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SOCIOLOGICAL CONCEPTS AND AGRICULTURAL DEVELOPMENT*

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1. INTRODUCTION

The purpose of this study is to review concepts relevant to the association between Brazilian agricultural development in rural communities and individual farmers. These concepts include two structural variables: community structural differentiation and leadership professionalism. The level of agricultural technology adopted by individual farmers will serve as an index of agricultural development. Hypotheses will be derived from the theory developed as a basis for analysing the problem of the study.

1.1. *The Community*

The concept of community becomes important to this study in that it is the level of investigation for structural variables. Communities are believed to differ in their structural components and are reflective of the level of technological achievement. The more structurally complex communities are believed to have a higher level of use of modern technological than less structurally complex communities.

One of the problems in researching community structure is the determination of community boundaries. T. Lynn SMITH (*3*) believed, however, that the problem of setting boundaries can be reduced. Communities, he explained, can be classified into two basic categories: the «village community» in peasant societies in which limits are obvious to almost anyone, and Galpin's «rural community», described as having a town nucleous plus a tributary zone. The latter can be found in Texas, Georgia, and some portions of Latin America.

WAGLEY (*5*) has suggested that the Brazilian community is amorphous, not easy to define, lacking in *esprit de corps*, and split by division of social class. The Brazilian community takes several different forms throughout the country, he says, but in none of them can it be said to provide a solid grass-roots foundation for the Brazilian national unit. Instead, like regionalism and social class, the Brazilian community promotes divisiveness.

Reviewing the Brazilian rural community spectrum, WAGLEY (*5*) mentioned the *município* as being composed of a village or town and small neighborhoods which are in several ways tributary to the town. Wagley's opinion on the *município* as a community, however, is in agreement with Smith's viewpoint, at least for the state of São Paulo. Other types of communities, according to Wagley, include small groups of farmers, collectors of native products, fishermen,

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and workers of small or medium-size agricultural and pastoral estates, depending on the economic activity of the locality and region.

MEDINA (*2*) has indicated some interesting aspects of the communities of São Paulo. He believes that the most developed São Paulo communities are consolidating into a broader national economic community. Agricultural organizations, including growers of sugar cane, coffee, and cattle, for examples, maintain a direct communication with the Federal Government and foreign agencies and constantly depend on the Federal Government in the shaping of their economic policies. It can be said, that the progressive organization of local communities in São Paulo has been oriented in such a direction that the horizontal axis (locality) becomes increasingly less important while the vertical axis (interest group) increasingly more important.

In this study the Brazilian *município* (county) was used as the working concept for community. This is in keeping with Smith's findings that at least for the state of São Paulo the boundaries of the *municípios* seem to define, fairly well, the limits of the rural towns and surrounding gardens, fields, pastures, woods and meadows which are used for agricultural stockraising and collecting activities and are considered by the local inhabitants as their community.

1.2. *The Leadership Variable*

Viewing the Brazilian situation relative to leadership, local *coronelismo* have been installed throughout the Brazilian country-side since the beginning of the century. *Coronelismo* (*caciquismo* for the rest of Latin America) have been, according to SPICER (*4*), the natural evolution of the Spanish and Portuguese *encomiendas* (royal provision by which the nobles received administrative power over determined land and persons settled in these lands).

After Latin America independence from Spain and Portugal, the *encomienda* system legally disappeared while the *fazenda* system (big plantations) took its place. The *fazendas* which embraced several categories of employees were organized around a central-absolute-paternalistic authority, the *patrão*. When the *fazenda* system after World War I began its slow but steady disintegration, the local *patrão*'s authority went to the local political boss, the *coronel*.

Analyzing the sociological roots of the *patrão-cliente* relationship, WAGLEY (*5*) found that for most Brazilian workers economic security and social well-being flow from the paternalistic structure of the authority system. On the worker's part, the *patrão-cliente* relationship involves a sense of loyalty and respect. GALJART (*1*) believes that there is a Brazilian «*patrão syndrome*» among the lower Brazilian social classes. According to Galjart, this syndrome determines the solidarity among the Brazilian peasants.

