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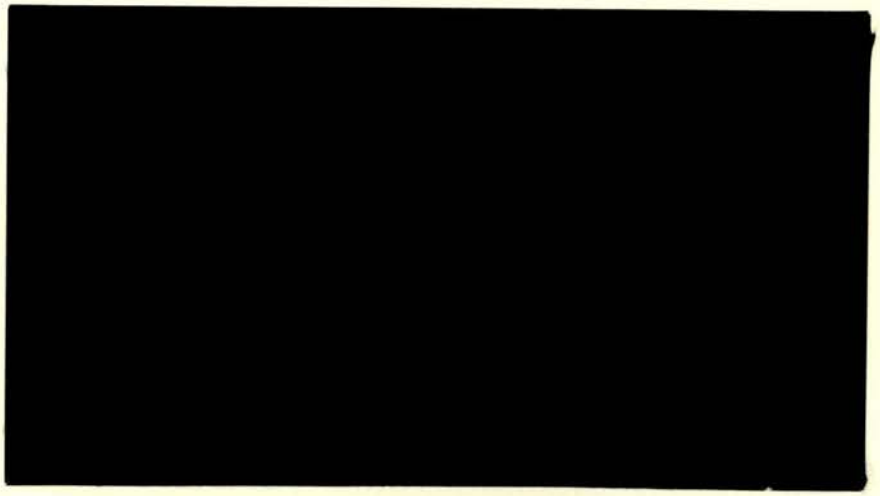

WORKING PAPER SERIES

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FARM DECISION MAKING AND RESOURCE UTILIZATION

by
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FARM DECISION MAKING AND RESOURCE UTILIZATION

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Farm Decision Making and Resource Utilization

ABSTRACT In a study investigating the adoption of irrigation and drainage reduction technologies, a classification of farms predicated on the organizational characteristics of the firm was used to assess farm decision making with regard to resource utilization. Organizational classes represent farms which differ in size, technology, crop mix or labor but which manage these and other resources similarly through their organizational structure. Organizational structure was the product of the farm's assignment of task roles, the formalization of rules and procedures surrounding the task, and the relationship between workers and the task. We identified five types of farm organizations -- the Unified Organization, the Primary Hierarchy, the Simple Functional Hierarchy, the Complex Functional Hierarchy, and the Market Hierarchy -- which were tested against common production resources in order to 1) determine the ability of our classification to differentiate farms according to these characteristics, and 2) to assess regional differences in the availability and quality of resources upon farm decision making.

Farm Decision Making and Resource Utilization

INTRODUCTION

In choosing a particular production resource over another, relative cost, availability and quality may complicate a decision maker's selection process. An even greater challenge to decision makers, however, is posed by the relationship between resources. Presented with an increase in the cost of irrigation water, for example, a farmer may adopt water-saving technologies. These technologies can place additional demands upon the operator, and require him to commit more time or personnel to managing the technology.

As a consequence of the complexity inherent in decision making, studies on this subject prefer to link available resources to a particular decision outcome through a correlation analysis. The resources accounted for by such methods include input and output prices, the dimensions of the decision unit (field and farm size), human capital, and locational variables such as land quality and weather (Caswell, 1991). While correlations often serve to identify resources in association with a particular outcome, they do not explain the long-term effects of a decision as determined by the relationships between resources.

In this paper we present an approach to modeling decision making through reference to organizational structure. Production organizations such as farms manage resources through the physical arrangement of labor. As the availability or quality of resources change the organization adjusts its structure to maintain the necessary balance between resources. A vegetable farm, for example, which requires an established rate of irrigation water may be required to reduce production, adopt new production or irrigation technologies or monitor the number and time period of applications if the price of water increases significantly. Reducing production capacities may mean leaving land fallow thereby reducing long-term labor demands. New technologies may require the farm to train or hire new personnel already trained to manage these new technologies. Control of irrigation application rates through labor means the organization's structure must change to compensate the shift in

personnel and task. All of these outcomes are reflected in the organization's structure.

Our interest in developing this typology has arisen from our analysis of technology adoption (Dinar and Campbell, 1990, 1991). Our specific research objectives there are to determine the effect of farm- and field-level conditions on the use of drainage-reduction and irrigation technologies in California's San Joaquin Valley. Given the increasingly complex nature of agricultural production in this region due to draught and declining water and soil quality, the San Joaquin Valley provides an ideal testing ground for the study of farm decision making.

We concentrate here upon the theoretical and methodological aspects of developing a typology of decision making. The first part of the paper considers the work of organizational theorists and its application to modeling agricultural decision making. The second part identifies six theoretical models of decision making with respect to their organizational structure, and then evaluates these types with respect to empirical data gathered in a survey of farms in the San Joaquin Valley[1].

