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AN INSTITUTIONAL APPROACH TO VERTICAL COORDINATION IN AGRICULTURE

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Abstract

Vertical Coordination in agriculture is a complex problem. Coordination arrangements have both technical and organizational dimensions. This paper calls attention to the institutional dimensions of vertical coordination. It applies concepts of institutional economics to vertical coordination problems. Finally, the paper calls for an integration of economic techniques within an institutional framework as an approach to research on vertical coordination systems.

Key Words

Vertical Coordination, Institutional Economics, Market Organization, Integration, Marketing.

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> "The difficulty in defining a field for the so-called Institutional Economics is the uncertainty of meaning of the word institution. Sometimes an institution seems to be analogous to a building, a sort of framework of laws and regulations, within which individuals act like inmates. Sometimes it seems to mean the "behavior" of the inmates themselves. Sometimes anything additional to or critical of the classical or hedonic economics is deemed to be institutional. Sometimes anything that is "dynamic" instead of "static," or a "process" instead of commodities, or activity instead of feelings, or management instead of equilibrium, or control instead of laissez-faire, seems to be institutional economics."
>
> John R. Commons, 1934

Institutional economics remains a difficult field to define. An increased interest in institutional economics has developed in recent years. This interest has centered on issues of welfare economics and public choice. Applications of institutional economics in agriculture have focused attention on natural resource problems and land tenure.

The purpose of this paper is to bring concepts of institutional economics to bear on vertical coordination in agriculture. We attempt to clarify the concepts by developing an institutional economics framework for analyzing vertical coordination. We also attempt to apply the concepts within this framework to contemporary vertical coordination problems in agriculture.

An Historical Perspective

The work of John R. Commons is taken as central to the development of institutional economics.[1/] His work was deeply rooted in the historical evolution of legal and economic systems. A major point of his analysis was the transition from an economy where the major reason for production was for an individuals own use to an economy where production was mainly for exchange.

In the world of production for one's own use the importance of economic interrelationships is severely reduced. When economic activity becomes specialized and dependent on exchange, the relationship between economic units becomes critical.

In the context of this paper we note that vertical coordination as an economic problem also is associated with the transition to a specialized exchange economy. In Adam Smith's pin factory the coordination task was simpler when a single man shaped the heads, shaped the shaft, and ground the points. When workmen specialize in the operations, the coordination of their work becomes a central problem. This is control and coordination within the firm. These coordination and control problems are further complicated when the necessary operations are performed by separate firms.

In an economy where production was mainly for personal use, property rights protected the physical usefulness of property. Thus, initially if the physical productivity of property was not impaired, the courts held that persons were not deprived of property.[2/] The legal system evolved so as to protect not only the physical value of property but its future exchange value.[3/] The courts held that not only were physical things objects of property but also the expected earning power of those things. The courts recognized both use value and exchange value. They recognized that events which reduced the future income streams from exchange was similar in effect to physical taking of property.

Transactions and Exchange

Commons believed that the transition to an exchange economy called for a new focus. It was no longer sufficient to concentrate on commodities, it was necessary to concentrate on the exchange process. Commons develops the transaction as the main unit of analysis. He distinguished transactions from exchange. Transactions involve the legal transfer of ownership of things as

well as the physical transfer of things. Exchange is the physical transfer of things. Thus, a transaction involves exchange among individuals and the legal mechanisms for ownership transfer, the establishment of exchange rates (prices), and settlement of disputes. The focus of institutional economics is transactions.

More recently, Schmid and Shaffer have developed the idea of three general transaction systems.[4/] They are administrative, status, and bargained.[5/] In an administrative transaction system, resource allocation and exchange ratios are governed by those with political authority. In a status system, transactions are governed primarily through prescribed roles associated with social position. Exchange rates tend to be fixed or prescribed by custom.[6/] In a bargained system, transactions are governed primarily by a set of impersonal rules within which exchange rates are established by bargaining processes. Each of these transaction systems exist to a greater or lesser extent in all economies. The importance of distinguishing these systems is in their emphasis on how rules for transactions are established and how exchange rates are discovered.