The leadership in the developed State of São Paulo presumably will exhibit a trend toward professionalism. It is assumed that professionalism in leadership will bring a new input into the economic development process mix. It is hypothesized accordingly that *the more professional the leadership in the community the higher the level of technological adoption among the farmers of this community.*

1.3. *The Structural Differentiation Variable*

Structural differentiation is defined by YOUNG (*6*) as «the system capacity to process a diversity of information types» or to emphasize the mechanism by which such information is handled. It will express the diversity of meaning areas in a symbolic structure. Young's definition has to be understood in the context of his «symbolic structure» scheme of society. The capacity of the societal structure to survive is determined, according to Young, by its ability to organize information in other symbolic structures. This ability is mostly dependent upon the presence of two other variables: solidarity and relative centrality. Solidarity is understood as the degree of consensus by which the social symbols maintained by the group are organized to convey a focused definition of the situation. Centrality is defined by Young as the degree to which the community has access to information in the larger social system. For the purpose of this study, structural differentiation will be defined as the accounting of social and economic institutions and facilities at the community level. It is considered a reflection of the technological complexity and economic activity of the community. It is hypothesized that *the more structurally differentiated a*

community the higher the level of technological adoption of the farmers in this community.

2. METHODOLOGY

2.1. *Municípios Selected for the Study*

The first stage of the present study was conducted in 1969 by a team of Brazilians from *Escola Superior de Agronomia «Luiz de Queiroz»* (ESALQ) and Americans from Ohio State University (OSU). The Brazilian researchers were interested in observations chosen for the study that would reflect the major agricultural products in the state of São Paulo. The researchers from Ohio State University, on the other hand, wanted farms which exhibited various rates of capital formation and technological development. Based upon these criteria a group of nine *municípios* from the Ribeirão Preto region was chosen. Of the nine, seven were included in the present study. (The two *municípios* excluded from the present study were Sales de Oliveira and Colômbia. They were excluded because only a few farmers were found for tthe sociological re-interview). The seven *municípios* are:

Barretos	Sertãozinho
Guaíra	Pontal
Altinópolis	Batatais
Jardinópolis	

2.2. *The Collection of the Farm Level Data*

In accordance with the requirements for data, three general types of farmers were identified within the region selected: those specializing in 1) ranching, 2) annual crops, and 3) perennial crops. An individual farm was place in one of these categories if more than 50 percent of its land was devoted to that type of farming. The farm owner operator (no renters or share cropper were included in the sample) was subsequently interviewed to determine the extent to which he used modern agricultural technology. The index of technology was based on use of mechanical and chemical technology. It consists of the sum of machine operating costs, custom hire, and depreciation divided by total land used (land under cultivation plus natural pasture, in hectares). It also views the ratio of crop costs (including fertilizer, insecticides and other chemical inputs) to hectares cultivated.

Through *a priori* knowledge it was decided that an economically viable farm unit would be not less than ten hectares. Thus, farms smaller than ten hectares were excluded. Because the number of large farms (3,000 hectares or more) was minimal, these were also excluded from the sampling. Farms in the 10 to 3,000 hectares range represented the type of farming upon which most of the agricultural population were residing and accounted for most of the agricultural production in the state.

It was further felt that the population should be stratified so an adequate number of different size farming operations would be included in the sample. Based on the statistical requirements for subsample size and *a priori* knowledge of farming in the region, three subgroups were purposively chosen:

1) small--10 to 49 hectares;
2) medium--50 to 199 hectares; and
3) large--200 to 3,000 hectares.

2.3. *The Structural Variables*

Structural differentiation and professionalism in leadership are the structural variables chosen for the study. A discussion on each of these variables follows.

