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DEVELOPMENT NARRATIVES:  
ACTOR-NETWORK THEORY AND  
PANAMANIAN AGRICULTURAL DEVELOPMENT POLICY

presented by

Gerad D. Middendorf

has been accepted towards fulfillment  
of the requirements for

Ph.D. degree in Sociology



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DEVELOPMENT NARRATIVES:  
ACTOR-NETWORK THEORY AND  
PANAMANIAN AGRICULTURAL DEVELOPMENT POLICY

By

Gerad D. Middendorf

A DISSERTATION

Submitted to  
Michigan State University  
in partial fulfillment of the requirements  
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Department of Sociology

2002

This dissertation proposes explaining development each of these approaches technology, the social strategies, dominant development processes to any one of these directions its theoretical difficulty basis is grounded in examine the actors negotiations and action 1940s to the present. The as well as extensive is suggested as one way agricultural development diverse actors as they things (e.g., documents

## ABSTRACT

### DEVELOPMENT NARRATIVES: ACTOR-NETWORK THEORY AND PANAMANIAN AGRICULTURAL DEVELOPMENT POLICY

By

Gerad D. Middendorf

This dissertation proposes a critical analysis of three major theoretical approaches to explaining development: material determinist, social realist and discursive. Adherents to each of these approaches look either primarily to the material (e.g., nature, geography, technology), the social (e.g., social structure, power) or the discursive (e.g., rhetorical strategies, dominant discourse) as primary determinants of development outcomes. Yet, development processes are simultaneously material, social and narrated, while not reducible to any one of these dimensions. The crisis in the critical stance, argues Latour (1993), lies in its theoretical difficulty in weaving these three into a single, coherent narrative. This thesis is grounded in a case study of the shaping of development policies in Panama. I examine the actors (human and material), the language, the policy documents, the negotiations and actions that have shaped agricultural research policy in Panama from the 1950s to the present. The study draws on more than forty in-depth interviews with key actors as well as extensive archival and current policy documentation. Actor network theory is suggested as one way to move towards less partial narratives. In particular, it is argued that agricultural development in Panama can be understood as an outcome of negotiations among diverse actors as they attempt to extend their networks. They do so by strategically enrolling things (e.g., documents and new crop varieties), people (e.g., producers and spokespersons

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**for the development financiers) and rhetoric in order to advance their interests. Implications of the actor network approach for development studies are discussed.**

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John Andre and Su

To Jan, Andre and Sarah . . .





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with me their time, knowledge and ideas about IDIAP's research programs and process of transition during these times of rapid changes in their environment.

Of course, I owe a great deal to my committee at MSU, which comprises Lawrence Busch, Marilyn Aronoff, Craig Harris and Scott Whiteford. I am particularly grateful to Lawrence Busch, my committee chair and mentor, for his support over the past several years, for providing in his research group an extraordinary and challenging intellectual climate in which to work, and for enduring multiple drafts of each of the chapters that follow. He has been an inspiration through the model of his own work. Marilyn Aronoff consistently provided a voice of wisdom and careful reflection throughout the project, and helped to ensure that it not lose sight of the people involved. Craig Harris has provided thorough and thoughtful critiques as various aspects of this work have developed. I have benefitted greatly from our conversations. Scott Whiteford, as committee member and director of the Center for Latin American and Caribbean Studies, has supported in numerous ways my efforts to carry out research in Latin America. I am very grateful for the consistent support of all my committee members.

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this document remains imperfect. The arguments here are ultimately my own responsibility, as are the remaining flaws.

Finally, I am grateful to my parents, Paul and Jeanette Middendorf for their encouragement through the years, and for never limiting the range of the possible. My deepest appreciation is for my wife, Jan, who is my closest friend and companion. She provided intellectual and unwavering emotional support along the way – far beyond what one could reasonably expect. She is always my most judicious adviser. Our children, Andre and Sarah, are a constant source of wonder and hope. They have made sacrifices in their own way, for which I plan to repay them manyfold.