Institutions and Institutional Economics

Institutional economics focuses on transactions and transaction systems. It examines the way in which economies and their subsystems are organized. Institutions are the organizing mechanisms of a society. As is clear from the initial quotation in this paper (p. 1) the definition of an institution is complex. Commons (1934, p.69) defined institutions as "...collective action in control of individual action." Crucial to this definition is the concept of collective aciton which we take to mean organized control of individual activity. Collective action exists in a sole proprietorship with few workers and in corporations and public agencies with hundreds of thousands of workers. It exists in the firm and between firms.

Schmid (p. 893) has defined institutions as ordered sets of relationships among people which define their rights, exposure to the rights of others, privileges and responsibilities. He goes on to say that institutions involve collective choice, though it need not be explicit. A description of property rights describes the institution. A description of individual rights within and outside a "firm" describes whether that "firm" is a corporation, proprietorship, partnership, or cooperative. A description of the rights of individuals in and to a public agency defines whether that agency is a part of a county, a city, a state, or a federal government.

Vertical Coordination

Vertical coordination has been defined by Mighell and Jones (p. 1) as "... the general term that includes all the ways of harmonizing the vertical stages of production and marketing." This has become an accepted definition among agricultural economists. In the terms of institutional economics the "ways of harmonizing" vertical stages are transaction systems. They involve "collective action in control of individual action." They form the web of economic organization which is part of an economic system. Vertical coordination is, in short, accomplished through institutions. The relevant institutional context may be within the firm, industry, or economy.

The major focus of research on vertical coordination has been at the interfirm level. This research has centered on the transition from bargained transactions systems to administrative transactions systems, from open bargained exchange between firms to administered exchange within firms, or from "market" coordination to vertical integration. Some research has also focused attention on the transition from spot markets with implicit property rights structures to "contract" markets with explicit property rights structures. Transactions with written contracts may merely specify in written language the provision of transfer, what rights of the contracting parties are exchanged. In bargained exchange, without written contracts, the rights ex-

changed and rules of exchange exist but are not explicitly specified.

In the study of vertical coordination, the distinction between administrative transaction systems and bargained transaction systems with written agreements (i.e. contracts) has not been made clear. In fact, it is generally accepted language to refer to written contractural agreements as shifts toward administered exchange. If the terms of exchange and ownership change are the result of bargaining within impersonalized rules then the transaction is bargained whether the terms are made explicit in writing or not. The differentiation of contract and noncontract exchange is misleading. The issues of relevance are how exchange terms are arrived at within rules of exchange and the constitutional question of how exchange rules are legitimized.

In our view, an institutional approach to vertical coordination focuses attention on transactions and the way exchange rules are established, and the way individuals and firms react to and attempt to change the rules. We will attempt to apply this approach in an initial way to some selected contemporary problems of vertical coordination.

AN INSTITUTIONAL APPROACH TO SELECTED VERTICAL COORDINATION PROBLEMS

Efficiency

A traditional and contemporary problem in vertical coordination is the efficient vertical organization of production.[7/] This involves the traditional problem of determining technical complementarities between stages and harmonizing the timing and level of production. The efficiency problem has generally been approached by asking "how much could the cost of producing X be reduced by improving the physical flow and timing, coordination between production stages?" This question has sometimes been addressed using economic

engineering techniques which simulate physically coordinated production systems and estimate cost reductions associated with improved coordination (for example, see Snyder and Candler, and Holtman, Sullivan, and Bareto). These studies have several limitations. A major limitation is the failure to estimate the cost of establishing the institutional framework necessary to achieve the degree of physical coordination assumed. This limitation generally may lead to an overstatement of the gains to be achieved from improved vertical coordination.

A second limitation of efficiency analysis of vertical coordination involves the measurement of efficiency. Physical efficiency of production relates quantity of input to quantity of output. A comparison of efficiency of two vertical coordination systems requires that the inputs and outputs be comparable. A change in a vertical coordination system often results in changes in the input and output categories and may destroy the comparability of input-output measures. An example may be drawn from the poultry industry. An integrated broiler production system might be compared to a system of independent entrepreneurship. If this comparison on an efficiency basis only looks at the pounds of broilers produced per dollar of capital invested, it may over or understate the change in efficiency. The integrated and nonintegrated broiler production systems may produce different outputs and use different inputs. Input quality may vary considerably. For example, the management input required may be entirely different in quality between the two systems.

