Systems of Production and Production of Knowledge:
Reflections on the Basis of Ivorian and Mexican Experiences

Jean-Philippe Colin [1]

ABSTRACT

This paper discusses the links–so important in farming systems analysis–between the type of data collection techniques used and the type of knowledge produced, in terms of causal explanation. The major point argued in the paper is that if one aims to understand and explain farmers' socioeconomic and technical practices, rapid information collection with low personal involvement of the researcher may not be the best suited methodology. This point is illustrated through two research experiences: an in-depth study of a village economy in Lower Ivory Coast, and a study based on a classic questionnaire survey in various Mexican villages.

INTRODUCTION

The concept of production system, whatever its meaning, is an intellectual construction intended to facilitate the perception and the interpretation of the real world. This perception and interpretation requires the "operationalization" of the concept, the implementation of a whole set of information collection techniques, to provide an empirical content. A fundamental point, then, is to recognize that strong bonds link the type of data collection technique used and the kind of knowledge produced.

This article provides an illustration of this point through considering the methodology of two research experiences: the first in the Ivory Coast between 1983 and 1985 (Colin, 1990), the second in Mexico in 1990-91 (Colin, 1992). These research programs were both based on the economic analysis of agricultural production system (APS); however, they used very different data collection techniques. The first was an in-depth study of a village economy in Lower Ivory Coast; the second was a study based on a classic questionnaire survey in various Mexican villages.

1 Agricultural economist with the ORSTOM (French Scientific Research Institute for Development through Cooperation), Visiting Professor with the Colegio de Postgraduados Sistemas de Producción y Desarrollo Agrícola (Texcoco, Mexico). I would like to thank Eric Crawford, from Michigan State University, for his comments on a first draft of this paper. I remain responsible for its imperfections.

I will not present here the APS concept (see Badouin, 1987); rather, I will liken the APS with what would be an economic understanding of the farming system, emphasizing three points:

1. Research on "farming systems" or "production systems" (in a generic sense) is usually likened to "Farming Systems Research" (FSR);[2] however, it is important not to confuse them (Crawford, 1981). The main differences between FSR and Agricultural Production Systems Research (APSR) are the following:

- FSR involves an interdisciplinary approach, whereas APSR is explicitly an economic research program.
- FSR is explicitly problem-solving research; its objective is the generation and dissemination of relevant technologies through on-farm research[3] –even if, according to Tripp et al. (1990), the principal contribution of FSR has more to do with methodological improvement than technology development. APSR does not have this aim. I would have called it subject matter research (SMR), but according to Johnson's definition (1986), SMR must be multidisciplinary, and this is not the case. We sometimes make the distinction, in France, between cognitive research (*recherche cognitive*), aimed at understanding a given subject without any explicit orientation toward action to change the situation under study, and problem-solving research (*recherche-action*); APSR as presented here would be labeled as cognitive research.
- The scope of FSR is limited–in practice more than discourse, showing what Baker (1991) describes, from an economic viewpoint, as an overinvestment in technology production, with little interest in improved institutional performance, or in feedback relating to the effects of policies and development programs on producers. As defined, the scope of APSR is broader as far as socioeconomic issues, and much more limited regarding technological issues.
- FSR stresses quick data collection, such as rapid rural appraisal, whereas APSR, even if better implemented with more data collection, does not set up any prescription regarding fieldwork techniques.

These differences do not preclude similarities such as a same-system orientation (which does not mean a real "system science" perspective), on-farm research, the recognition of farmers' goals and the relationships between human and technical factors, and the recognition of local specificity and heterogeneity.

2 On FSR methodology, I rely on Dillon (1976), Gilbert et al. (1980), Norman (1980), Crawford (1981), CIMMYT Economics Staff (1984), Maxwell (1986), Collinson (1987), Byerlee and Tripp (1988), Tripp et al. (1990), Worman et al. (1990), Baker (1991), and Crawford and Baker (1992). See Portères (1950) for a precursory analysis of the logic of African traditional farming systems and sustainability, in terms of systemic relationships.

3 The systematic parallel drawn between on-farm research and FSR may be questioned. See Sébillotte (1974, 1987) for an excellent epistemological analysis of on-farm research as an essential component of fundamental agronomy.

