (Williamson, 1975). Between these two extremes lies

a wide range of coordination strategies where the market mechanism is modified through some kind of formal or informal contractual arrangements between the parties involved (Blois, 1972). Moreover, structural arrangements are embedded within the socio-political characteristics of the dyad (Eccles & White 1988; Granovetter 1985) -- representing the allocation and use of power and control as well as corresponding sentiments and behaviors (e.g. conflict, cooperation).

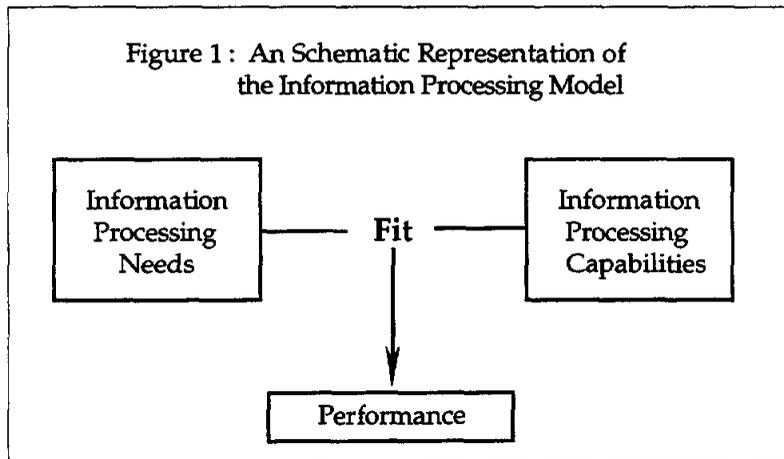
The contribution of the political economy paradigm to the present context is primarily due to its holistic approach to this level of analysis, whereby it explicitly addresses the whole relationship over time, i.e. in its history and anticipated future, and across its economic/political as well as structural/behavioral dimensions. Its weakness, though, resides in the lack of conceptual and operational definitions for these concepts and the relationships among them, so as to allow for empirical validation.

### **An Information Processing View of Inter-Organizational Coordination**

While these three perspectives contribute to our understanding of inter-organizational coordination, each is concerned with a part of the larger phenomenon. Collectively, they address the structural and process (behavioral) characteristics as well as their determinants within a holistic perspective. The value-added sought in this paper is to provide an information-processing view that systematically integrates these three different perspectives. Specifically, we argue that when brought together along an information-processing view, they complement each other and provide insights into the determinants, components and implications of different strategies for inter-organizational coordination.

**The Information Processing Model.** The basic logic in this model (Fig. 1) is that: (1) organizations can be conceptualized as information processing systems; and (2) the basic function of organizational design can be seen as to create the most appropriate configurations of structures, processes and information

technologies to facilitate the collection, processing, exchange and distribution of information (Galbraith, 1977; March & Simon, 1958). The basic axiom is that the fit between information processing needs and information processing capabilities is a strong determinant of task effectiveness, or performance (Galbraith, 1977).