The quality of outputs may also vary. The complaint consumers voice over the "tasteless" broiler may indicate that the broiler produced under an integrated system is qualitatively different. This indicates that the cost per pound of broilers produced is not an accurate measure because it assumes constant quality.

The cost per pound also may be a poor measure of efficiency because the "social" costs of one system are different than another. This again relates

to the definition of input-output categories. Is the loss of individual entrepreneurship in the integrated broiler system a relevant cost of the system? Is the increased concentration of control in an integrated system a cost to a competitive economy? Are these and other costs part of the input-output categories that go into measures of efficiency?

The point is that the institutional context defines the bounds of input-output categories. That which is relevant to the input side of the conventional efficiency analysis is that which has cost as expressed through current market mechanisms. That which is relevant to the output category is that which has value in the current market.

Externalities

External impacts of firm decision making have received greatest attention in the environmental policy area. There have been several attempts to classify and define external effects (Mishan). A classic "solution" for externality problems has been to internalize the effects within a single decision unit (firm, county, Conservation District, etc.). Thus, if the decisions of hog producers have external effects on meat packers, one solution might be for meat packers to integrate into hog production. External effects which are the result of technical complementarities might also be handled by vertically integrating two firms with complementary processes.[8/] The degree of technical complementarity between stages of production and thus the potential external impacts if each stage were organized separately is a major force defining the "normal" firms vertical structure.[9/] In agriculture the "normal" hog producing firm once contained breeding-farrowing-finishing stages. Today the technical complementarity between these stages has been reduced by technology which results in significant differences in scale economies at each stage. Thus, the "normal" hog production firm may contain only one of the vertical stages.

A critical institutional question is how to organize transactions so that external effects both positive and negative will be taken into account. The focus of institutional analysis in vertical organization may be either between or within firms. The rules under which transactions occur may, under current organization, appear to take external effects into account but in fact fail to consider them. The feed manufacturing industry in recent years attempted to stabilize demand for their product by several different arrangements. In one case, manufacturers leased sows to hog producers to increase and stabilize demand for feed. Organization of this activity within the firm may illustrate the critical nature of transactions rules and external effects. In some corporations, sow-leasing operations were set up as separate "profit centers"; these operations were expected to earn rates of return equivalent to other enterprises. Under accounting rules of some firms the sow-lease portion of the firm was not given credit for increased feed sales generated. In other firms, the sow-lease operation was part of the feed sales division and was considered a part of the cost of selling feed. In the first organizational system the external impact of sow-leasing is understated and the contribution of sow-leasing is underestimated. In the other system, the organization is consistent with the objective. Sow leasing is considered as part of the unit where its contribution will be counted toward the objective.[10/] The institutional approach focuses attention on the way transactions are organized. In the above cited case, the analysis goes beyond the fact that the firm is leasing sows and asks how is this operation treated within the firm. We have a case where there were internal (within the firm) externalities (between divisions). The institutional analysis brings these externalities to attention and adds to the information available in evaluating firm behavior.

An institutional approach assumes that external effects are a major part of the organizational work of a transactions system and questions how external impacts are counted. This involves examining which external impacts count,

i.e., quality of hogs produced, and which are ignored, i.e., the incidence of cancer from the use of pesticides. Samuels has discussed the problem of externalities in the context of welfare economics. He has shown that the externalities which are part of the bargaining process are largely determined by the power of the parties effected including their ability to influence the rules under which bargaining takes place. With different rules, different externalities are considered. With different transaction rules, the rights of one party may be more important than the rights of the other. The ability to influence the rules thus becomes a critical aspect of transaction system dynamics.

Control - Equity - Freedom

The assertion of many proponents of vertical integration is that centralized control within a firm will result in "improved" vertical coordination. This view often appears to favor a system in which optimal vertical coordination is a mechanistic stimulus-response system. We have already indicated above some of the difficulties in achieving organization which could coordinate activity to this degree. While the empirical observation of control through different institutional arrangements is important, our discussion will concentrate on some broader aspects of control.

We define control as the ability of individuals in a vertical system to effect the terms and rules of exchange in favor of their objectives. These objectives may or may not be in harmony with the objectives of other members of the system or those outside the system. The invisible hand of competition exercises control in a competitive economy through the universal objective of profit maximization, availability of information, atomistic organization of producers, and rational behavior of consumers. When perfect competition is not present, control may be exercised in different ways. The question becomes who will control? Whose objectives are to count?