2. The APS includes explicitly, as a principle point of analysis, the social organization of production–that is, the way in which production units function: internal decision structure (who decides what?), conditions of access to productive resources (land tenure system, labor relationships, etc.), and relationships between the farm and its economic environment (parastatals, cooperatives, markets, etc.).

- The economic approach followed here is close to the American "Old Institutionalist" stream (Colin and Losch, 1992). Research is not restricted to the analysis of resource allocation but rather considers the social conditions of access to resources. The economic calculation in terms of production costs and factor productivity is set within the institutional context that gives it its meaning. The economic calculation is not in itself the purpose of the research but serves as an explanatory element of peasant practices and economic dynamics, in addition to other factors. The analysis must include a diachronic and spatial dimension, necessary for shedding light on the present conditions of access to resources and, more generally, the ambient economic system. The processes of economic differentiation are stressed; rural society is considered neither stable nor homogeneous. This heterogeneity proves to be a determining factor for the understanding of the diversity of peasant practices, even at local or regional levels. Starting with empirical questions, the research has to provide a framework for the understanding of a specific, localized reality. This viewpoint tends to distend the connection with established theoretical bodies and with a "hard" disciplinary approach.

In the first part of the paper, I sketch a link between fieldwork and explanations. In the second part, I illustrate this point through the presentation of two research experiences. In the Ivory Coast, it was possible to give causal explanations of the dynamics of the agricultural production systems. In Mexico, the APS were roughly described and some typologies and correlations produced, but what I would consider satisfactory explanatory models were not reached. The focus is on the objective of each program and the fieldwork techniques used. For further information regarding the differences in the types of knowledge produced, see Colin, 1992.

PRODUCTION OF KNOWLEDGE AND DATA COLLECTION SYSTEM

Regarding Explanation

The deductive-nomological model of explanation proposed by Hempel and Oppenheim (1948) is generally considered as the model of scientific explanation. It defines a valid explanation as composed of two parts, an explanandum (description of the event to be explained) and an *explanans* (including a list of antecedent conditions and general laws), the former being a logical conse-

quence of the latter. However, it is sometimes objected that this model of explanation is too restrictive, especially in the social sciences, in which other models may be more appropriate (Piaget, 1970; Grawitz, 1981; Caldwell 1982): historical explanation (stressing the singularity of a historical cause); genetic explanation (looking for the conditions for the occurrence of the events); or motivational or functional telcological explanations (explanation by reference to ends or purposes). The specificity of causality in social sciences is underlined by Grawitz (1981): the purpose of the analysis is less to find *the* generating fact than to discover the dynamics of interdependent facts. Another specificity of the analysis of human behavior is that we have to understand the motivations and reasons that induced the actors' decisions; this Weberian *Verstehen* implies the understanding of the (subjective) meaning of the actions from the actor's viewpoint (Aron, 1967).

Another model of explanation, the pattern model–considered the typical institutionalist mode of explanation (Wilber and Harrison, 1978; Ramstad, 1986)–describes quite well the kind of procedure followed in the Ivory Coast. I will follow Diesing (1971:142-167) in his description of the steps leading to the construciton of such a model. Prior to fieldwork, the researcher builds a checklist of "things to look for" on the basis of theoretical issues of empirical questions. The first step consists in the socialization of the researcher-participant observers, which allows them to be impressed by recurrent themes. The next step is to interpret these themes, looking for their significance. These interpretations are tested through contextual validation[4] by cross-checking several types of evidence (e.g., data obtained through informant statements, documents, observation, etc.). The final step is to build the model by connecting the themes in a network or pattern. Themes and the linkages between them are thus explained by specifying their place in the pattern.

Diesing underlines some major differences between the pattern model of explanation and the deductive model. In the deductive model, the anplanas is always a general law; in the pattern model, both the explanandum and the explanans are specific to the system studies, without reference to a general law. The symetry between prediction and explanation, so crucial in the deductive model, does not appear in the pattern model. Finally, a pattern model can never be considered as complete and definitive, due to information constraints and also because human systems are always changing.

Fieldwork and Explanation

It is my view that the main aim of APSR is not to put forward a general theory or to embellish an existing theoretical edifice, but rather to provide explicative models that are valid locally–that is, partial (as opposed to general) theories.[5]

4 As Wilber and Harrison point out, "this technique of contextual validation can never produce the rigorous certainty espoused by logical positivists; it can only indicate varying degrees of plausibility" (1987:76).