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APACH	Associati
BDA	Banco de l
BD	Banco Inte
CATE	Centro A
	Agronomi
CIAR	Consultat
CIAT	Centro Int
CIATYT	Centro Int
CP	Centro Int
FACA	Facultad
FAO	Food and
IRCI	Internat
ICRD	Internat
	Investiga
IDB	Inter-Am
IDAP	Institut
	Research
IEA	Institut
IM	Integrat
IME	Internat
INA	Institut
IRI	Internat
ISAR	Internat
ISU	Michig
MCDA	Ministe
	Develo
MPPE	Ministe
	Econom
NARS	Nation
NLA	Nation
PAR	Particip
PM&E	Plannin
PRECODEPA	Progra
	Progra
ROCAP	Regio
SICAP	Servic
USAID	US A
WID	Woma

## LIST OF ACRONYMS

APACH	Association of Rice Producers of Chiriquí
BDA	Banco de Desarrollo Agropecuario (Agricultural Development Bank)
BID	Banco Interamericano de Desarrollo (Inter-American Development Bank)
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agronomic Center of Research and Teaching) (Costa Rica)
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical
CIMMYT	Centro Internacional para el Mejoramiento de Maíz y Trigo
CIP	Centro Internacional de la Papa
FACA	Facultad de Ciencias Agronómicas de la Universidad de Panamá
FAO	Food and Agriculture Organization of the United Nations
IARC	International Agricultural Research Center
ICRD	International Center of Research for Development (Centro Internacional de Investigaciones para el Desarrollo) (Canada)
IDB	Inter-American Development Bank (Banco Interamericano de Desarrollo)
IDIAP	Instituto de Investigación Agropecuaria de Panamá (Panamanian Agricultural Research Institute)
IICA	Instituto Interamericano de Cooperación para la Agricultura
IM	Integrated Management
IMF	International Monetary Fund
INA	Instituto Nacional de Agricultura
IRRI	International Rice Research Institute
ISNAR	International Service for National Agricultural Research
MSU	Michigan State University
MIDA	Ministerio de Desarrollo Agropecuario (Ministry of Agricultural Development)
MIPPE	Ministerio de Planificación y Política Económica (Ministry of Planning and Economic Policy)
NARS	National Agricultural Research System
NIA	National Institute of Agriculture
PAR	Participatory Action Research
PM&E	Planning, Monitoring and Evaluation
PRECODEPA	Programa Regional Cooperativo de la Papa (Regional Cooperative Potato Program)
ROCAP	Regional Office for Central America and Panama
SICAP	Servicio Interamericano de Cooperación Agrícola de Panamá
USAID	US Agency for International Development
WID	Women in Development



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## Chapter 1 Introduction

This is a study of how we tell stories about development. One of the fundamental and abiding aspirations of the social sciences has been to explain how societies change and develop. While classical theorists such as Marx and Weber were interested in understanding and explaining social change, the study of “development” as we currently understand it is generally taken to have emerged in a post WWII context. Contemporary models of explanation can be categorized into three major theoretical approaches: material determinist<sup>1</sup>, social realist and discursive. By “approaches” I do not mean to suggest that these are clearly defined schools with adherents following a strict set of tenets. Rather, I have imposed these categories as a way to talk about the perspectives or lenses through which analysts view, describe and attempt to explain the world.

The first approach looks primarily to the material order to explain social outcomes. Here analysts look to the environment, geography or even the “natural” endowments of people as primary determinants of development. It is often presumed that modifications in the material world (e.g., new technologies, improved infrastructure) are what is needed to spur social and economic progress. In other words, material improvements are understood as determinants of development outcomes. Society is seen as somewhat derivative in these explanations, and language is often bracketed out altogether. The second approach relies on

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<sup>1</sup>I use the term “material” to include nature and physical objects (or the biophysical). Thus, any biomaterial such as organisms, plant and animal life is included. The physical includes soil, water, geography and climate, but also laboratories, microscopes, roads or automobiles. Taken together, we might refer to them as environment and infrastructure. I use the term material as shorthand to include both.