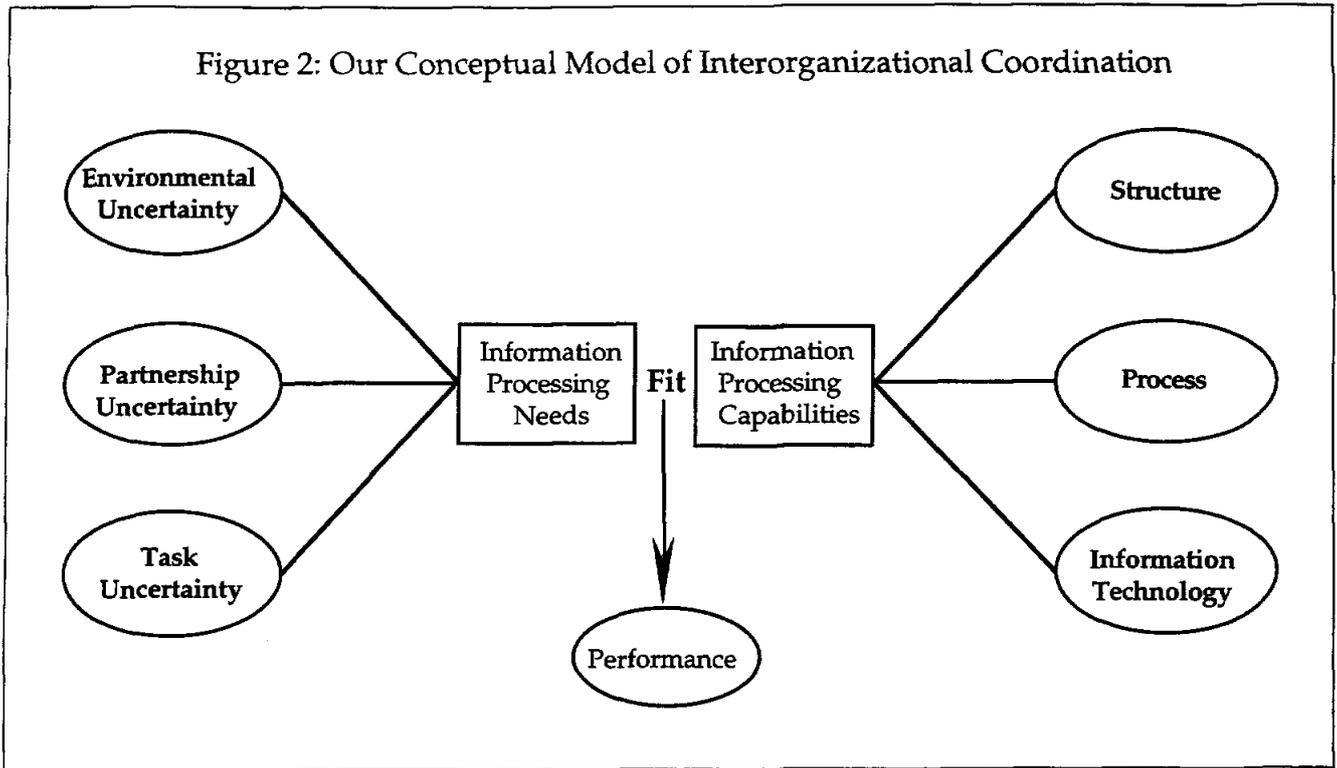


Although empirical studies do not directly test this axiom, several streams of research support it. In the task-structure fit literature, Aiken and Hage (1968) found that psychiatric agencies (non-routine tasks) were more organismic than were case work agencies (routine tasks). Similarly, Woodward (1965) found that successful organizations with relatively complex tasks were less mechanistic than successful organizations with routine tasks. Similarly, in the environment-structure fit literature, Duncan (1972) found that successful subunits in a changing environment had organic structures while successful subunits facing stable environmental conditions had more mechanistic structures. For an overview, see Drazin and Van de Ven (1985).

### The Proposed Research Framework

In Figure 2, we present a research framework with the information processing needs derived from different types of uncertainty and the information processing capabilities derived from an array of coordination mechanisms.

Figure 2: Our Conceptual Model of Interorganizational Coordination



### Uncertainty States

The proposed model of inter-organizational coordination recognizes three generic sources of uncertainty leading to the information-processing needs of a dyad: (1) environmental uncertainty about the general market conditions surrounding the relationship, (2) partnership uncertainty about a focal firm's perception regarding a partner's future behavior, and (3) task uncertainty about the specific task jointly accomplished. The greater each dimension of uncertainty, the greater are the information-processing needs.

**Environmental Uncertainty.** Duncan (1972) and Thompson (1967) define the determinants of this type of uncertainty in terms of two dimensions: (1) the *homogeneity-heterogeneity* of the environment or the degree of similarity-dissimilarity of the elements of the population dealt with, and (2) *stability-dynamism* of the environment or the degree to which contingencies remain basically the same overtime or are in a continual process of change. Other researchers have also related the perception of uncertainty to the *concentration-*

*capacity* of the environment or the degree to which resources are controlled by a few relevant organizations (Pfeffer & Salancik, 1978; Williamson, 1975).