5 In short, as a sociologist, I favor Weber over Durkheim.

These theories–which always remain conjectural (Popper, 1990)–can be built through a combination of historical, genetic, teleological, pattern model, or even deductive-nomological modes of explanation. But the main point is that constructing these locally valid models requires immersion in the local reality in order to gain a many-sided perception of the rural society and accumulate knowledge that is specific to that society. As Ramstad stated (1986:1075),

> ... one needs a theory capable of saying a great deal about a few cases, rather than very little about all cases . . . to develop 'practitioner's knowledge', that is, knowledge directed to the understanding and control of the specific case. This is in sharp contrast to the formalist's preoccupations with the development of knowledge applicable to aggregates even if it is of limited applicability to individual cases.

This practitioner's knowledge has to be soundly grounded in a researcher's personal field experience.

Couty (1991:4) observes that "in social sciences, experience requires personal, sincere and durable involvement in the historicity and singularity of the situation under study. Without this we are threatened by mathematical formalization or by verbiage, whichever one likes." We pointed out elsewhere (Colin and Losch, 1992) how direct implication of the researcher in information gathering has epistemological effects. The nearness of the realities of the field (which are not given, but must be constructed from a paradigmatic framework) in all their complexity makes one sensitive to the interrelations between the economic, technical, and social dimensions of the problems. Awareness of local is an excellent antidote against the reductive oversimplifications of the great theoretical constructions with universal claim, especially when the purpose is to understand peasant practices in a specific environment. This tradition also allows one not to sink in what Hirschman calls the syndrome of the economist on an assignment: "(the) habit of giving peremptory opinions and prescriptions while invoking economic principles and remedies of universal values . . . after having barely got to know the 'patient'" (1984:76).

I disagree with Heady's (1952) description of information collection as simple routine. Instead, I see this phase as a determining component of research justifying on-site investment of the researcher, even with a PhD. Here I join Parsons, an institutional economist who, writing as early as 1949, stressed that data collection constitutes an integral part of research–and one of the most difficult.

In FSR methodology, the main researcher's direct participation in data collection is generally limited to "sondeos," or "exploratory surveys." The job has to be done quickly–"Social science research methods need to be flexible, relatively simple, well focused and rapid"–as opposed to the use of "long and tedious baseline questionnaires to obtain information about all aspects of the system" (Byerlee and Tripp 1988:147). However, the question remains as to whether these are the terms of the alternative; has the well-founded rejection of long and tedious questionnaires led systematically and normatively to rapid

rural appraisal? Defining the purpose of information collection is essential to answering this question. I feel strongly that if one aims to understand and explain farmers' socioeconomic and technical practices, rapid information collection with a low researcher involvement may not be the best methodology.

An implicit assumption of FSR methodology is that it is possible to define the problems and discover their causes through rapid data collection. This may sometimes be the case, but is surely not *always* true–especially regarding socioeconomic issues. In FSR, as Baker remarked (1991:46), data quality is often

> pragmatically sacrificed in favour of quickly obtaining results. Unfortunately, in many cases, "time- and cost-efficient" methods were not actually so efficient since inadequate understanding was generated on the important factors influencing farmer behaviour and farming systems performance.

The risks of misunderstanding farmers' socioeconomic and technical practices and environment are real. Let me give just four illustrations.

- Motivational explanation may encourage an easy construction of *ex-post facto* accounts. The lower the researcher's personal first-hand knowledge of the local society, the higher the risk.
- As emphasized by Malinovski in anthropology (quoted by Salamone, 1979), or more recently by Milleville (1987) in agronomy, what people say about what they do has to be distinguished from what they actually do. In order to distinguish between the norm and the practice, it is questionable whether rapid information collection is the most appropriate field technique.
- In some contexts, the definition of socioeconomic categories such as production, consumption, residence, and accumulation groups (Gastellu, 1980) may need some time.
- If the analysis is too superficial, the theoretical and practical risk of causal explanation is to over-reduce the conditions (causes) of what has to be explained. Using the deductive-nomological model form, "if $L_1, L_2, \ldots L_n$, and if $C_1, C_2, \ldots C_n$, then E",[6] the risk is to put forward "if C_1, then E," where it would have been necessary to write "if $C_1, C_2, \ldots C_n$, and especially C_1, then E" (Mingat et al., 1985). One way to limit this risk is to develop models of explanation that are as complete as possible–that is to say, to have the best possible understanding of the situation under study.