A typology of farm decision making provides one means to formalize our understanding of differences between objects of study. In considering decision making from the perspective of organizational structure we extend the possible applications of organizational analyses. Such studies have been relegated to a lower value by some because of their decidedly non-quantifiable methods. However, their application here enhances the application of quantitative methods because organizational studies contain a theoretical explanation of the link between resources. Correlations do not explain the effect of changing resource levels or qualities on a decision outcome or why similar resource mixes might result in different decisions. Organizational theory substantiates the interdependency of resource variables and make interpretation over time possible.

Since our model considers all resources as part of the decision process we propose that the importance of political, economic, and social resources may be evaluated in terms of

[1] A typology of decision making may provide a means to classify farms which employ similar decision strategies together. The effects of varying resource levels upon the decision outcomes may then be considered. Research in this direction is currently under way using the data obtained from farms in the San Joaquin Valley.

decision outcomes. The more comprehensive and detailed the organizational models, the more responsive these models will be to evaluating the effect of these conditions on resource utilization.

CONCEPTUALIZING A TYPOLOGY OF FARM DECISION MAKING

In defining an analytically useful typology, Whatmore et al (1987) require that it be theoretically informed. She undertakes this task in the form of a "relational" typology of farm businesses through which she intends to connect theory and empirical data collection. Beginning with the concept of subsumption, Whatmore and her colleagues distinguish farm types with regard to the degree of internal or external subsumption they exhibit. Since internal and external subsumption formed an axis of theoretical values, the "ideal" types identified by Whatmore et al include those inaccesible to observation.

In our analysis of farm decision we employ a similar approach to that of Whatmore et al. In place of subsumption we have used the concept or organization structure. Organization structure provides the dimensions of organizational processes which allow us to create a theoretical continuum of organizational difference. Like the typology of Whatmore et al ours is theoretically informed. Organizational structure mediates the relations of productions including the variability of resources (Mintzberg, 1979). The notion of organizational structure refers to the assignment of task roles in the organization, the formalization of rules and procedures surrounding the task, and the relationship of workers to task and the to other workers[2].

Organizations utilize structure, that is, task assignment, work rules and work relations, to coordinate the varying levels of resources such as labor, environment, technology, and capital. In these terms should the cost of labor increase, the farm might decide to adopt labor saving technologies. Accordingly, the organization's assignment of tasks or the links between workers would change to reflect the introduction of these technologies. In the same

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[2] The understanding of organization represented here conforms to the goal oriented model of Blau and Scott (1962), Parsons (1960), Udy (1961), and Etzioni (1961). Udy defines production organizations as "any social group manifestly (though not necessarily exclusively) engaged in producing material goods from raw material" (ibid, p. 247).

way, new technologies might require the organization to retrain or hire more specialized workers. The roles between managers and workers or between workers who once shared the same unspecialized tasks would change to reflect the increased skill required by the new technologies.

Production organizations are faced with two fundamental and opposing requirement: 1) the division of labor, and 2) the subsequent coordination of that labor (Mintzberg, 1979:2). In classifying the differences between farm organization we have selected two dimensions of organizations which correspond to these requirements: task specialization and configuration. Both dimension have been extensively reported upon in the work of Blau & Schoenherr (1971), Child (1972, 1977), Hage & Aiken (1967), Hall (1963), Pugh, et al (1968, 1969), and Meyer (1972). Like Whatmore et al, we have identified points along the continuums posed by task specialization and configuration as different organization types. Farm types identified with respect to task specialization and configuration contain farms which employ similar task roles, rules and procedures, and task-workers relationships. Mintzberg (1973, 1979) and others (Burns & Stalker, 1961; Haas et al., 1966; and Miller & Friesen, 1977, 1978) have demonstrated the conceptual and empirical interdependency among organizational dimensions by which different dimensions may be used to identify the same organizational structure. Therefore, our attention to task specialization and configuration does not produce different types from those which may have been apparent through reference to other organizational traits.

Task specialization refers to the degree of segmentation between work groups[3] or between job roles and distinguishes the degree of internal segmentation along two dimensions (Hall et al., 1967).

Horizontal task specialization may appear as "inter-unit" or "intra-unit" task specialization. Inter-unit task specialization refers to the division of labor between operating units, each composed of operators who perform the basic work of the organization (Figure 1).

[3] Work units are those components of the task organization to which roles are assigned. They include the decision making unit, the managerial unit, the technical assistance unit, the production unit, and the support unit (Mintzberg, 1979).

Insert Figure 1 here

Intra-unit task specialization refers to the differentiation of tasks between workers within a work unit (Figure 2).

Insert Figure 2 here

Along the vertical axis, task specialization refers to the hierarchical segmentation of work units or positions. Vertical specialization addresses the separation between the work of the production unit and the administration of that work. Hierarchies created by the vertical segmentation of the organization are designed so that progressive layers serve as a point of (process and input) merger for those beneath them.

Task specialization, as we have defined it, integrates various interpretations of complexity, including hierarchical differentiation and formalization (Hall et al, 1967), structuring of activities (Pugh et al, 1969), functional specialization and role specialization (Child, 1973; Reiman, 1973), vertical and horizontal differentiation, division of labor, and person specialization (Beyer & Trice, 1979).