**Partnership Uncertainty.** We define it as the uncertainty a dyad member experiences about its relationship with another member. This type of uncertainty has traditionally been subsumed under either the general environmental uncertainty or the specific task uncertainty. When there is a predominance of market-like transactions, environmental uncertainty is the critical thrust; for predominantly hierarchical transactions, task uncertainty is the relevant thrust. However, in view of the emergence of hybrids (Williamson, 1991) or partnership-like arrangements with independent firms as partners differing in their capabilities and goals (Gardner & Cooper, 1988), it is important to recognize this type of uncertainty as in between the broader environmental uncertainty and the narrower task uncertainty. More specifically, as we move away from arms-length market transactions towards newer types of partnerships, the uncertainty due to each partner needs to be recognized separately.

From recent work in the MIS literature on partnership (Cooprider, 1990; Henderson, 1990), and new applications of political economy and exchange theory to marketing channels research (Anderson & Weitz, 1989; Gardner & Cooper, 1988) we derive three determinants of partnership uncertainty: goal compatibility, trust, and power-dependence. *Goal compatibility* represent the extent to which both dyad members perceive their relationship as a long term relationship which adds value and generates mutual benefits (Reve & Stern, 1976; Eliashberg & Michie, 1984; Schmidt & Kochan, 1977). *Trust* has been argued to contribute to the reduction of uncertainty about potential opportunistic behavior by the other dyad member (Axelrod, 1984; Dore, 1983; Ouchi, 1980), thus reducing the need to monitor each other. The balance of *Power-Dependence* (Frazier, 1983; Frazier & Summers, 1984) affects the perceived uncertainty about potential recourse in case of opportunistic behavior by the other dyad member.

In particular, specific investments made for a particular relationship may hold one member hostage of the other (Anderson, 1985; Heide & John, 1990).

**Task Uncertainty.** Organization theory distinguishes between three sources of task uncertainty: task analyzability, task variety and task interdependence. *Analyzability* refers to the extent to which there is a known procedure that specifies the sequence of steps to be followed in performing the task. It is similar to Thompson's knowledge of cause-effect relationships (1967) as well as to Cyert and March's search procedures (1963), which favour either programmed or un-programmed organizational responses (March & Simon 1958). *Task variety* refers to the number of exceptions or the frequency of unanticipated and novel events which require different methods or procedures for doing the job. This definition is consistent with the various notions of task variability (Pugh et al., 1969; Van de Ven & Delbecq, 1974); uniformity (Mohr, 1971); predictability (Galbraith, 1977; March & Simon, 1958); complexity (Duncan, 1972), and sameness (Hall, 1962). *Task interdependence* refers to the degree and type of interdependence -- pooled, sequential and reciprocal -- based on the flow of processes between the members of the dyad (Thompson, 1967).

### **Coordination Mechanisms**

To cope with these types of uncertainty, organizations employ a number of alternate coordination mechanisms which *independently* and *collectively* contribute to increasing the information processing capabilities of the dyad. In the paragraphs below, we discuss the roles of three types of mechanisms: structural, process, and information technology.

**Structural Coordination Mechanisms.** Daft and Lengel (1986), for instance, argue for a hierarchy of structural mechanisms with different information processing capabilities: rules and procedures, direct contacts, liaison roles, integrator roles, task forces, teams . These mechanisms establish a formal

assignment of information roles among boundary spanners as well as a formal assignment of authority. We argue that the following are characteristics of structural mechanisms: (a) their level of *formalization*, (b) *intensity*, (c) *multiplicity*, (d) *asymmetry*, and (e) *boundary interpenetration*. Information processing capabilities are hypothesized to increase with higher intensity, higher multiplicity, higher boundary interpenetration, and lower formalization and asymmetry of these structural mechanisms.