This brings up to the key question of how far one has to go in empirical observation to avoid these pitfalls. Or, to put it differently, how can we know that we have reached a satisfactory explanation? It is always possible to build a coherent explanatory model, whatever our knowledge of the situation–even if it remains very superficial. But it is also possible to progress toward more satisfactory (complete) explanations–under the stimulus of better empirical knowledge, and under the pressure of external criticism. Unfortunately, in our

6 With L for law, C for conditions (*explanans*), and E for what has to be explained (*explanandum*).

field of study characterized by locally specific research, little can be expected from peers' criticisms when the researcher handles (consciously or not) the art of rhetoric, except when those peers have sufficient knowledge of the situation under study to question a weak but coherent explanation.

Thus our question remains unanswered, for there are no norms, no recipes allowing one to define *ex ante* or to evaluate *ex post* the appropriateness of a researcher's fieldwork investment–apart from an *ex post* subjective evaluation of the researcher him/herself. On the basis of the two research experiences related in this paper, I feel that I succeeded at least partially in building explanatory (qualitative) models in the Ivorian case, and that I would have failed in the Mexican case had this been the purpose of the research.

The origin of this difference in the type of knowledge produced using the same conceptual framework can be traced to differences in the objectives of the research programs, and in the way the fieldwork was conceived and organized. Let me turn now to the presentation of the two research experiences to illustrate this point in concrete terms.

FROM INTENSIVE TO EXTENSIVE INFORMATION COLLECTION METHODS

The Place of APS Analysis in the Research Programs

In the Ivory Coast, research was concerned with the dynamics of a smallholder plantation economy. This economy can be characterized by land abundance, labor scarcity, and extensive coffee and cocoa production. Two dominant factors of change act upon this model: an increasing land shortage and, mainly in the Lower Coast, diversification of farming systems led by agroindustrial parastatals that are developing smallholder contractual farming. Understanding the evolution of the peasant plantation economy in this new and relatively specific context was the purpose of the study. Two fundamentally related topics were addressed by the research: (1) the sources and features of technical and institutional changes, and their incidence on the plantation economy; and (2) the production strategies adopted by farmers, according to their different opportunities, resource availabilities, and objectives. The research required a holistic, empirical analysis encompassing cropping systems (food and cash crop relations, place of new crops), input combinations (toward intensification), and the social organization of production (evolution of the land tenure system, evolution of labor relationships, analysis of peasants-parastatals relations).

In Mexico, the analysis of the agricultural production systems was only the first stage of an economic program that was itself part of a multidisciplinary study of the production and commercialization of potatoes in the central area of the country. This diagnostic (not problem solving) study was initiated at the

request of the Veracruz State authorities, who were facing an agricultural crisis in the Sierra (Cofre de Perote region). The crisis was linked to agroecological and economic problems facing potato production–a near monoculture in this region. An agronomic program was concerned with the study of potato yield and producers' technical practices. The economic program, implemented by four researchers, had various components beyond the conception of the APS research: the study of sharecropping systems, the labor market, and the potato subsector. The author of this paper had responsibility for the APS analysis and for the study of sharecropping. The purpose of the APS study was to draw a general picture of the socioeconomics of potato production in the area delimited by the Pico de Orizaba (Puebla State) and the Cofre de Perote (Veracruz State). This was done to provide an overview for the other components of the research program, and to prepare the analysis of the sharecropping system.

The features of potato production (a cash crop with great price variations and high production costs), the economic context (breaking-down of the prices since 1989, bank credit rationing), and the socioeconomic production (differentiated production structures) led to the following questions: Is there an economic efficiency difference between small- and large-scale farmers, between *ejidatarios* and *pequeños proprietarios*,[7] between the *Sierra* (mountains) and the *Altiplano* (mountain plateau)? What is the impact of the potato price crisis, and what are farmers' reactions?