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unalloyed social categories as the firm grounding from which the world is explained. Development is seen as the outcome of conflict and struggles – involving negotiations, coercion and power – between groups with predictable and stable interests. In this view, discourse is recognized, but it is viewed as a tool for supporting or camouflaging interests. The material (e.g., nature) is frequently portrayed as a passive background category, with human action in the foreground. Nature appears, but mostly as a limited resource that competing interest groups struggle over. In the third approach analysts interrogate spoken words and texts in order to reveal rhetorical strategies, tactics of argumentation and persuasion, inscribed authors and intended audiences. Reference to the discursive tells us about why the material and social are the way they are. In this perspective the notion of a neutral discourse (e.g., Western rationalism or science) capable of describing and explaining development is problematized. Also, in this view, the material and the social are rather plastic, flexible categories that are the subject of a broad range of interpretation and representation.

Yet, development processes are never purely material, merely social, or only discursive. As Latour (1993) argues, the world is simultaneously real, social and narrated, while not reducible to any one of these dimensions. For example, while scientific claims about nature are constructed in social interactions, they cannot be reduced to merely a social product because the networks of their production are populated by material objects such as microscopes and protein gels. Likewise, while a scientific article might be taken as a narrated text, it cannot be reduced to merely discourse because its questions were shaped within existing social structures and its very production depends on technologies to produce

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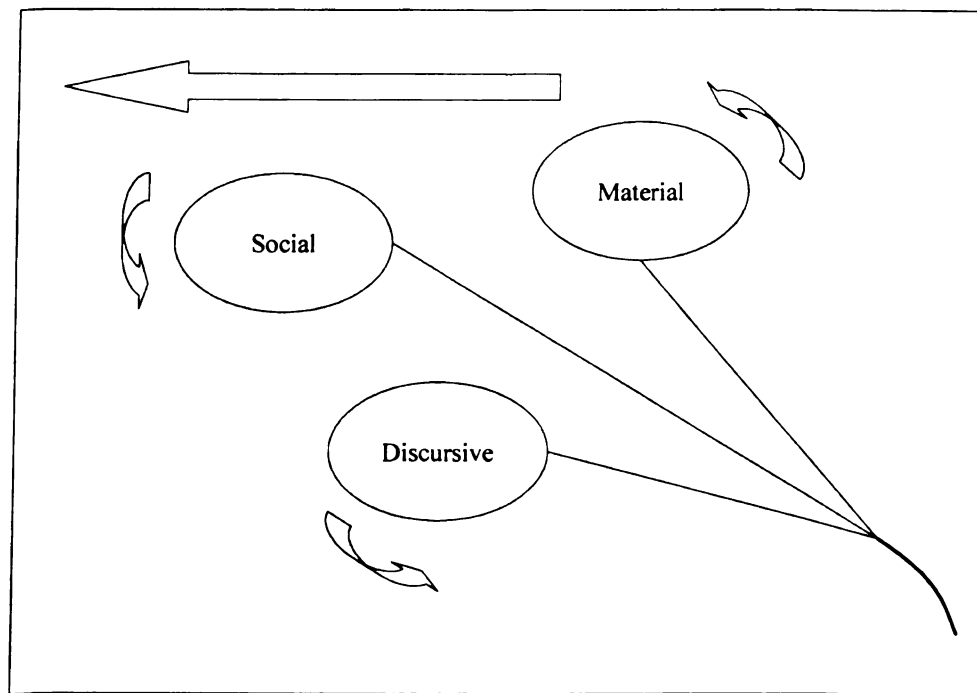
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**Figure 1: Tension  
Discursive**

South American Indian  
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its symbols (e.g., graphics programs and Southern blots). Thus, like the spinning stones of a hunter's bola<sup>2</sup>, the material, the social, and the discursive are in constant tension with each other, and therefore in constant interaction. At one moment, one of the stones is pulling the others towards its own orbit, while it is simultaneously being pulled by the others into theirs. Yet the three of them together have a common trajectory. Such is the case with the material, the social and the discursive.



