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Staff Paper

**THE VERTICAL COORDINATION CONTINUUM
AND THE DETERMINANTS OF FIRM-LEVEL
COORDINATION STRATEGY**

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Abstract: A number of past authors have argued that vertical coordination strategies lie along a continuum running from spot markets to vertical integration. However, the strategies that make up the middle of this continuum have remained ill defined and the sense in which the continuum is truly a continuum has not been made specific. This paper attempts to define the continuum and its “middle” strategies in such a manner that the continuum is truly a continuum has not been made specific. This paper attempts to define the continuum and its “middle” strategies in such a manner that the continuum becomes a useful means by which firm-level decision makers could examine their options for vertical coordination strategy.

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THE VERTICAL COORDINATION CONTINUUM AND THE DETERMINANTS OF FIRM-LEVEL COORDINATION STRATEGY

Fundamental changes are underway in the U.S. agri-food system, changes that are altering traditional marketing relationships. Parts of the food system are becoming tightly integrated, such as the poultry and increasingly, the pork subsectors (Barkema, 1993). The tightening of vertical linkages has been characterized by movement from open markets to various forms of managed coordination, e.g., contracting, strategic alliances, and single ownership of multiple market stages.

To date, research about these changing modes of coordination appear to be largely focused on either (1) developing a better understanding of the characteristics and motivations of an individual mode of coordination (Sporleder; Frank), or (2) understanding the broad differences between external (market) and internal (contract/ownership) approaches to vertical coordination (Barry; Martin; Barkema, 1994; Boehlje and Schrader). Both of these efforts have been necessary and valuable, but the research in this arena needs to take an additional direction: **Given the increasing variety of vertical coordination strategies available to agri-food firms, how does a particular firm decide which strategy to use?**

Empirically, it can be observed that many variations of vertical coordination strategy have evolved, both in agri-food markets and in other industrial markets, including joint ventures, keiretsus, virtual corporations, licensing agreements, production specification contracts, etc. On the one hand, if each of these strategies is distinct and no taxonomy exists to show how these various strategies are interrelated, then firm-level decision making becomes an immensely complex task of assessing, option by option, which strategy may be feasible and appropriate for a

particular firm in a particular market situation. On the other hand, if the strategies are interrelated and form a true continuum of options, then understanding the continuum and its characteristics helps simplify the decision process. A given firm can assess its current and/or desired place on the continuum and then select an appropriately limited number of coordination strategies for further analysis and choice.

The purpose of this paper is to suggest that a continuum does exist that may provide a limited number of factors a firm should consider in its choice of vertical coordination strategy. The paper proceeds as follows: definition of the continuum, development of criteria for strategy selection, and presentation of conclusions and unresolved issues.

Defining the Continuum

Vertical coordination can be defined as “the alignment of direction and control across segments of a production/marketing system (King).” The factors that are aligned and controlled are price, quantity, quality, and terms of exchange (Sporleder). From a theoretical perspective, the options for achieving vertical coordination have been conceptualized as a continuum running from open markets to complete vertical integration (multiple market stages under single ownership). Williamson has established this sense of continuum generally, while Sporleder, Barkema (1994), and others have presented this idea in relation to agri-food markets.