The two APS studies differed in the following ways:

- In the Ivory Coast, the economic APS study was the objective of the research, conducted by only one economist. In Mexico, the purpose was to draw a panorama, a context in which to situate other economic or agronomic studies; in other words, the research served as a simple component of broader multidisciplinary research.
- In the Ivory Coast, the approach was open to all the diversity of agricultural production systems at a local level. In Mexico, it was restricted, focusing on a specific crop. Because potato production was almost the only enterprise on the farms studies, the "system" perspective came mainly from the analysis of farm and off-farm activities.

Thus the researcher's direct participation in data gathering, the length of the data collection stage, the complexity of the information collection system, and the quality of the data were intensive in Ivory Coast and extensive in Mexico.[8]

7 *Ejidatarios* are producers who own land in common; *pequeños proprietarios* are smallholders who own their own land.

8 For analysis of data collection methodology, see the abundant literature produced by the AMIRA group (Improvement of investigation methods in African rural areas), e.g., Couty and Winter (1983). The AMIRA network has played a driving role in producing and publishing documents on as varied themes as the comparison of random and non-random sampling, the connection between the qualitative and the quantitative, the complementary of statistical survey and monographic studies, the definition of economic units, and the problem of scale of analysis.

From the Researcher-Observer to the Researcher-Supervisor

In the three-year research project in the Ivory Coast,[9] the researcher was a constant presence in the field and participated directly in the information collection, with the help of one permanent high-school level enumerator, and temporarily with a team of topographers. In Mexico, the information collection stage for the APS study was limited to five months, and largely delegated to enumerators (four agronomists and two graduates in history and geography). In the Ivory Coast, the researcher used data collection techniques close to the fieldwork tradition of anthropologists–but common in the practice of French Africanist rural economics (see Colin and Losch, 1992). In Mexico, he took care of research design, logistics, and data analysis, but had little direct involvement in data gathering.

From a Simple Village Study to a Multi-Localized Survey

An essential difference between the two programs came from the choice of a single-site study in the Ivory Coast (mainly a single village) and multi-localized sites in Mexico.

In the Ivory Coast, the research was an in-depth analysis of the economy of agricultural production at the level of a Lower Coast village (Djimini-Koffikro, in Adiaké *sous-préfecture*). Study of a simple village afforded various advantages. The village is often an optimal level at which to observe the relationships between production units, and the diversity of producers' constraints, strategies, and practices. Here it was considered a life-size laboratory in which to observe changes in the plantation economy. Another advantage was that the crosschecks permitted by the researcher's immersion in everyday village life greatly improved the quality of data.

In Mexico, the APS analysis had to be carried out quickly and it had to ensure a regional perspective. For these reasons, the study was conceived as a classical questionnaire survey, with the collection of information on a sample of production units in various villages.

The Question of Representativeness

In neither case were sample sites chosen at random. This choice merits some discussion.

The major criticism of approach chosen in the Ivory Coast is the lack of representativeness of a village study, and consequently the impossibility of inferring rigorously from the conclusions. But first, let us recall that orthodox statistical approaches may and often do hide, by the "scientificity" of the figures, the fundamental problem of the quality of field data on which analysis is based.[10] Furthermore, there is a significant risk of reductionism, as these

9 Followed by one year in France to complete data analysis and write the report.

10 As stated Salamone (1979:57), "I argue that no matter how sophisticated are methodological analyses or how elegant our theory construction, if our primary data-gathering techniques are faulty, then our theories and methodologies will be but elegant exercises in futility."

approaches presuppose the collection of information on the basis of a conceptual framework that may not reflect the complexity of the real world. However, the lack of representativeness criticism is well-founded if the study pretends to build a general model of refined applicability. Such was not the case in the Ivory Coast research experience. The village was conducted was not intended to be representative of the villages in the area. Djimini-Koffikro was deliberately chosen for its specific characteristics of land shortage, and its wide range of cropping opportunities related to the simultaneous intervention of several parastatals. These features, especially the presence of cropping opportunities, were expected to give rise to a range of production strategies and behavioral patterns. Our objective was to build models of behavior of production units taken from a life-size laboratory, which under the same economic and institutional context faced different constraints in land, labor, etc.