In an imperfect world, the invisible hand does not always work. If perfect competition existed, there would be no reason for firms to exist. Alchian and Demsetz (p. 794) have emphasized the importance of firms as resource organizers. They emphasize the ability of the firm owner to detect the performance of the team of input owners. They state "No authoritarian control is involved; the arrangement is simply a contractural [bargained?] structure subject to continuous renegotiation with the central agent." This analysis ignores the possibility of inequitable distribution of power among input owners. If there are differences in power among resource owners, they may effect the terms of exchange. "Control" may rest with a single input owner. Control exercised through bargained transactions may represent either voluntary or volitional choice. Parties may either have complete freedom of choice (voluntary choice-implied by perfect competition) or they may choose from the alternatives available as set by someone else (volitional choice).[11/]

In the vegetable processing industry, the objectives of growers and processors can be in conflict. In pea production for example, highest yields would be reached if peas were planted near some optimum date. If all peas are planted on this date, processing capacity would have to be very large to process the entire pack during peak maturity. This particular problem has been resolved by paying planting bonuses, to spread plantings over a wider season and thus spread the harvest and canning season. Canning companies issue contracts which control planting and harvest dates. The problem is a vertical coordination problem. Both growers and processors may be better off if planting dates are controlled. To concentrate on the "pure" physical coordination problem of successive plantings avoids the complex institutional questions in this decision. An institutional approach focuses on the question of how growers and processors resolve their vertical coordination conflicts. This focuses attention on legal, economic, and social interrelationships.

These may involve central markets, collective bargaining, marketing orders, vertically integrated firms, futures markets, forward contracts and other institutional arrangements. The tools of analysis could involve standard economic analyses of market structure, econometric analysis, systems modeling, and economic engineering studies. The institutional approach also involves analysis of the power of participants in the vertical coordination process. This involves defining the distribution of control and the rules which allow this distribution to exist.

An example may be helpful as follows. In the Wisconsin vegetable industry, processing vegetables compete with corn and small grains for land and other production inputs. It is alleged that the returns from vegetables for processing were below those for corn and small grains during most of the 1960's. It is further alleged that the returns paid to vegetable producers were low because the allotments in government price support programs left Wisconsin vegetable growers with land which could not be used for corn or small grains. If these allegations can be supported with empirical evidence, it would demonstrate how the rules of the price support program impacted on returns to vegetable producers and vegetable processors. The empirical test of the allegation would likely involve no new tools for the economist. If he had analyzed the situation (low returns to vegetable production) without examining the institutional setting, he would have missed a major explanatory variable.

Control and Adaptability

If we assume that we can create equitable institutional arrangements for determining the objective function for a system, will these arrangements insure that the system can adopt a new objective function? Will the system be flexible? The physical coordination process appears to require less flexibility with increased coordination. As the production stages are specialized

and harmonized, the optimal scale of operations and the products produced seem to become increasingly fixed. Thus, the system which is highly coordinated in terms of physical productivity may have limited flexibility in terms of the quality and quantity of output. Further, if highly specialized technology is necessary at several stages, the ability to shift resources out of a particular vertical system may be reduced.

It is not clear how particular institutions would rank on a flexibility scale. We might expect institutions which result in a high degree of centralized control to be more flexible relative to changes in the level of output. Improved pricing efficiency or vertical control might lead to a more rapid response to small changes in demand. If a centrally controlled vertical system is faced with major changes in objectives, it might be very inflexible. Centralized control may lead a vertically coordinated system to resist major changes which would disrupt current institutions and current income patterns. How would the broiler complex react to a shift in environmental control laws which required widely dispersed flocks? We don't know, but we hyopthesize that the current vertically integrated broiler complex may be much more rigid in reaction to major changes than a more open system. We may be creating, through adoption of highly integrated vertical systems, an industrial pattern less capable of change.

If Gailbraith's thesis is correct regarding the sectors of our economy which he calls the planning system, then the highly coordinated, planned and controlled system will use political and economic power to maintain a course of action which favors its objective. With a transition of agriculture toward a vertically administered set of subsystems, we may be creating a rigid set of production and institutional patterns which strongly resist change. Is there some level of centralized control which represents a critical level; an irreversible point beyond which the system becomes increasingly rigid?