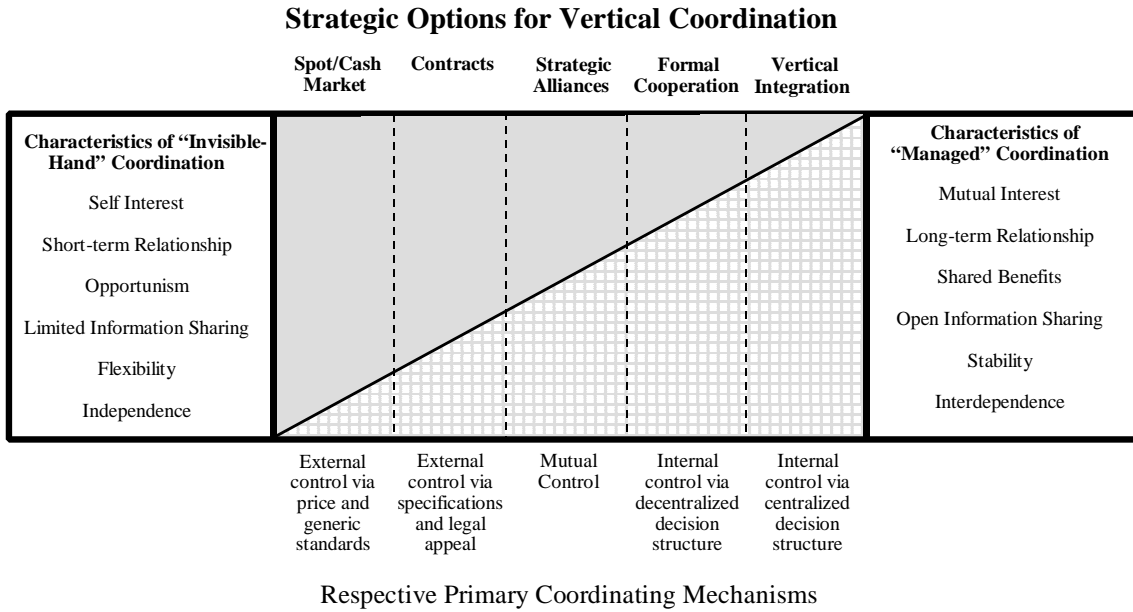
Although this idea of a continuum is intuitively appealing, most of the prior theoretical work has focused on the two ends of the continuum, i.e., spot markets and vertical integration, while the middle of the continuum has been largely unexplored in detail, except to posit that various forms of contracting lie along the middle points. In order to help firms make decisions

about coordination strategy, much more needs to be known about the middle and how it truly is a continuum.

To be fair to the literature, there has been considerable research regarding individual strategies within the continuum. For example, Spekman et al. conducted an in-depth analysis of a number of international strategic alliances in order to better understand the processes of alliance formation and management. Spekman's findings were limited to demonstrating that successful alliances depend on both business and interpersonal relationships, and that the demands of each vary over the lifetime of the alliance. While this type of research is useful, this paper calls for research that seeks to understand the uniqueness and inter-connectedness between individual strategies and the continuum of vertical coordination strategies.

Figure 1 presents the continuum hypothesized for this discussion. Five major categories of vertical coordination strategy are suggested running, as in past works, from spot markets to vertical integration. At the ends of the continuum, the characteristics of "invisible-hand" coordination and "managed" coordination are respectively listed. True to Adam Smith, invisible-hand coordination allows individual economic actors to follow their self-interest and pursue exchange relationships that are short-term, opportunistic, limited as to information sharing, flexible, and preserving of the actors' independence. At the other extreme, managed coordination is built upon the mutual interests of the exchange actors who pursue relationships that are long-term, benefit sharing, open as to information flow, stable, and supportive of interdependence. The continuum of Figure 1 suggests that, as strategies are considered from left to right, coordination moves from being dominated by invisible-hand characteristics through a changing mix of invisible-hand/managed characteristics to being dominated by managed characteristics.

Figure 1: THE VERTICAL COORDINATION CONTINUUM



NOTE: The diagonal line represents the mix of invisible-hand and managed coordination characteristics found in each of the five alternative strategies for vertical coordination. The area above the diagonal indicates the relative level of invisible-hand characteristics and the area below the diagonal indicates the relative level of managed characteristics.

Showing that the two end strategies as well as the middle strategies form such a natural continuum requires a primary focus on how the mechanisms for achieving coordination change across the continuum. In spot markets, coordination between two actors in an economic exchange is exclusively or nearly exclusively achieved through reliance on a control mechanism external to the actors' relationship. Price and broadly accepted performance standards determine the nature of exchange. In pure competition, neither of the parties can influence price or the generic standards and both must adhere to them if effective exchange is to occur. In cases of less than pure competition, e.g., monopoly, one actor can have a major influence over the establishment of the coordinating conditions. To the actor with this market power, it would seem that some level of control is internal to the exchange relationship. The powerful actor can, after all, specify some of the terms of exchange. However, in spot markets, the weaker actor retains the right to walk away from the exchange, and the availability of substitute products puts another type of external limit on the exchange. The true nature of spot markets arises from this notion that the controlling mechanism of coordination is entirely or nearly entirely external to the exchange relationship.