Data was gathered for some variables in all the farms of the village, or in the farms for which the variable under study had meaning, and for other variables the information was collected through purposive sampling (informal quota method).[11] Complementary surveys were carried out in four other villages, all farmers being interviewed, to test whether the behavioral models identified in Djimini-Koffikro could adequately explain the strategies adopted by farmers operating under different circumstances. These villages were chosen from the same region to be as different as possible from Djimini-Koffikro, on the basis of two variables, easily discernible in a pre-survey: the type of tree crops planted, and ethnic composition of the village.

In the Mexican case, the village was chosen as the first sampling unit, on the hypothesis of the existence of a village specificity regarding potato production and marketing conditions–the existence of this village-effect was, in fact, proven by the investigation. After a pre-survey (visit to all villages, and collection of data regarding the number of potato growers and potato cropping cycles), the villages were chosen on the basis of their location (distribution along the *Sierra*, and between *Sierra* and *Altiplano*) and the number of producers, in order to include systematically the most important centers of the potato production zone.

Contrary to the initial plan, the farms to be surveyed in each village were not chosen from probability sampling; first, because of the lack of sampling frame and the unfeasibility of constructing one for what was primarily an exploratory survey–some of the villages having around 500 production units; second, because of a serious reluctance of the producers to participate in surveys. This reluctance comes, on the one hand, from governmental taxation and mandatory permits to grow potatoes and, on the other, from the lack of understanding of a study that did not pretend to benefit the interviewed farmers directly. Proceeding with a random sample would have required a great deal of time spent in explanations to producers as to why they were registered on a list, and how their names were chosen. An agreement dragged from them would not have guaranteed a true willingness to participate, and the risk of getting voluntarily-biased information was too high. Therefore, interviews were first focused on the volunteers who registered themselves after the meetings that were organized in each village to explain the research. Then, to eliminate major selection biases, we sought to cover the complete range of intra-village variations in terms of acreage under potato, through an informal quota sampling. We tried to interview the largeholders systematically; because they were rarely present at the meetings, they required a researcher's specific "diplomatic investment." As recognized in a FSR handbook, "Ideally, stratified sampling probably would be best. (But) practical realities make compromises necessary" (Worman et al., 1990:139).

The position advocated here is that, in studies of production economics in LDC, rigor does not always consist in using formal random sampling procedures, with biased sample frames and answers–generally detected by the researcher but overshadowed in the final report. It consists of recognizing the almost impossibility of using such a tool in some situations, and trying to put as much rigor as possible in more "informal" sampling techniques–knowing that this choice would certainly upset the supporters of "scientific" formalism and will not permit the publication of the study's results from most academic journals.

[11] Purposive sampling is a method inn which the selection of the units to be surveyed is subject to consious purpose. The informal quota method is an informal method involving non-probability sampling (e.g., a procedure of selection of the units which does not allow th euse of sampling theory and the estimation of the sampling error. Quota refers to the non-probability selection of produciton units, aiming to include a given number of units belonging to specific groups of farmers (i.e., the sample was realized after the construction of a qualitative typology of production units, and on the basis of this typology). See Casley and Kumar, 1988.

From Complex to Simple Data Collection Systems

In the Ivorian case, different data collection systems (DCS) were used in Djimini-Koffikro and in the other villages. In Djimini, the collection of information was based on a mixture of various techniques, from qualitative to structured surveys; in the other villages, a simple, one-shot, formal questionnaire survey was administered. In Djimini-Koffikro, the topic of the study required the collection of two kinds of information:

- Historical information sketching the history of migrations, the first land occupation and exploitation, land tenure system changes, etc. This information was collected through topic-focused interviews with old farmers because the use of the colonial archives turned out to be disappointing.
- Information regarding the current context and conditions of agricultural production. In addition to direct observation allowed by the researcher's lengthy stay in the village, the collection of this data required three techniques: (1) qualitative interviews; (2) topic-focused interviews to grasp, in rather qualitative terms, the logic of the functioning of the agricultural production systems; and (3) measurements and questionnaire surveys to systematize the data collection and, when necessary, to quantify them.

The basic DCS framework was provided by an initial agricultural and demographic census, by the measurement and mapping of the plots of all the village farms (as there was no previous cadastral survey),[12] and a weekly 34-farm sample survey over a one-year period. Furthermore, a set of specific topic semistructured or structured surveys included a review of land transactions since the end of the pioneer era for all land owned by farmers in the village, off-farm activities, migration itineraries, labor requirements per hectare for each crop, crop yield measurements, production strategies, labor availabilities, agricultural product sales for all farms not sampled for the weekly survey, technoeconomic analyses of local processing activities, etc. (see Colin, 1990).