AN INSTITUTIONAL APPROACH RELATIVE TO OTHER APPROACHES

An institutional approach to vertical coordination is a way of looking at problems of organization of a vertical production system. It focuses attention on transactions and transactions systems. It calls to attention problems in organizing a system toward a set of objectives.[12/]

An institutional approach involves using conventional methodologies within a particular framework. Thus, market-structure analysis, subsector analysis, economic engineering studies, econometric modeling, and systems-simulation all are a part of the tools or methodologies available. The application of these methods within an institutional approach requires a synthesis of economic theory with other social sciences. This is not to say that as economists we need to become amateur sociologists or psychologists. It does say that the hypotheses relevant to analyzing the vertical organization of a production system may come from outside our theoretical system.

The institutional approach depends heavily on a description of a particular system for its hypotheses. It is a positive approach because it asks how is a system currently organized; what are its performance objectives; what are the rules; where is the power; who has control; what is its performance? When these questions have been answered, an institutional approach asks how would different rules, different power distributions, different objectives effect performance. An institutional approach describes what is and asks what could be.

Major weaknesses of an institutional approach are the temptation to extreme empiricism and the limits of the economists theoretical framework. The temptation to extreme empiricism may result in analyses which become anecdotal. In some instances, the pecularities of a particular case may seem to limit generalization. The challenge is to go beyond description of indi-

vidual cases to generate and test new hypotheses based on empirical observation.

The limits of economic theory in explaining behavior tempts the analyst to become amateur psychologist, sociologist, anthropologist, etc. The institutional approach will require drawing on other social science disciplines. While we believe that economists generally need to draw more heavily on the other social sciences, few will be able to master other disciplines. Rather, an institutional approach will require drawing on related social sciences as we have on statistics and mathematics. The economist will need to establish a basic understanding of the other social sciences and draw in experts to aid in specific applications.

Doing institutional analysis is a process. It implies a blend of hypothesis generating and hypothesis testing. In this sense, the neo-classical and institutional literature provide some hypothesis while the problem under study also generates hypotheses. We believe that institutional analysis increases the breadth of understanding of economic phenomena. That while many of the problems called "institutional" are currently fuzzy and difficult to tackle, they are capable of analysis. Further, if we could increase our efforts in the "institutional" area, the long run pay offs may be large.

FOOTNOTES

1. While this paper devotes its major attention to the work of J. R. Commons, readers are also referred to the work of Thorstein Veblen, Wesley Mitchell, Clarence Ayres and others.

2. Commons (p.11, 1924) illustrates this point in his analysis of the Slaughterhouse Cases. Here courts upheld the right of the city to regulate use of a slaughterhouse. The butchers had charged deprivation of property because their incomes were reduced by the regulation. The court in essence held that because the butchers were not deprived of physical property there was no taking of property. The case of Munn versus Illinois also adhered to the physical definition of property.

3. The Minnesota Rate Case involved the legislature's right to regulate rail rates. The court held that the ability to regulate exchange values was a question of judicial investigation requiring due process of law for its determination. Thus, it accepted the importance of exchange value as well as use value (Commons, p.15, 1924).

4. Schmid and Shaffer use the term "exchange systems" although their classifications are analogous to those by Commons of transaction systems.

5. These systems are similar to what Commons (1950, p.43) calls rationing, managerial, and bargaining transactions. They are also similar to Heilbroners systems of tradition, command, and market.

6. This is <u>part</u> of the area which Boulding has called the Grants Economy.

7. Production is used here to mean all components of the vertical value adding process.

8. This is a case of technology "forcing" institutional change. Institutional change may "force" technological change. The patent system is an institution to encourage technical change. The Land Grant University is a similar example.

9. The costs of organizing transactions between vertical stages also influences the definition of the "normal" firm. Coase in his classic article on the nature of the firm examines the relation of transactions cost to firm organization in great detail.

10. Firms have generally been encouraged to avoid "cross subsidization." Nove has discussed the issue of internal economies and firm organization extensively emphasizing the importance of "cross subsidization."

11. For further discussion see Samuels.

12. For an example of an institutional approach see Roberts.

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