**Process Coordination Mechanisms.** Process coordination mechanisms represent the socio-political climate (Arndt, 1983; Benson, 1975) within which the previously defined structural mechanisms are embedded. They range along a cooperative-conflictual continuum, and directly affect the extent to which information is freely exchanged between the dyad members because or in spite of the nature of the structural mechanisms (Reve & Stern, 1976). For instance, under the same dyad structure information processing capabilities will tend to decrease in a negative, conflictual, and non-cooperative climate. We define these process mechanisms along three distinct dimensions: (a) *conflict* (Gaski, 1984; Lusch, 1976), (b) *cooperation* (Robicheaux & El-Ansary, 1976), and (c) *commitment* (Gardner & Cooper 1988; Henderson 1990). Information processing capabilities are hypothesized to increase with higher cooperation, higher commitment and lower conflict.

**Technological Coordination Mechanisms.** These represent the use of information technology for facilitating inter-organizational coordination as opposed to intra-organizational uses. These include electronic linkages between the two dyad members that could range from simple, asymmetric access to databases to a more integrated platform involving symmetric sharing of a deeper set of information elements such as: joint design and development as well as knowledge sharing. The nature of the technology, the structure of ownership and access policies (Barrett & Konsynski 1982; Konsynski & Warbelow, 1990) all

contribute to different information processing capabilities. In this framework, we consider the following characteristics of these mechanisms: (a) level of *intensity* of use, (b) *asymmetry*, (c) *integration*, and (d) *scope*. Information processing capabilities are hypothesized to increase with intensity, symmetry, higher integration of processes, and scope.

### **Linking Theory Building and Theory Testing**

The proposed framework is intended to serve as a basis to guide research in the area of inter-organizational coordination strategies. Specifically, it argues that the three types of uncertainty -- environmental, partnership, and task -- give rise to a set of information-processing requirements which are appropriately balanced by a set of mechanisms -- structure, process and IT -- that reflect the total available capabilities to process information. This framework has three roles -- descriptive, empirical (analytical), and prescriptive. Given the space constraints, we are not able to discuss these issues as comprehensively as we would like.

**Role as a Descriptive (Conceptual) Framework.** At a first level, this framework can be viewed as a framework that allows the researchers and managers to organize the complex set of factors that could potentially influence the nature of inter-organizational coordination. Thus, at a minimum, this framework (Figure 2) identifies a parsimonious set of sources of uncertainty within a dyadic transaction as well as coordination mechanisms that can be used to resolve it. Assessing its role as a descriptive framework using criteria such as: *parsimony*, *internal consistency*, and *domain-coverage*, we can argue that the framework serves this role. Beyond such theoretical and researcher-oriented criteria, this framework has been used to discuss the phenomenon of inter-organizational coordination in IT-mediated settings with managers in one industry -- automotive; our own subjective assessment is that it fulfills its role as a descriptive framework well.

**Table 1: The Dimensions of the Proposed Research Framework and the Relevant Theoretical Anchors**

### Types of Uncertainty

	Organization theory	Transaction cost economics	Political economy
<b>Environmental Uncertainty</b>	- homogeneity/heterogeneity - stability/dynamism (Duncan, 1972; Khandwalla, 1977) - concentration/capacity (Pfeffer & Salancik, 1978)	- concentration/capacity or small number of firms (Williamson, 1975)	- external economy and polity (Benson, 1975)
<b>Partnership Uncertainty</b>	- goal compatibility (Schmidt & Kochan, 1977; Stern & Reve, 1986, Eliashberg & Michie, 1984) - Power/dependence (Pfeffer & Salancik, 1978; Frazier, 1983)	- opportunism - asset specificity (Williamson, 1975; Heide & John, 1990; Anderson, 1985)	
<b>Task Uncertainty</b>	- Task analyzability - Task variety (Perrow, 1967) - Task interdependence (Thompson, 1967)	- bounded rationality (Williamson, 1975)	

### Coordination Mechanisms

<b>Structural Mechanisms</b>	- Formalization, Centralization, standardization of the relationship (Van de Ven, 1976)	- market, hierarchy or hybrid governance structures (Williamson, 1975; 1990)	- internal economy (Benson, 1975)
<b>Process Mechanisms</b>	- Cooperation, commitment, conflict (Gardner & Cooper, 1988)	- trust (Williamson, 1985; Ouchi, 1980)	- internal polity (Benson, 1975)
<b>Information Technology</b>	- Information systems (Galbraith, 1974; Daft & Lengel, 1986)	information technology could mitigate transaction cost determinants (Malone et al, 1987)	