Thus the information was collected at various levels, according to the variables under study:

- *All 180 production units of the village.* Basic history of the farm; land tenure; area of cultivated crops; agricultural product sales (excluding market gardening); cash-crop yields (estimated on the basis of product sales, assuming no or insignificant autoconsumption); quantitative analysis of permanent labor force availabilities; qualitative analysis of temporary labor force employed; and one year agricultural net income (excluding temporarily hired labor cost and market gardening income).
- *34-farm sample* (weekly-visit survey). Quantitative analysis of labor use and social division of labor; quantification of market gardening; off-farm income; and budget data.
- *Ad hoc samples.* Food-crop yields; labor requirements per hectare, processing activities, etc.

The frequency of information collection varied according to the variables: single-visit surveys to grasp structural data; multiple-visit surveys to establish flows of labor, products, and money. Multiple-visit surveys included the weekly visit of the 34-farm sample, as *ad hoc* visit surveys; for example, the collection of marketing information was organized for each of the 180 farms on the basis of the anticipated harvesting time calendar, specific for each plot for those crops (as cassava) that did not present a common cropping cycle (planted and harvested all year long). Therefore, the combination of techniques used during the study of this village economy borrowed various types of data collection techniques, from qualitative surveys to structured questionnaires, and from micro-approaches (in-depth study on a limited sample) to macro-approaches (collection of rough quantitative or qualitative data on a large number of production units).

In the four other villages to which the research was later extended, a single-visit questionnaire–built on the basis of the knowledge produced by the former baseline study–was administered to all farms in each village (128 production units in total), without plot measurement or direct observations. Information was collected on variables such as farm structure, historical processes (migrations or evolution of access to land), and behavioral variables (such as the determinants of crop choices).

12To obtain reliable data on land availability and use, and to provide a solid baseline for future studies of the evolution of this village economy.

In Mexico, the DCS was a single-visit questionnaire survey of a 245-farm sample selected from seven villages. Information was collected on: (1) farm structure (area owned and cultivated, land tenure system, crops cultivated, permanent labor force availabilities, machinery, and agricultural financing); and (2) potato production (recent evolution of acreage, and for each plot sown in 1990: variety, cropping cycle, production, and sales). Detailed production and marketing costs for 1990 were also collected for one potato plot per farm.[13] Because producers' estimates of acreage were not reliable, we planned to measure the plots to improve the quality of the quantitative economic analysis; however, it was possible to realize this time-consuming measurement for all farms. A general questionnaire was also filled out for each village, during interviews with key informants, to collect historical information regarding the village, potato production and marketing, land access, etc.

A common weakness of both the Ivorian and Mexican programs has to be stressed: over-investment during what was initially devised as only the first stage of the research. In the Ivory Coast, extension of the research to other villages was excessively subordinate, in comparison with the simple village study, and should have received a more significant time investment. In Mexico, what was planned initially as a rapid baseline survey turned into a rather heavy study, requiring major fieldwork and data analysis that was probably not justified by the quality of the data. Thus between these two remote poles of the methodological continent, the equilibrium point is still to be found–assuming it exists.

The Search for Data Quality: From Purism to Compromise

The differences in DCS led to differences in data quality between the two research programs. In the Ivory Coast, the DCS monographic stage involved a search for information as reliable and precise as possible. This search used a set of measurements (acreage, yields), the duration and localized character of the information collection (allowing acquaintance with farmers, progressive rectification of errors in structural data, crosschecks of the information), the multiple-visit system for flows-information collection, and the researcher's existing contextual knowledge.