In addition to horizontal and vertical task specialization, farm organizations may be distinguished by different physical and processual relationships between roles within the organization (Pugh et al, 1963). The structure of these relationships compose the organization's configuration.

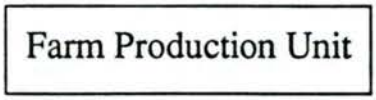
An organization's configuration may be described as either functional or market. Functional configurations combine work roles which perform similar tasks in order to accommodate interdependencies in their production activities such as shared knowledge, resources or materials. Functional configurations enhance process or scale relationships (Mintzberg, 1979). Market configurations reflect an emphasis on work flow interdependencies and combine roles committed to the same products, clients or locations to form a single production unit (Mintzberg, 1979). Market configurations fragment the organization into discrete production units which may contain duplicate jobs.

FARM ORGANIZATION TYPES

Following Whatmore et al (1987) it is possible to project 6 different organizational structures based on the presence or absence of task specialization and configuration. Each differs with regard to the organization's strategy for managing the relations of production. These 6 structures are presented in Table 1.

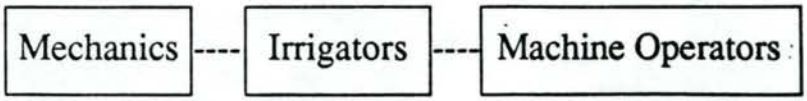
Insert Table 1 here

The first organization type is termed the Unified Organization. It is identified by the absence of both vertical and horizontal specialization. Organizations of this type contain individuals doing precisely the same task. Decision making and task responsibilities are not differentiated within the organization.



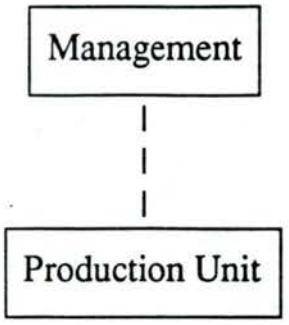
Type 1: The Unified Organization

In Type 2, the Cooperative Organization, a diversified production unit shares responsibility for all decisions. Specialization occurs on a horizontal plane only. Continued specialization through growth may increase the size of the production unit but will not result in the subordination of workers to a management unit. Depending on several factors internal to the unit, particularly decision making, growth in the cooperative organization will force it into a new structural alignment.



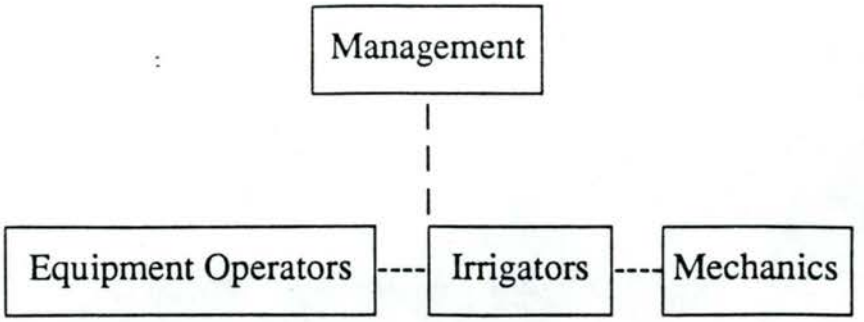
Type 2: The Cooperative Organization

The third type of organization, the Primary Hierarchy, contains vertical task specialization and the absence of horizontal task specialization. These elementary hierarchies are composed of two units: management and labor. Although elaboration along the vertical axis increases the number of managers it does not increase the number of work units. In addition, the lack of horizontal specialization limits the degree to which managers and workers can specialize since specialization leads to differentiation.



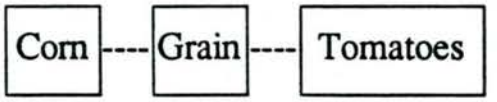
Type 3: Primary Hierarchy

The fourth type of organization, the Functional Hierarchy, is the product of vertical and horizontal task specialization. It is distinguished by the fact that the members of the production unit are arranged to the type of work they do (function). The height or width of the organization is dependent upon the nature of the organization's work, the type of technology used, and the experience and training of the work force. As the work becomes more complex workers will face pressure to specialize. Specialization will fragment the organization by producing more production units and more managerial units to oversee their work.



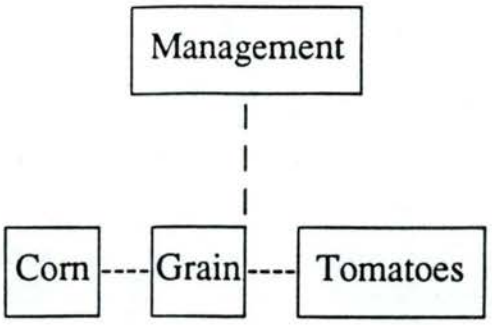
Type 4: Functional Hierarchy

The fifth type of organization is the Cooperative Market Organization. This type exhibits the same cooperative structure as Type 2 except that the individual production units are organized with respect to the different products, clients or locations of the organization (markets). The Cooperative Market Organization, however, lacks credence because the farm's work cannot be exclusively divided by products, clients, or locations. In the absence of a link between market-based production units, they may operate independently as any of the other functional organizations.