**Figure 1: Tension and Interaction Between the Material, Social and Discursive**

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<sup>2</sup>South American Indian weapon, primarily used for hunting, consisting of stone balls, usually in a group of three, attached to long, slender ropes. In hunting . . . the bola is whirled like a sling, then thrown parallel to the ground to entwine the quarry's legs (from Encyclopedia Britannica 1994-1999).

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The crisis in the critical stance, argues Latour (1993), lies in its theoretical difficulty in weaving these three into a single narrative, a practice he refers to as translation. The predominant practice in social science relies on “purification” or maintaining clear ontological distinctions between things, society and language. Likewise, the current explanatory narratives in development studies do not problematize these distinctions. Is development primarily explainable by referring to nature, society or discourse? Rather than trying to solve this (misguided) question, this study attempts to ask: When and how is development defined as predominately a material problem, a social problem or an outcome of discourse? How is the narrative constructed? How do some actors convince others that their version is the “correct” one?

Moreover, explanatory models are never *only* about explanation, nor do academics work in complete isolation of social policy arenas. At the same time that scholars have elaborated models of explanation, i.e., knowledge claims about the way the world is, they have also made explicit or implicit claims about the way the world should be. In other words, positive claims and normative claims are almost always inextricable. Not surprisingly, these knowledge claims are often appropriated by policy makers – based perhaps on the extent to which the model resonates with the values they want to promote – adapted to the purposes at hand, elaborated into (explanatory and prescriptive) models for development and implemented in policy. Furthermore, development models do not diffuse through society because of some inexorable logic; rather they are vigorously promoted through techniques of conditional funding, favorable lending and numerous other incentive schemes. Thus, there is a link, I shall argue, between explanatory models and development



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This study attempts a critical analysis of these three approaches, grounded in an empirical study of the shaping of development policies in Panama. In particular, I examine the actors, the language, the policy documents, the negotiations and actions that have shaped agricultural research policy in Panama from the 1950s to the present. The central questions of this study are sociological ones, regarding attempts to explain development in a way that accounts for materiality, sociality and discourse in a single narrative. This includes critical commentary on the dualisms in social theory, especially the micro-macro and nature-society divides. This Panamanian case study is an entree into those issues. As such, the empirical case might have been a commodity study, or a study of biotechnology policy, or of indigenous knowledge. The interpretation proposed herein is but one of any number of possible interpretations. It is offered not as *the* account of agricultural development policy in Panama, but as one account that has an interest in decreasing the partiality of the conventional narratives. The primary interest here is in dealing with some of the central issues in sociological theory through the vehicle of the empirical case.

This is also an important historical juncture at which to study the relationship between the models promoted by the major actors in development (in this case, the Inter-American Development Bank, the World Bank and USAID), and the models adopted at the national level. In the past fifty years in Latin America, there has been a major shift from the promotion of statist models to the promotion of a market model. In the market model the size and role of the state is ostensibly diminished, and its task is seen as facilitating the liberalization and expansion of trade. One could argue that a central part of the current

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globalization discourse is about this very idea: To what extent, and with what strategies, are the major development actors and dominant nations able to “globalize” the model which they see as the most appropriate for world development?