The next step along the continuum is suggested to be contracting, the legally enforceable establishment of specific and detailed conditions of exchange. With contracts, the mechanism for coordination has now become partly internal to the exchange relationship. The actors must agree among themselves on the specifications of the contract. However, the relationship is still governed largely by forces external to the relationship in the sense that once the specifications have been agreed to, the ultimate enforcement of performance is delegated to a third, external party represented by the legal system. What begins as negotiated terms among the actors internal

to an exchange becomes an external standard that the actors must adhere to or face an external enforcement power. Given the costs of appealing to this external power, the threat of such appeal may be more important to the conduct of exchange than the reality of it.

A strategic alliance, the third portion of the continuum, may be defined as an exchange relationship in which the firms involved share risks and benefits emanating from mutually identified objectives. For an exchange relationship to be a strategic alliance, Martin maintains that it must exhibit the following three characteristics: mutuality in objective identification, mutuality in controlling decision making processes, as well as mutuality in sharing risks and benefits. Following this definition, the coordinating mechanism in a strategic alliance is the mutual agreement of the parties involved in the alliance. In other words, coordination arises from mutual control. In a significant way strategic alliances represent a “no man’s land” between external and internal control over coordination. The analogy of a marriage is appropriate when discussing strategic alliances. The partners agree to work closely together and thus must find some means to resolve internal differences and concerns. Yet, both parties retain their separate, external identity. The breadth of the agreement is such that mere appeal to a third party judge is not practical across most of the agreement (except in the unfortunate case of dissolution), and yet a formal joint management structure is not present to allow for strong internal control. The coordinating mechanism must be based on mutual control arising from mutual interest.

With strategic alliances, the continuum crosses a significant dividing line between coordination mechanisms that rely on external control (spot markets and contracts) and mechanisms that rely on internal control, i.e., enforcement mechanisms that are established internal to the exchange relationship. Before discussing these internal mechanisms further, an

observation is in order. Many strategic alliances do have some form of contract as part of the alliance. For example, the Michigan Livestock Exchange (MLE) has an exclusive supplier contract as part of its alliance with a meat processor, Thorn Apple Valley. But this contract is only one part of the alliance's foundation. The two organizations hope to develop joint marketing strategies that will improve the ability of both organizations to prosper in the changing meat industry. If the alliances were merely limited to the nature of a legal supplier contract, neither firm would achieve the broader working relationship that each wants for long-term viability. Therefore, the existence of a contract in an exchange relationship does not necessarily mean that the relationship lies on the contract portion of the continuum. The real question is what is the *primary* mechanism of coordination. In the MLE-Thorn Apple Valley example, the operative mechanism is not the legal agreement itself, but rather mutual control with a fallback reliance on a contract as a minimum standard for the exchange relationship.

The fourth position along the continuum, formal cooperation, has been the one least explicitly defined by prior authors. It is designed to include a seemingly odd mixture of organizational forms that include joint ventures, partial ownership relationships, clans, and other organizational forms that involve some level of equity commitment (money, sweat, or emotional) between the actors in an exchange relationship. The distinguishing feature between this portion of the continuum and strategic alliances is the presence of a formal organization that has an identity distinct from the exchange actors and that is designed to be their joint agent in the conduct of a cooperative exchange. For the first time along the continuum, there is a formal organizational structure that can allow for some form of true internal control. Policies and procedures can be formally put in place for the conduct of exchange between the parties. An equity commitment

makes the defining of decision rights and responsibilities more clear cut than in the case of a strategic alliance. Agricultural cooperatives clearly lie at this point on the continuum as do joint ventures and the keiretsus of Japan. The key to understanding this coordination mechanism is that, although control can now be accomplished internally, the control is *decentralized* among the ownership parties and the ownership parties still maintain a separate identity that allows them to walk away from the exchange if they so desire. The ability to walk away, however, has been dramatically reduced by the presence of the new independent identity.