In the Mexican experience, the objectives and conditions of the APS study precluded such data quality. However, the intent of some elements of the DCS was to limit the risk of collecting excessively questionable information: the selection of highly qualified enumerators; the one-month stay of the enumerators in each village, which offered the possibility of building up confidence relationships with farmers and the progressive subjective evaluation of the quality of data collected; and the fact that questionnaires were filled out only

13Using only 159 of the 245 questionnaires, after eliminating questionnaires of doubtful reliability or, more frequently, presenting incomplete information.

with volunteers. The decision to measure one plot per farm to provide a sound basis for quantitative economic analysis is an example of excessive concern for data quality. Seen *a posteriori*, the decision was not justified for this study, the other data remaining of a relatively rough quality. However, even these attempts to reduce the risk of collecting low-quality information were not sufficient to overcome the limits on information collected through a single-visit questionnaire survey.

CONCLUSION

This account of the two research methodologies provides an opportunity to examine the kind of knowledge produced by each. Of course, the objective of the research can never be forgotten.

The method followed in the Mexican research program is probably well justified if the research aims at sketching the main structural characteristics of a given situation, or answering a few simple questions on the basis of an already available database. This kind of knowledge is no doubt useful, but will provide less an *explanation* of a situation than a set of correlations.[14]

If, however, the objective is to understand peasant decision-making and its institutional setting, to go beyond the '*what* they are doing' to reach the '*why* they are doing it', to build explanatory models, then such a method is inadequate. It constitutes only a pre-survey– the first stage of research that has to be followed by a personal field-investment of the researcher (without spending necessarily three years!). To take a concrete example, the first insights for the analysis of sharecropping systems in potato production, in the Mexican case, came from the APS analysis, but subsequently required specific fieldwork carried out directly by the researcher and a graduate student who lived for several months in two villages.

Ultimately, the problem does not lie in the choice of method, but in the purpose of its use, the bias–is it exceptional in the vast field of farming systems research?–occurring when one pretends to complete the second type of objective using the first type of method.

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Evolving Crop-Livestock Farming Systems in the Humid Zone of West Africa: Potential and Research Needs [1]

M.A. Jabbar [2]

INTRODUCTION

Livestock is an integral part of the economies of most Sub-Saharan African countries. For the region as a whole, livestock constituted eight percent of total Gross Domestic Product (GDP) and 25 percent of agricultural GDP in 1988. If the values of intermediate products such as traction and manure were included, livestock's share of agricultural GDP might be as high as 35 percent (ILCA, 1987; Winrock, 1992).

The incidence, functions, and relative importance of different types of livestock vary across countries and agroecological zones. The main focus of this paper is the humid zone consisting of rain forests and derived savannas located mainly in Central and West Africa. The purpose is to assess the status and potential of livestock development in the zone and determine research needs and priorities.

PREVALENCE OF LIVESTOCK IN THE HUMID ZONE

The incidence of tsetse flies and trypanosomiasis has been the single most important determinant of the distribution of livestock across ecological zones. The humid zone has generally been considered unsuitable for livestock production due to high tsetse-fly infestation (Stenning, 1959). However, transhumant pastoralists from the semi-arid and sub-humid zones visit the derived savannas during the dry season, when the tsetse challenge is reduced, in search of feed and water. In fact, transhumant pastoralism made cattle production viable in the given ecological stratification in West Africa.

Where the tsetse challenge allowed and/or where an acceptable degree of tolerance developed in the livestock, there has been a tendency among pastoralists to remain in the more humid areas. Over a long period, this process has led to a degree of adaptation, facilitating permanent exposure of livestock to light tsetse challenge (Ford, 1971; Fricke, 1979). There are also breeds of cattle, goats, and sheep that have developed trypanotolerance through long

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2 International Livestock Centre for Africa, Humid Zone Programme, PMB 5320, Ibadan, Nigeria.

Erratum

Page 31, footnote 1, read "Colegio de Postgraduados en Ciencias Agrícolas (Texcoco, Mexico)".

Page 33, 3rd paragraph, last sentence, read "Because of space constraints, I will not present as such these differences in the type of knowledge produced (see Colin 1990 and 1992), but will concentrate rather on the objectives of each program and on the fieldwork techniques used" instead of "The focus here ... see Colin, 1992).

Page 38, footnote 7, read "*Ejidatarios* hold a use right on land, in the framework of a land tenure system inherited from the Revolution; *pequeños proprietarios* hold a private property right on land".

Page 44, at the end of the second paragraph of the introduction, add "To give an illustration, it has been possible to answer the questions regarding economic efficiency differences between farmers, but the analysis could not offer a coherent and well documented explanation of these differences".

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