**Role as a Empirical (Analytical) Framework.** The next role pertains to its potential to guide empirical research. To the extent that the framework builds from diverse perspectives and offers an integrated view on the phenomenon of interest (see table 1), we believe that this could serve as a framework to empirically examine several research issues. This requires that the relevant constructs of uncertainty and coordination mechanisms be operationalized using observable and measurable indicators (Bagozzi, 1980). We believe that the normal criteria for an empirical framework will be met here since the constructs and the dimensions enumerated in Figure 2 have been derived from research disciplines that are known not only for their theoretical contribution but also for their body of empirical research and insights. Indeed, we can argue that all the six major constructs can be operationalized using observable indicators that satisfy the required measurement properties (Bagozzi, 1980) by extending and adapting an impressive array of research studies reviewed earlier in this paper.

**Role as a Prescriptive (Normative) Framework.** This is an important role for this framework. Being an applied discipline, where researchers are concerned with the ability of studies to inform and guide management practice, it is important that the framework has the inherent potential to offer normative insights. We believe that empirical research rooted in this framework could offer important insights into areas such as: the relative importance of the various coordination mechanisms under different conditions of uncertainty; trade-offs (or substitutability of one type for another) among the various mechanisms; selection of partners for dyadic relationships given possible constraints under different conditions of uncertainty; and the selection of IT mechanisms under given conditions of market, partner and tasks.

#### **Its Potential Use in a Program of Research on Inter-organizational Coordination**

**Bivariate Relationships Under ceteris Paribus Conditions.** The most basic set of analyses that could be examined within this framework relates to bivariate relationships between a given type of uncertainty and a type of coordination mechanism. Thus, the extant research stream on environment-structure fit can be positioned within this framework if we consider *only* environmental uncertainty and structural mechanisms. Similarly, the task-structure fit research stream can be positioned. Extending such a logic, we can examine bivariate relationships between environmental or partnership uncertainty on IT mechanisms. However, such a bivariate approach is limited since it invokes ceteris paribus conditions on other factors that may be too stringent for representing reality (see Venkatraman, 1989 for discussions on the relative advantages/limitations of bivariate versus multivariate approaches to fit).

**Multivariate Patterns of Configurations.** Thus, a promising avenue for leveraging the value from this research framework is to adopt a multivariate or configurational approach (McKelvey, 1982). As Miller argued: "Instead of looking at a few variables or at linear associations among such variables, we should be

trying to find frequently recurring clusters of attributes or gestalts." (1981; p 5). Along similar lines, Miller and Friesen noted, "Archetypes appear to represent a set of relationships which are in a temporary state of balance. The ..... situations which are described seem to form a number of gestalts. There is something holistic and ordered about the patterns of...attributes (1977; p. 264) and as Venkatraman argued: "such a pattern could provide useful insights into powerful concepts of equifinality or the feasible sets of internally consistent and equally effective configurations" (1989; p 432). We believe that the power of the proposed framework is best highlighted by using it to uncover these configurations or gestalts of the alignment between uncertainty types and coordination mechanisms. This is different from a theoretically-derived typology of possible combinations among the uncertainty types and coordination mechanisms since empirical delineation of configurations highlight actually occurring, feasible patterns in any given context.

Such a research strategy could be powerful in linking theory and practice and has the capability of developing managerially relevant guidelines for the use of different IT mechanisms for inter-organizational coordination. In other words, while research in the area of inter-organizational information systems has adopted a bivariate perspective, which has been argued to be limited earlier, we believe that the multivariate logic where IT is embedded within a larger set of forces is more appropriate. We hope that the conceptual synthesis developed here along with the research framework (Figure 2) would serve as a useful framework to stimulate and organize research efforts in the emerging theme of inter-organizational coordination.

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