The final portion of the continuum is vertical integration, but note that if the above arguments are taken to their logical conclusion, vertical integration is not so much defined by single ownership as it defined by *centralized control*. Although a corporation operating at multiple levels in a production/marketing chain may have single ownership, it need not constitute a case of vertical integration if the business units of that corporation are allowed to operate autonomously, i.e., in decentralized fashion. Such a corporation operates as a form of formal cooperation and not vertical integration. Vertical integration in this version of the continuum is an mechanism that relies upon centralized control to achieve coordination. This is what economists have most often meant by true hierarchy--an order and command system within a single organization. The difficulty of the observed evolution of firms is that single ownership no longer assures singularity of organization as the above example of a decentralized firm suggests. Vertical integration requires a centralized decision making structure that tightly controls the operations of its diverse business units. Just as single ownership may not result in vertical integration, multiple ownership does not rule out vertical integration by this definition. For example, does a Tyson Foods operate on the contract portion of the continuum, or does it

exercise sufficient centralized control that it operates a truly vertically integrated system with producers maintaining separate ownership identity in name only? The latter is probably closer the truth, and thus a Tyson can be said to be vertically integrated even in the absence of single ownership.

The above discussion has attempted to establish that the proposed continuum is a continuum in much more than name only. The coordinating mechanisms move from completely external in form (spot markets) to completely internal in form (vertical integration) while passing through several transitional stages of mixed form (contracts, strategic alliances, and formal cooperation). Although ownership is correlated with this transformation, it is not (as historically argued) synonymous with it.

The Coordination Strategy Decision

Having defined the nature of the coordination continuum, the next logical question is where should a particular firm locate itself along the continuum. Potentially, a firm must make this strategic decision for every vertical (forward and backward) exchange relationship that it must execute in the process of doing business. Finding effective and efficient means to make these decisions would seem of obvious importance.

The Mahoney Framework

Within the agricultural economics literature, Barkema (1994), Martin et al., and Boehlje and Schrader have all made initial attempts to define criteria that help a firm decide between open markets and generic managed coordination, but these attempts were only partially designed to

address the finer decisions between the various forms of managed coordination. From the management strategy literature, Mahoney has provided an extensive theoretical derivation of eight coordination strategies based on three conditions that he argues are sufficient to specify coordination mechanisms. He draws upon agency, organizational economics, property rights, and dynamic resource-based theory to justify his three conditions. These conditions in their dichotomous form are:

1. **Task Nonseparability**
 Low task nonseparability: The contribution of individual efforts can be clearly separated through output measurement; therefore, individual rewards can be fairly distributed and a manager is not required to monitor shirking.

 High task nonseparability: The contribution of individual efforts can *not* be clearly separated through output measurement; therefore, individual rewards can *not* be fairly distributed without a manager to monitor shirking.

2. **Task Programmability**
 Low task programmability: The product transformation process is *not* well established or routine; therefore, input measurement is uncertain and not amenable to monitoring.

 High task programmability: The product transformation process is well established and routine; therefore, input measurement is fairly certain and amenable to monitoring.

3. **Asset Specificity**
 Low asset specificity: Human, physical and/or site investments are not particularly firm/strategy specific.

 High asset specificity: Human, physical and/or site investments are quite firm/strategy specific.

Table 1 presents Mahoney's strategies organized along the continuum defined in this paper. Mahoney's strategies match the continuum rather well. Low levels for each of his three

variables map into the spot market end of the continuum while high levels for all three map into the vertical coordination end. The mixed strategies in terms of the three factors fall in between. When tasks are output separable (low nonseparability) and assets have low specificity (little chance for opportunism), the spot market works well irrespective of programmability (it can be high or low). Even when programmability is high, there is little incentive for taking on the cost of managed coordination when outputs are easily measured and the risk of opportunism is remote. In contrast, when the risks of opportunism are high (high asset specificity) and outputs are easily separated (low nonseparability) and inputs are not easily measured (low programmability), there is incentive to manage the specifications of exchange through long-term contracts; but, no incentive to establish formal internal organization because the low programmability will keep such organization from being effective.