Type 5: Cooperative Market Organization

The sixth type of organization is the Market Hierarchy. It resembles the Functional Hierarchy in every way except with regard to the relationships between workers and the task. In the Market Hierarchy, workers are organized by markets, clients or locations rather than the work they do. The dynamics of growth in the Market Hierarchy differ from those in the Functional Hierarchy. In the Market Hierarchy the organization must commit itself to new markets in order to expand. The decision to produce another crop or serve another client will result in the addition of another unit.



Type 6: Market Hierarchy

CONSTRUCTING A TYPOLOGY OF FARM DECISION MAKING

Like the typology of Whatmore et al ours provides the opportunity to investigate empirical data on farm production. To this end "ideal types" serve to refine the models and to provide a reference to evaluate the patterning of data. In this section we set out the methods used to operationalize the 6 "a priori" types.

The Study Area

The study area, identified as the westside of the San Joaquin Valley, contains 4,330 farms and 3.44 million acres of farm land[4]. This area represents 5.2% of all farms and 11.2% of farmed land in California. Nearly 40% of the farmed land in the study area was irrigated. Forty-three percent of the farmed land in the study area was committed to cotton, another 40% to other field crops including grain, hay, wheat, sugar beets, dry beans, and rice, 10% to Fruits and Nuts, and 10% to vegetables. Average farm size was 500 acres with approximately 55% of these farms fully owned by the operator. Non-family corporations were negligible in number and accounted for less than eight percent of the land in farms. Individual owners and family corporations accounted for 76.3% of the farms controlling 54% of the agricultural land. Sixty-one percent of the farm operators resided on the farm. Thirty-one percent did not reside on the farm they operated. Sixty-five percent of the operators reported farming as their

[4] All study area statistics were obtained from the 1987 Census of Agriculture as reported in Archibald (1990).

primary occupation. 2,356 farms reported hiring labor in 1987, representing 54% of all farms on the westside. These farms spent an average of $127,627 per farm for this labor. During that same period, farms in California averaged $131,205 per farm for hired labor.

Sampling

The study area was divided into five subareas to conform to hydrological conditions, political boundaries, and current drainage practices[5]. The number of farms in each of the five subareas was estimated using County Agricultural Commissioner records. These figures were modified to account for differences between county lines and the boundaries of the study area. The sample was weighted by the average size of farms in each subarea to account for differences in farm size between subareas. A sample of six percent of full-time farms in the study area was used in order to attain statistical significance. We drew a random sample from a list of operator names who had applied for restricted material permits in 1988[6].

Survey

A formal questionnaire was used to obtain data on farms. Farm operators were contacted by phone and asked to participate in the study. Information on the project and the survey instrument were sent in advance of a scheduled interview. Twenty-two questions solicited information on labor use, position titles, organizational charts, types of employee reimbursement, type of labor agreement (contract versus direct hire), educational level of managers, relationship between managers and owners, and residence of managers and owners.

All questions related to agricultural activities conducted during the 1988 growing season. The interview process was begun on April 1, 1989 and the final questionnaire was completed on September 19, 1989. A total of 285 farms were surveyed. Ten farms were excluded from the analysis because responses provided insufficient data on the farm organization. Upon

[5] The division of the study area into 5 subareas was intiated by the San Joaquin Valley Drainage Program, a federal-state task force concerned with resolving the problems created by agricultural drainwater in the San Joaquin Valley. Work conducted in support of the program conformed to this design for practical purposes.

[6] This list was obtained from the Office of the Agricultural Commissioner in each of county in the study area.

review, ex-post coverage of the study area was found to be quite satisfactory.

Operational Measures of Farm Organization Structure

Organizational charts obtained from each farm were evaluated in order to assign farm organizations to one of the six types. The type of task specialization and configuration of the organization exhibited determined the classification to which it was assigned. Organizational charts, provided information on the size and complexity of the managerial unit and the relationship between roles in the organization. In addition, they served to identify whether the organization was a functional or market structure.

Organizations which exhibited a division within the production unit conforming to the principles of work process or scale economics were identified as functional configurations. Among farm organizations, functional alignments appear as the logical separation of machine operators and irrigators or between milkers and barn workers. Organizations which structured their production units by reference to products, market locations, or clients were labelled market configurations. These farm organizations generate independent production units to serve different crops (corn, tomato), different fields which may be separated by natural boundaries or space, or different clients (commercial markets, organic markets).

Task specialization was measured horizontally as inter-unit and intra-unit task specialization and vertically as the separation between a production unit and a managerial unit. Organization charts were often unable to distinguish horizontal specialization, particularly intra-unit task specialization. In these cases we referred to data on job titles, salary, and benefits to distinguish roles. An organization that contained units identified by different job titles was considered to have inter-unit task specialization. An organization with a production unit that contained individuals with different job titles as corroborated by wage and benefit information exhibited intra-unit task specialization.