Thus far, I have said that the case study will deal with Panamanian development policy. This should now be qualified by adding that the case study is mainly of development policy in the agricultural sector, and specifically of agricultural research policy. The model for agricultural research that a nation adopts – embodied in its policies and practices – is a crucial component of the overall development model of the nation. How are public agricultural research institutions responding to the changing context of lower tariff barriers, the expansion of trade, increased competition, rapid technical changes and the expanding role of the private sector in agricultural research and development? Certainly, the agribusiness sector is in some cases striving to become researcher, extension agent and vendor for commercial producers in Panama and elsewhere. These issues are important because as the basis for knowledge generation in agriculture, the research model is an expression of what kind of agriculture the nation aspires toward: What kinds of knowledge should be produced? To what ends? Who should be the audience, beneficiaries and users of that knowledge? How should the knowledge generated be communicated to the beneficiaries? What role should the beneficiaries play in the generation of that knowledge? Finally, and perhaps most importantly, the development model is an expression of the policy elite’s view of the place of technoscience in development.

This study is perhaps distinguished in another way. Given sociology’s central interest in structural inequalities, much of the discipline’s focus has been on marginalized groups.

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We might refer to these actors as “policy takers” in the sense that policies are written in distant development agencies and these groups have little choice but to “take” – be impacted by – them. In response to that line of research, some scholars became interested in “studying up,” that is, in studying elite groups in an effort to show how they produce and reproduce their privileged status and position. The elite groups are seen as “policy makers.” In contrast to both of these research trajectories, many of the actors interviewed in this study – e.g., researchers, research managers, planners, and leaders of the organization – are both takers and makers. On the one hand they are takers in the sense that in the larger development policy picture they are middle level bureaucrats in a small country. They have little choice but to accept some of the policy directives that come to them in an Inter-American Development Bank (IDB)-financed modernization program, for example. They are in a position of having to respond to these directives.<sup>3</sup> On the other hand, they are elites in their national (and regional) contexts. They are an educated group; they garner the social status that a title of “Doctor,” “Engineer,” “Professor,” or “*Licenciado*”<sup>4</sup> brings. Sometimes they are a cosmopolitan group, having taken their Master’s or Ph.D. degrees in the US, Brazil, France or Mexico. Thus, in some ways they are policy makers in that they can take the IDB program policies they have to work with and recast them to some extent, having influence locally. In short, they are an elite group nationally, yet minor vis-à-vis overall development policy. The sociological literature on such groups is rather small.

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<sup>3</sup>This is over simplified here. They do not only respond, but (re)interpret and recast policy to advance their own interests. This is discussed in later chapters.

<sup>4</sup>A *Licenciado* technically means one licensed in their profession (e.g., Lic. Rodriguez), but it is a title commonly used for those with the equivalent of a US bachelor’s degree. Those with technical degrees, such as an agricultural agronomist, are referred to with the respected title of Engineer or *Ingeniero*.

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In sum, this study articulates a problem at two interrelated levels. The first is the broader sociological problem of the competing approaches to explaining development: material, social and discursive. What are the merits and limitations of each approach? And what are the relationships between them? The second is grounded in an empirical study of development processes in Panama, specifically the shaping of Panamanian agricultural research policy from the 1950s to the present. Here the interest is in the relationship between the models promoted by the major international development actors and the model at the national level in Panama. How is the model for research policy reinterpreted and recast by the various actors involved? What is the relationship between the policy rhetoric and the practices of the actors? This is a particularly good empirical case for this kind of study because it links actors from the development banks and aid agencies, to state leaders, to ministers, to bureaucrats and administrators in the research community, to researchers, to agribusiness concerns, to extension agents, to producer associations and farmers.

Rather than produce a study with two distinct levels of analysis – one an abstract meta-analysis and the other an empirical study – this study attempts to address the theoretical questions from the grounding of the empirical study. To do so, three narratives of the shaping of agricultural development policy in Panama are presented: one through a material determinist lens, one through a social realist lens and the third through a discursive lens. While the theoretical issues emerge as the analysis progresses, I argue that each of these approaches by itself can only render partial accounts of development, and that some synthesis of the approaches is necessary. Actor network theory (ANT), which has emerged primarily out of science and technology studies, has been advanced as one approach that can address