TABLE 1: RECOMMENDED COORDINATION STRATEGIES BASED ON NONSEPARABILITY, PROGRAMMABILITY, AND ASSET SPECIFICITY

Continuum Strategy	Spot Market	Contract	Strategic Alliance	Formal Co-op Organization			Vertical Integration
Mahoney's Recommended Strategy	Spot Market	Long-term Contract	Relational Contract	Joint Venture	Inside Contract	Clan	Hierarchy
Nonseparability	Low Low	Low	High	High	High	Low	High
Programmability	Low High	Low	Low	High	Low	High	High
Asset Specificity	Low Low	High	Low	Low	High	High	High

Source: Mahoney, Joseph T. The Choice of Organizational Form: Vertical Financial Ownership Versus Other Methods of Vertical Integration, Strategic Management Journal, vol. 13, 1992, p. 576.

Similar arguments can be advanced (and Mahoney does so in his article) for each of the other strategies along the continuum. One of the more interesting observations based on this reorganization of Mahoney's eight cases is that three of them fall into the formal cooperation category, and all three exhibit high scores on two of Mahoney's three criteria. This suggests the existence of trade-offs among the criteria that are all consistent with some form of formal cooperation. Formal cooperation may be one of the richest portions of the continuum in terms of further research efforts and future vertical exchange behavior among firms.

If Mahoney's approach is to be accepted, individual firms should assess each of their exchange relations with others in order to determine the degree of nonseparability, programmability, and asset specificity. With this assessment complete, an appropriate coordination strategy could then be chosen and pursued. Mahoney appears to have established a framework that makes clear prescriptions about firm-level coordination strategy.

The Sufficiency of the Mahoney Framework

Is Mahoney's approach adequate to the task? Martin et al. present a related scheme of strategies created by using risk, trust, and competence as the criteria. A number of effective arguments can be offered for the relevance of these criteria. However, Mahoney argued that risk does not translate into a determinant set of strategy recommendations, and it might be argued that competence and trust are sub-elements of programmability and nonseparability. Even so, Martin et al. still provides grounds for speculating about the sufficiency of Mahoney's conditions. Boehlje and Schrader also speculate on a number of additional conditions.

Given the evolving nature of vertical coordination strategies, the authors of this paper have reason to advance several other criteria that may serve useful to decision making along the continuum. These criteria arise from focusing more specifically on the analysis that the manager of a firm might make as part of any decision about vertical coordination strategy. Five such criteria appear to warrant consideration:

- 1. How strong is the firm's stand-alone competitive advantage?** If the firm has a strong competitive advantage as a stand-alone organization, e.g., market power, highly differentiated products, proprietary technology, then the incentive to move toward managed coordination is less strong. If the firm needs the cooperation of others in the vertical chain to achieve competitive advantage, then the incentive toward managed coordination is stronger. Evolving agri-food markets appear to be creating circumstances in which competitive advantage will often need to arise from cooperative, as opposed to stand-alone, efforts.
- 2. What is the firm's tolerance for residual risk?** Inability to tolerate the risks of open market exchange could lead a firm to consider more managed coordination with its emphasis on mutual as opposed to conflicting interests. Martin et al. used risk as a key variable in their scheme. However, a producer can manage price risk through futures contracts that do not require any form of vertical linkage with others directly in the marketing chain. To the extent that such individual strategies for managing market risk exist, the incentives for managed coordination are diminished. It is conceivable that the more relevant risk issue to the coordination decision may be the residual risk that the firm can not manage through any stand-alone means. The risk of market access over time may

be one of these types of risk. Being part of a strategic alliance, for example, may reduce this type of risk significantly. Further efforts are needed to define the relationship between various forms of risk and the various points on the strategy continuum.

- 3. How compatible is the firm with available partners?** The issue of trust may in the end come down to an issue of compatibility with potential partners. Do any potential partners share the firm's strategic approach? For example, a cost-leader producer would most likely want to partner with a cost-leader processor, or a superior-quality producer would prefer a quality focused processor. Do any potential partners share the firm's culture, e.g., values, philosophies, conflict resolution approaches? When values are shared, trust is an easier thing to create in a relationship. When firm's are compatible on these two levels, the probability of a successful relation is enhanced. Also, part of the compatibility issue is whether or not the firm and its potential partners are complementary. Do their strengths and weaknesses compensate for each other allowing the partnership to be stronger than the individual entities?
- 4. What is the firm's managerial competence?** If a firm has learned to effectively "horse trade" in the open market, this very managerial competence may protect it from otherwise excessive opportunism and reduce its desire to partner. In turn, successful partnering depends on its own set of skills, e.g., negotiating, collective problem-solving, effective communicating across organizational boundaries. Vertical integration demands yet another set of managerial competencies that allow effective management over a broad scope of control. Without such competence, vertically integrated firms could quickly

cease to be competitive. The managerial competence that a firm has or is willing to develop is thus a potentially important determinant of strategy selection.