The presence of each of these variables was considered in the absolute. Either the organization exhibited vertical specialization or it did not. It was horizontally specialized between units or not or within units or not. Roles within the organization were arranged

according to the function of the incumbent to that role or it was arranged by market considerations. As the presence of absence of each of these variables was determined for the 275 farms, the organization was assigned to one of the five types.

INTERPRETING THE FIELD DATA

As with the typology of Whatmore at al, the interaction between the concept of organizational structure and the empirical data differed. We found evidence of only four of the six "a priori" farm types in the study area. The two cooperative organization's were not present or did not exist. However, we did find that Functional Hierarchies differed according to the level within the organization at which the functional separation of duties was made. The first type, which exhibited a functional separation of the work within the production unit but not within the management unit, was termed the Simple Functional Hierarchy (Figure 3). The second, which divided the work of managers along functional lines, was labelled the Complex Functional Hierarchy (Figure 5).

As a part of analyzing the decision processes of farm business we proposed that organizations with different structures had consciously utilized resources differently. Structure represented the organization's strategies managing the varying levels of resources. In so far as organizations shared the same structure they had chosen the same strategy for coordinating these resources. Similarly, organization's with different structures had chosen different strategies. These strategies are expressed in the concept of organizational structure. Simple Functional organizations differed from Complex Functional Organizations because the latter had resolved the unique problems it faced by diversifying the role of management. Primary Hierarchies solved problems faced by the Unified Organization by establishing a managerial role with different responsibilities from those or workers.

The relationship between organizational models may be explained by complexity. The more complex the relations of production the more complex the organizational structure. In the same way, the more complex the decision process the more complex the structure. Accordingly, we can expect that the 5 organizational models we have identified will differ with respect to factors which increase the complexity of decision making. These factors must

include changes in the availability or quality of resources.

Table 2 represents the distribution of the 5 farm business types across the resource variables land, technology, and labor. Income was included because it is often considered a production resource and on other occasions as a measure of organizational difference. The variable Acres Farmed was defined as all land farmed by the respondent during the 1988 crop year. Years of Computer Use recorded the number of years the subject farm had used a computer for any farm-related purpose. Years of Agricultural Experience reported the number of years managers had worked in agriculture in any capacity. Full-time Employees per 100 Acres Farmed was the number of persons whose agricultural labor was provided on a full-time basis and to whom the farm paid salaries and wages during the 1988 agricultural season. Part-time Employees per 100 Acres Farmed included all persons whose agricultural labor was provided on a part-time basis during the agricultural season of 1988. Both figures were calculated on a per acre basis and did not include managers and owners or the support and technical staffs of the farm. In collecting data on labor, we did not attempt to define the differences between part-time and full-time work in terms of days worked but relied on the operator's (respondent's) understanding of each.

The results of the analysis of continuous variables in Table 2 is consistent with our interpretation of the relationship between organizational complexity and different levels of inputs. The 5 farm business types differed with regard to labor and technology That is, different levels of labor and technology were correlated with differences between organizational types. Four farm business types differed with respect to land. The more complex the farm businesses -- Complex Functional and Market Hierarchy -- did not significantly differ with respect to the amount of land farmed. Finally, 3 of the 5 farm types did not differ significantly with regard to income. We anticipated this based on our assumption that organizational models did not measure performance such as income per acre, but the manner in which the farm businesses remained productive even though input levels varied. The values of the F-tests reported for these continuous variables indicate they were statistically valid indicators of difference between the 5 types.

Distribution of Farm Types in the Study Area

Table 3 presents the distribution of the five farm organization types and the total acres farmed by each type for the five subareas. Ten percent of all farms were run by individuals operating as a Unified Organization. These farms accounted for slightly more than one percent of the land farmed in the study area. Forty-Six percent of the farms were Primary Hierarchies. These farms operated 20% of the land farmed. Workers on these farms were unspecialized and shared the work among themselves while managers performed tasks related to both supervision and production. Twenty percent of the farms in the study area were Simple Functional Hierarchies which relied on discrete job assignments to divide the farm's work. Twenty-four percent of all farms approximated the model of industrialization present in the Complex Functional and Market farm organizations with Complex Functional Hierarchies operating 41% and the Market Hierarchy operating 17% of the land farmed. Together the Complex Functional and the Market Hierarchy accounted for 59% of the farmed land but represented only 14% of the farm organizations in the study area. The less complex hierarchies represented 66% of the farm organizations but operated only 40% of the land.

Table 4 presents values for various inputs for the 5 subareas. Farm decision making should reflect differences in resources. That is, farm type is responsive to the availability and quality of resources. The Average Size of Owned Land is average of all acreage owned by growers in the five subareas. The Pan Evaporation and Average Rainfall were obtained from weather stations throughout the study area. The difference between these two values gives some indciation of the irrigation demands of farms in each subarea. The Aggregated Environmental Variable is a compound measure of adverse environmental conditions including high water table and high soil salinity and selenium levels. The Average Cost of Water was obtained from directly from operators.