Structural Differentiation

This community variable has been measured by the diversity of public facilities in the communities. Facilities were ranked according to a G-scale

(Guttman scale) procedure (Table 1). District towns were also included in the scale in order to observe their structural position in relation to municipal capitals. The city of Ribeirão Preto, cultural and financial center of the region, was also included in the scale. Ribeirão Preto's high level of community differentiation gave a comparison point to other municipal capitals in the study. Thirty-nine public facilities were selected for the scale. From more to less discriminating, those facilities are:

Employment agency
Municipal theater
Specialized clinics
Professional associations
Ethnic associations
Parking garages
Tourist agency
Technical schools
Determined zone of prostitution
Private clinics
Colleges
Night clubs
City bus service
Commercial associations
Bus station
Agricultural cooperatives
Emergency medical care
Tax office
Airport
Local newspaper
Sport stadium
Radio station
Court
Hotels
General hospital
Technological agricultural assistance
Social clubs
Restaurants
Supermarkets
Banks
Secondary schools
Inter-cities bus service
City council
Drug stores
Factory with more than ten workers
Movie halls
Local telephone center
Churches other than Roman Catholic
Child care center.

Professionalism in Leadership

This variable was especially designed to measure the level of professionalism of the local leadership. Personal interviews with the mayors plus conversations with other formal and informal leaders, archivists, and historians were the sources for developing the scale. A G-scale of 24 items was used (Table 2). The items from more to less discriminatory were:

Does the *município* have:
24. A planning municipal office
23. Municipal priorities determined by experts
22. Local organizations consulted before planning
21. A technical committee to assist the mayor
20. Neighboring mayors meetings for regional planning
19. Mayoral political compaign based on a platform
18. High level of communication with federal and state authorities (determined by the yearly number of meetings with federal and state authorities)

TABLE 1 - Guttman Scale of Structural Differentiation. Selected *municípios* of the Ribeirão Preto Region

	Child care center	Churches other than Catholic	Telephone central	Public theaters	Factories (more 10 employees)	Drug stores	City council	Inter city buses	Secondary schools	Banks	Super-markets	Restaurants	Social clubs	Agricultural assistance	Hospitals	Hotels	Court	Radio Station	Newspapers	Sport stadium	Airport	Tax office	Emergency medical service	Cooperatives	Bus station	Commercial associations	Intra city bus service	Night clubs	College or Universities	Private clinics	Inst. place for prostitution	Technical schools	Tourists agency	Parking garage	Ethnic associations	Professional associations	Specialized clinics	Municipal theater	Employment agency	TOTAL
Ribeirão Preto	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	39
Barretos	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	0	0	37
Sertãozinho	∅	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	0	0	0	0	0	0	0	32
Batatais	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	∅	I	I	I	I	I	I	I	I	I	I	I	I	0	0	0	0	I	0	0	0	0	0	31
Guaíra	I	I	I	I	I	I	I	∅	I	I	I	I	I	I	I	I	I	I	∅	I	I	0	0	0	0	0	0	0	0	0	1/	0	0	0	1/	0	0	0	1/	0	21
Jardinópolis	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	∅	I	I	I	I	0	0	0	0	0	0	0	0	0	0	0	1/	0	0	0	0	0	0	0	0	20
Altinópolis	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	0	0	0	0	0	1/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19
Pontal	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	0	0	0	0	1/	1/	1/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19
Colômbia	0	I	I	I	I	I	I	I	0	0	0	0	0	0	0	0	0	0	1/	0	0	I	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Cruz das Posses	I	I	I	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Jurucê	I	∅	1/	0	1/	0	0	0	1/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Cândia	I	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
TOTAL	10	11	11	10	10	09	09	08	06	08	08	08	08	08	08	07	07	06	07	06	06	06	06	06	05	04	04	04	04	04	04	04	03	03	03	02	02	02	01	

Errors = 22
∅ = 7
1/ = 15

Coeficient of scalability = .80
Coeff. of reproductibility= .95

TABLE 2 - Guttman's Scale on Leadership Professionalism. Selected *Municípios* of Ribeiro Preto Region