- 5. How responsive does the firm need to be to ultimate (end-user) customers?** Nearly all of the arguments presented above about positioning along the vertical coordination continuum focused on cost and efficiency issues. Mahoney himself notes that one limit to his approach is that all three of his criteria are efficiency derived. What if effectiveness in the market chain is as critical as efficiency? Responsiveness to ultimate customer demands is one of the evolving characteristics cited for agri-food markets (Barkema, 1994). Responsiveness is not merely an efficiency issue. It is an issue of effective information flow, managerial flexibility, and capacity to respond to changing demands. Both open markets and vertical integration may be threatened by this criteria--open markets because of ineffective incentives for responsiveness that requires cooperative change throughout the production/marketing system, and vertical integration because of the large sunk costs (in assets across levels of the chain) that may be stranded by changing demand. Responsiveness probably favors the middle of the continuum, but much additional work is needed before any real conclusions can be drawn.

Although the above five factors seem reasonable to consider in firm-level decisions about vertical coordination strategy, this alternative framework is far from having the clear mapping of factors into strategies that is found in the Table 1 presentation of Mahoney's model. More theoretical and empirical work must be done to convert this first attempt into a meaningful set of prescriptive guidelines.

Conclusions and Issues

This paper has attempted to add to the evolving discussion about vertical coordination strategies. It has examined several interrelated topics. First, a vertical coordination continuum can be defined that moves from external mechanisms (spot markets) for accomplishing vertical coordination to internal mechanisms (vertical integration) with three transitional stages in between (contracts, strategic alliances, and formal cooperation). Ownership was shown to be correlated with this continuum, but not synonymous with it, i.e., single ownership is not necessary for vertical integration, but centralized control is.

Second, Mahoney's taxonomy of vertical coordination strategies readily fits the continuum defined. This lends support to the continuum and provides one set of three criteria (nonseparability, programmability, and asset specificity) for determining where a firm should be along the continuum.

Third, questions were raised as to the sufficiency of Mahoney's criteria. Specifically, a set of five criteria were introduced that seem appropriate for a individual firm to consider when making its vertical coordination decision. The criteria were: (1) strength of the firm's stand-alone competitive advantage, (2) the firm's tolerance for residual risk, (3) the compatibility of available partners, (4) the firm's managerial competence, and (5) the firm's need to be responsive to ultimate customers.

Where should the scholarly work go from here? First, as Mahoney said of his own three variable framework, ". . . **an empirical study that utilizes all three variables is warranted** (boldface taken from the original)." More empirical work of all descriptions, e.g., case studies, cross-sectional, and time-series, is much needed in this arena. Firms are facing an increasingly

bewildering set of vertical coordination options. They need sound reasons for selecting one strategy over another. The theory needs to be tested empirically.

Second, the criteria offered as an alternative to Mahoney need to be theoretically refined and better operationalized to determine the extent to which they add meaningfully to the debate about coordination strategy. They have at least face validity because they are designed to take a firm-level perspective. They can thus potentially add to the findings from the broader economic system perspective of other past approaches.

Third and finally, the implications for public policy need to be explored. Are current anti-trust laws antiquated in this new environment? Should all the options along the continuum be legally available? Will forces in agri-food markets cause convergence on one or a very narrow set of strategies along the continuum and thus make the food economy vulnerable to unforeseen risks or costs?

Vertical coordination strategy seemed a simple thing for most of the history of agriculture. After all, agriculture produced commodities that seemed best traded in open markets or transformed through vertically integrated processors. Cooperatives were also present as a third way. But, the events overtaking the hog industry and other agri-food markets have shown that agriculture is susceptible to rapid change, and the possibility of effective operations at any point along the vertical coordination continuum are real. Further work is needed to convert these possibilities into doable strategy for specific firms.

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