The five subareas exhibit significant differences relative to the availability or quality of some resources. In particular, farms differed substantially in terms of their irrigation deamnds and the cost of irrigation water. Our theory suggests that these differences will result in a different distribution of farm types between the subareas. First inspection

indicates that the subareas did differ in this regard (Table 3). This issue is being considered in a current study of the relationship between resources and the organization type.

LIMITATIONS OF AN ORGANIZATIONAL CLASSIFICATION OF FARMS

The organizational classification presented in this paper assigns farms to different classes according to the relationships between workers and between workers and their tasks. Organizational theory suggests that a classification based on organizational criteria would account for both input and output factors in the farm's production of goods. While an organizational model resolves problems associated with spurious criteria it does have other weaknesses which need to be considered.

First, the organizational model assumes that all organizations are operating at maximum efficiency and applying the same management concepts. As a result, farms with more labor than others are assumed to be operating at a higher capacity. One farm could, however, maintain a larger labor force than another while consuming the same amounts of inputs and producing the same quantity of outputs. The larger farm is simply less efficient.[7]

Second, the organizational model does not account for the influence of land ownership on farms. A farm operated on rented or leased land may not use the same cultural practices as a farm which owns the land (Feder et al, 1988). As a result, farms on rented or leased land may have a reduced demand for the labor and management that would be committed to such improvements as land leveling and sub-surface drainage systems.

In the same fashion, the organizational model does not account for farms operated by management firms or untitled operations. Such farms often employ a large labor force which works on several different farms some of which may be located outside California. In collecting data on farms we restricted ourselves to information pertaining to the farm units identified through sample selection. Operators of large diversified businesses or management companies either could not answer questions concerning the parent company or were unwilling to do so. As a result, we may have underestimated the number of Market

[7] In defense of our analysis, Table 4 indicates no significant difference in the income/acre between the five farm types. Given that this measure of productivity may not reflect the full use of labor, other measure should be developed to assure that farms do not significantly differ with regard to efficiency.

Hierarchies which may be present and operating as large diversified businesses in the study area.

Third, since we did not differentiate farms according to tenure or occupation, part-time farms were included along with the largest farm enterprises. The influence of non-farm income among part-time farmers on the use of labor or technology was not considered. Off-farm income may allow part-time farmers to hire labor for tasks they could perform alone, thereby, elevating the farm from a Unified Organization lacking vertical differentiation to a Primary Functional Hierarchy. The acquisition of technology may act in the reverse direction to reduce the need for labor or to specialize that labor.

Finally, in our focus on full-time labor we have failed to account for the influence and effects of part-time labor[8]. This is particularly true among family farms and part-time farms where family members may perform many tasks without wage renumeration. At the same time, we have not considered contract labor which under certain circumstances may allow the operator to farm a larger unit than he could alone. Farms which used contract labor may have been inappropriately classified at a lower organizational level. A possible resolution to this problem would be to consider contract labor as another production unit and represent it as such in the farm's organization chart.

DISCUSSION

As Benedict (1944) noted "(A) classification of data is significant only in relation to some purpose for which it is to be used" (p. 697). The organizational classification presented here provides opportunity to assess the relationship between resources in terms of farm decision making. Organizational theory contends that structure reflects the organization's strategy for managing the relations of production including varying resource level. As a result, reference to structure serves to differentiate farms which employ different decision making strategies. By comparing the organization's structure we can classify farms employing the same decision

[8] The literature associated with the "Goldshmidt hypothesis" argues that community social conditions are mediated by the economic status of farm labor. A high proportion of part-time laborers to full-time is associated with lower social conditions.

strategy. Traditional methods of studying decision making entailing correlation analysis do not enable us to compare different outcomes or different farms. However, by grouping farms according to their decision strategies we have accounted for decision making processes and leave only resource factors as the independent variable.

An organizational typology serves another purpose as well. Organizational models highlight the relationships between labor and management which can be useful for programs committed to educating or changing either group. Knowing who does what and the educational or skill levels of the individuals involved is a prerequisite to extension programming. Second, organizational classes can anticipate the effect of a change in resource levels on the organization's production processes. Organizations which use different technologies are assumed to be different with regard to the assignment of tasks, regulation of tasks, and the relationships between workers and tasks if all other factors are held constant. Predicting the necessary farm-level changes which accompany the adoption of a technology is possible through an organizational model. In addition, organizational classes anticipate the range of inputs a farm utilizes while maintaining the same organizational structure. As input levels change so must the organization's structure. Since organization classes reflect systems for managing inputs, an increase in one input results in a decrease in another if the organization maintains the same structure. If the organization's structure changes it must reassign tasks, redirect tasks through new rules or alter its configuration in order to remain productive.

More comprehensive descriptions of organizational structure which may capture the finer differences between farms will result in more useful typologies. These models should be based upon the organizational dimensions which result from the opposing requirement of productions organizations to divide and coordinate labor. The finer the gradations between organization types the more accurate will be the analysis of resource utilization.