	Mayor high level of Comm participation	Mayor technocratic orientation	Statistical information available	Municipal jobs given by competence	Mayor participation in local organizations	Mayor full time position	Mayor administrative Experience	Reception desk before mayor's office	High level of voluntary associations	At least a project of outside capital invest.	High public participation in politics	Mayor high level of educ.	Mayor high cosmopolitan orientation	Mayor technically informed	Mayor reached by appointment	Organizational changes under way in the *munic.*	Records kept in organized way	Mayor highly communicative with fed. & state author.	Mayor's political campaign based on platform	Mayor's undergo regional planning	A technical committee assists the mayor	Local organizations consulted before decisions	Priorities determined by experts	Municipal planning office	
Batatais	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	24
Sertãozinho	I	I	I	I	I	I	I	I	I	ø	I	I	I	I	I	I	I	0	0	0	0	0	0	0	16
Guaíra	I	I	I	I	ø	I	I	I	ø	ø	I	I	I	I	0	0	I	0	0	0	0	0	0	0	12
Pontal	I	ø	I	I	I	I	I	ø	I	I	I	0	0	0	0	0	✗	0	✗	0	0	0	0	0	11
Barretos	I	ø	I	ø	ø	I	I	I	I	I	0	0	0	0	0	✗	0	0	0	✗	0	0	0	0	8
Colômbia	I	I	ø	I	I	0	0	0	0	0	✗	0	0	0	0	0	✗	0	0	0	0	0	0	0	6
Jardinópolis	I	I	I	0	0	0	0	0	0	0	0	0	0	0	0	✗	✗	0	0	0	0	0	0	0	5
Altinópolis	I	I	0	✗	0	0	✗	0	0	0	✗	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Cruz das Posses	I	0	0	0	0	0	0	0	0	✗	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Jurucê	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cância	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	10	6	6	5	5	5	5	5	4	3	5	5	3	3	3	2	4	3	2	2	1	1	1	1	

Erros = 21
ø = 10
✗ = 11

Coeficient of scalability = .65
Coeficient of reproductibility = .92

17. Municipal records kept in a systematic way
16. A planned organizational change under way
15. An appointment system to reach the mayor
14. Ways to inform the mayor on municipal problems
13. A mayor with a cosmopolitan orientation (determined by the number of foreign languages spoken by the mayor, his international interests and international travel plans)
12. A mayor with a high level of formal education
11. A high political participation (determined by the percentage of the people who vote in local elections)
10. At least one project to invest outside capital
9. High level of community voluntary associations (determined by the number of voluntary associations in the *município*)
8. A reception desk before the mayor's office
7. A full-time mayor
6. A mayor with a high level of participation in community organizations
5. A mayor with administrative experience
4. A system of job distribution by competence
3. Means to provide statistical information
2. A mayor with technocratic orientation (determined by the number of experts and technical commissions in the *município*)
1. A mayor with a high level of community participation (determined by the number of community activities in which the mayor participated).

The two Guttman scales were carefully designed for the Brazilian situation. In both cases the reliability test was very acceptable: .95 for the structural differentiation scale and .92 for the scale on leadership professionalism. Correlation between the two scales was also high at .76, significant at the .05 level.

3. RESULTS AND DISCUSSION

For purposes of analyzing the data the level of technology of the *municípios* was determined according to the following steps:

1. The farmers' mean levels of technological adoption scores were obtained:
2. A municipal mean of technological adoption scores of the farmers of each *município* was calculated (see Table 3).
3. Similar rankings were made for the two community variables using the results from the Guttman Scalegram Analysis (see Table 4).

Spearman rank-order correlation coefficients were used to identify the strength of association between the rankings of the municipal levels of technology and the other community variables. These correlation coefficients were:

1. Between technology and structural differentiation: — .18, not of statistical significance at the .05 level.
2. Between technology and leadership professionaism: .43, also not significant at the .05 level.

Correlation between technology and community variables was thus not significant at the .05 level and was slighty negative in the case of structural differentiation. The lack of support for the hypotheses however, can be viewed as an indication that the index of technological adoption used might not have been totally appropriate for the analysis of the community level of technology in a heterogeneous farm system. This index differs considerably between «crop farms» and «livestock farms». Communities which combined both crops and livestock operations or had livestock-based enterprises, for example, had lower indices of technological adoption than those based primarily on crops. The breakdown of technology by type of agricultural enterprises provides a confirmation of this finding (see Table 5).

According to Table 5, annual and perennial crop farms have similar technological profiles in the three technology categories: high, moderate, and low. The direction of technological adoption for crop farms goes from an average of 68.3 percent in the high, 24 percent in moderate and 8 percent in low category. Livestock farms, by contrast, go from 18 percent in the high to 41 percent in the moderate and low categories.