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Table 1: Farm organization structures characteristics

		Horizontal Task Specifiction			
		No	Yes In production unit		
Vertical Task Specification	No	Type 1	Type 2		
	Yes	Type 3	Type 4	Functional	Configuration
		Type 5	Type 6	Market	

Table 2: Analysis of Variance of mean values of the continuous variables using Harmonized Duncan-Waller grouping procedure (p=.05)

	Type of Farm organization Structure					
	Unified	Primary Hierarchy	Simple Functional	Complex Functional	Market Hierarchy	
			Mean value			F-test
Acres Farmed	172d	612c	1407b	3478a	3736a	8.48
Gross income per acre	1088.6a	893.3ab	606.1b	431.4b	415.1b	4.42
Years of Computer use	.53d	1.52cd	2.98bc	3.72b	6.16a	9.58
Years of Agr. Experience	29.7a	27.7a	27.6a	26.7a	30.3a	-
Full-time Employees (per 100 acres)	.011d	.572c	.622bc	.969ab	1.203a	7.78
Part-time Employees (per 100 acres)	20.72a	11.77ab	4.90bc	7.55b	3.43c	2.38

Means with the same letters on the same line indicate a nonsignificant difference between farm types.

Table 3: distribution of farm organization structures and farmed land by subareas

	Subarea					
	Northern	Grasslands	Westlands	Tulare	Kern	Total
Number[a] (%) of farms and farmed land (%) by organization structure						
Unified	9 (17)b	3 (6)ab	0 (0)a	10 (17)b	5 (6)ab	27 (10)
Land (acre)	1897 (6.9)	360 (.5)	0 (0)	1244 (3.6)	1170 (.8)	4671 (1.3)
Simple functional	25 (48)ab	16 (31)ab	7 (22)b	40 (68)a	37 (46)ab	125 (46)
Land (acre)	8189 (29.8)	76956 (11.2)	4372 (3.7)	22236 (64.5)	34058 (24.2)	76550 (19.8)
Simple market	11 (21)ab	16 (31)a	7 (22)a	5 (8)b	17 (21)ab	56 (20)
Land (acre)	7170 (26.1)	21845 (31.8)	18541 (15.9)	3623 (10.5)	27656 (19.9)	78835 (20.3)
Complex functional	2 (4)c	11 (21)b	16 (50)a	2 (3)c	15 (19)b	46 (17)
Land (acre)	1285 (4.7)	20761 (30.2)	90997 (78.5)	6341 (18.4)	40631 (28.9)	159995 (41.3)
Complex market	5 (10)ab	5 (10)ab	2 (6)a	1 (2)b	5 (6)ab	18 (7)
Land (acre)	8964 (32.5)	18102 (26.3)	2300 (1.9)	1040 (3.0)	36850 (26.2)	67256 (17.3)
No. Total	52 (100)	52 (100)	32 (100)	59 (100)	80 (100)	272 (100)
Land (acre)	27505 (100)	68763 (100)	116190 (100)	34484 (100)	140365 (100)	387307 (100)

[a] Three (3) farms which did not conform to the five types are not included in the table. Efforts to compress these farms with others were unsuccessful.
Means with the sam letters on the same line indicate a nonsignificant difference between farm types.

Table 4: Value of Selected Inputs By Subarea

	Subarea				
	Northern	Grasslands	Westlands	Tulare	Kern
Size of Owned Farms	306b	623b	2852a	336b	1276ab
Pan Evaporation	44.64cd	65.00a	54.75b	50.60bc	40.08d
Rainfall	21.01a	13.26b	9.77c	10.39c	8.02d
Aggregated Envir. Variable	0.33ab	0.39a	0.23bc	0.40a	0.18c
Surface Water Price	14.26c	13.22c	21.24b	21.26b	34.12a
Ground Water Price	17.48d	19.57d	45.00a	24.73c	33.69b

Means with the same letters on the same line indicate a nonsignificant difference between subares

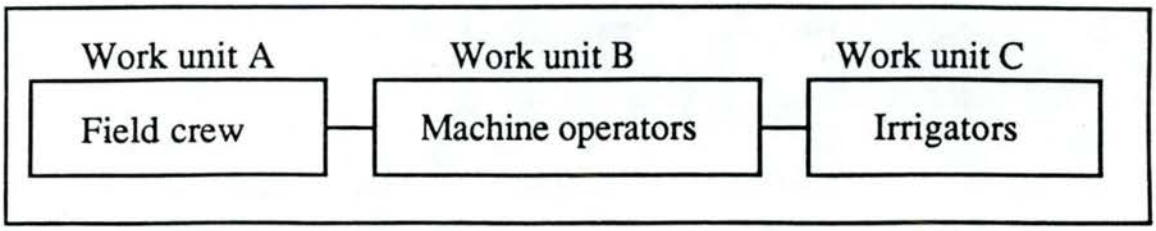

Figure 1: Inter-unit task specialization

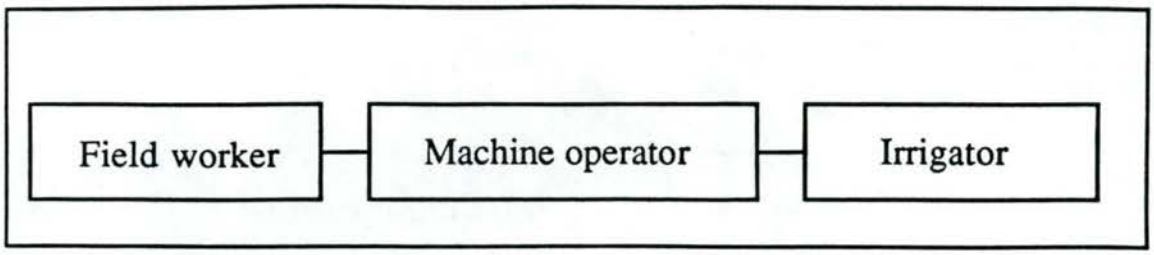

Figure 2: Intra-unit task specialization

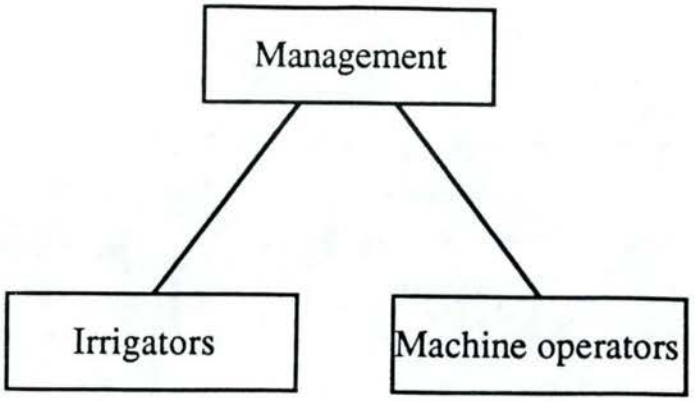

Figure 3: Simple Functional Hierarchy

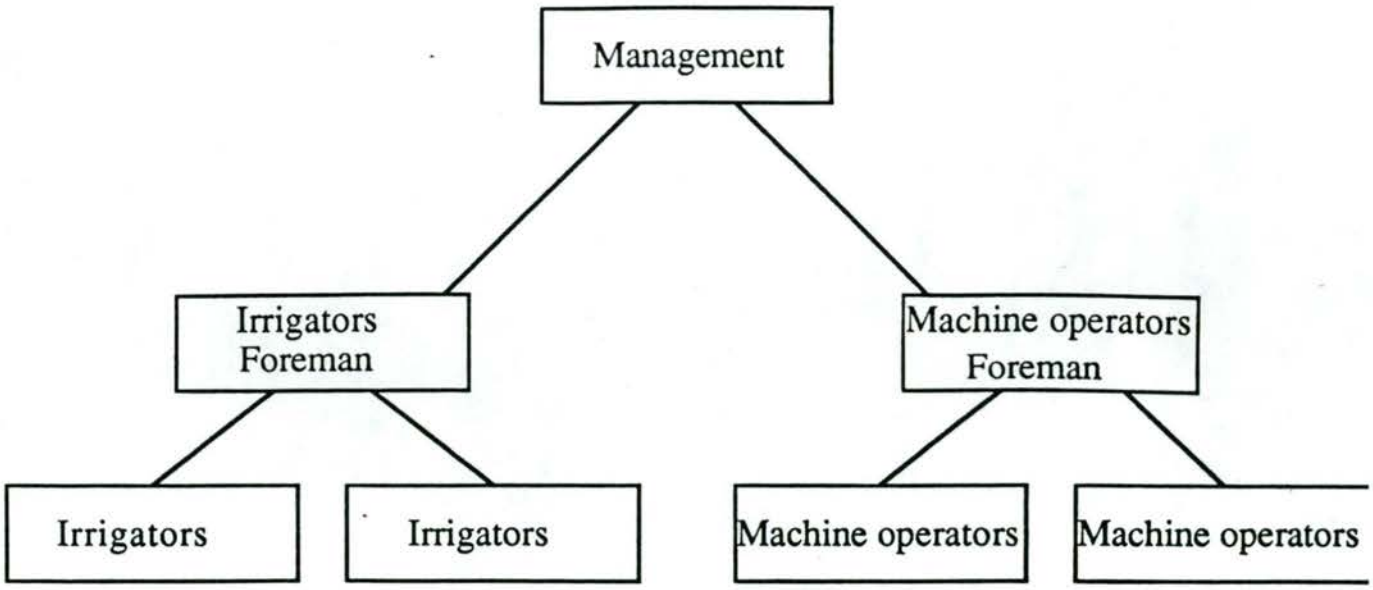

Figure 4: Complex Functional Hierarchy