TABLE 3 - Rank of selected Brazilian *municípios* on level of agricultural technology

Municípios	Technology rank
Sertãozinho	1
Guaíra	2
Pontal	3
Jardinópolis	4
Batatais	5
Altinópolis	6
Barretos	7

TABLE 4 - Rank of selected Brazilian *municípios* on structural differentiation and leadership

Municípios	Differentiation rank	Leadership rank
Barretos	1	5
Sertãozinho	2	2
Batatais	3	1
Guaíra	4	3
Jardinópolis	5	6
Altinópolis	6	7
Pontal	7	4

The reason that the technological index does not reflect the technological achievement of the livestock farms is probably related to the type of livestock operations of the *municípios*. Livestock farms in the *municípios* under study are «extensive» operations. They use large areas of unimproved pastures. The use of fertilizers and machinery in these operations is limited or nonexistent. This reduces the level of technology, especially when livestock operations are present in considerable numbers. In order to obtain comparable results on community technological development the data were re-analyzed excluding livestock operations. The *município* of Barretos, with 67 percent of its farms devoted to livestock operations, was consequently excluded from the analysis.

Technology and Community Variables (Livestock Operations Excluded)

A new rank of municipal technology was determined by the following

TABLE 5 - Percentages of Level of Agricultural Technology by Type of Agricultural Enterprises on Respondents' Farms

Agricultural enterprises	Level of agricultural technology			
	high percentage	moderate percentage	low percentage	frequencies
Annual crops	68.5	23.9	7.5	146
Perennial crops	68.2	23.2	8.6	69
Livestock operations	18.0	41.0	41.0	97
Number of observations	164	91	57	312

$X^2 = 80.957$

Significant at .01 level.

procedure:

1. The levels of technological adoption for annual crop and perenial crop farmers were obtained.
2. A municipal mean of technological adoption scores of the farmers of each *município* was calculated.
3. Using the farmers' mean technological adoption scores the *municípios* were ranked for technology (see Table 6).

The Spearman rank-order correlation coefficients for community technology scores and structural variables were:

1. For technology and structural differentiation .66, not significant at the .05 level.
2. For technology and leadership professionalism .78, significant at the .05 level.

By excluding livestock operations from the analysis the direction and strength of the association between technology and structural differentiation is now positive. Secondly, the association between technology and leadership professionalism went from .43 to .78.

TABLE 6 - Rank of selected Brazilian *municípios* on level of agricultural technology, livestock excluded

	Technology rank
Municípios	
Guaíra	1
Sertãozinho	2
Batatais	3
Pontal	4
Jardinópolis	5
Altinópolis	6

4. SUMMARY

The study attempted to identify the association between the adoption of modern agricultural technology and two structural variables, community structural differentiation and the professionalism of leadership. A purposive stratified sample of farm owners in São Paulo provided data for the index of agricultural technology being used.

Preliminary analysis failed to identify any statistically significant association between the variables examined. By analyzing the farmers separately — by the types of enterprises they had, however, significant association was identified. The professionalism of leadership was found to be positively related to the use of modern technology among crop farmers. Livestock farmers, who use minimal amounts of modern technology, were not significantly associated with this trend. From the present analysis no evidence was found that would associate community structural differentiation with the use of modern agricultural technology by the community members involved in farming.

5. RESUMO

O presente estudo analisa a associação entre o nível de tecnologia agrícola e

as variáveis estruturais, diferenciação estrutural e profissionalismo da liderança local.

Usou-se a análise de correlação adaptada a variáveis comunitárias (Rank order correlation coefficient) e observou-se que a variável nível tecnológico não se associou significativamente a nenhuma das variáveis estruturais. O fato de terem os municípios estudados explorações agrícolas diferentes foi considerado uma possível razão para a não associação entre as variáveis.

A exclusão, na análise, do município com exploração pecuária homogeneizou os dados, pois ficaram somente os municípios com explorações agrícolas. Desta vez, a análise reforçou a associação entre o nível tecnológico e a diferenciação estrutural e manifestou significância, ao nível de 5 por cento, entre tecnologia e profissionalismo da liderança. A diferenciação estrutural, porém, não se associou significativamente com o nível tecnológico do município.

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