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The fieldwork portion of this study was completed during two months in 1997 while I was hosted at the Instituto de Investigación Agropecuaria de Panamá (IDIAP), Panama's primary public agricultural research institution. The data collected during this time include forty in-depth, semi-structured interviews and extensive current and archival documentation of policy and change processes in IDIAP. Specifically, the interviews (see appendices) focused both on general questions regarding the role of agricultural research in Panamanian development, as well as a project of institutional change initiated at IDIAP in 1994, which remains in process. Some of these data have been analyzed in a discussion paper published by the International Service for National Agricultural Research (ISNAR) (Middendorf and Busch 1998). The interview data are further analyzed here in order to understand change processes in IDIAP, including policy changes, actors' perceptions of policy changes, and how these compare with practices (or actors' description of their practices). The policy documents produced by actors within the World Bank, the IDB, the Panamanian Ministry of Planning and Economic Policy (MIPPE), the Panamanian Ministry of Agricultural Development (MIDA) and IDIAP itself, are fertile and largely unexplored ground for research. These documents themselves can be seen as material artifacts whose construction is sociologically significant. They are examined to show how policy statements are reinterpreted and recast at each point in the networks stretching from the major development actors to researchers to farmers to reflect local interests.

## Objectives

The objective of this study is to explore different approaches to explaining development policy in the light of the drawbacks of conventional development models. Paramount (4) contribution is to show how the development process can be understood and finally, to (5) develop a new development model.

## Justification

This study will contribute to the understanding of development. Recent texts have reviewed the theoretical problems and the theoretical problems remain problematic in the current debates concerning development (Sociology 1999), structuralist theories, especially those of Buttel and others, and the development of

## **Objectives**

The objectives of this study are to: (1) advance a critical analysis of three major approaches to explaining development, grounded in an empirical study of the shaping of development policy in Panama; (2) advance ANT as an approach capable of addressing the drawbacks of conventional development narratives; (3) analyze the relationship between development models promoted by the major actors and the agricultural research model in Panama; (4) contribute to social theory of knowledge and development, especially exploring how the development studies and science studies literatures might be mutually enriching; and finally, to (5) develop a critical understanding of the role of scientific knowledge in post WWII development models.

## **Justification**

This study will not be a rehashing of the well-worn development debates. Other recent texts have reviewed these issues (Kiely 1995, Peet 1999). Rather, the attempt is to cast the theoretical problems in a new framework, addressing some of the key issues that remain problematic in explanatory models. The general sociological literature suggests that crucial debates continue unresolved around the issues of materiality-sociality (Brunel Sociology 1999), structure-agency (Giddens 1984) and micro-macro dualisms (Law 1994). These issues, especially structure-agency, are manifested in the development sociology literature (Buttel and McMichael 1994, Kiely 1995, Long and Ploeg 1994), and also in recent rural development and agrifood systems literature where the debate has placed structuralist

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approaches such as comparative historical and macrosociology (Buttel and McMichael 1994) and political economy (Bonanno et al. 1994, Friedland et al. 1991) in opposition to more interpretive approaches, such as Long's actor-oriented model (Long 1990, Long and Ploeg 1994) and actor network theory (Busch and Juska 1997, Sousa and Busch 1998). ANT seems to hold promise in challenging the material-social-discourse distinctions, yet attempts to advance this line of inquiry as applied to development have been few.

Thus, an empirically grounded critical analysis of the major approaches to explaining development is necessary. New work in this area is needed to move towards synthetic theoretical approaches which simultaneously link the material, the social and the discursive into more fluid, less disjointed accounts. The remainder of this chapter discusses the research experience and the methods of the study, considers the potential contributions of this work, and finally, lays out the stylistic structure of the argument and the overall organization of the dissertation.

### **The Research Experience**

In 1996 I had the opportunity to spend about one month at IDIAP, Panama's primary public agricultural research institution. During this month I participated in regional and national workshops<sup>5</sup> focused on initiating and carrying out programs of institutional change

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<sup>5</sup>*Regional* refers here to a sub-region of Latin America, in this case Central America, Mexico and the Spanish-speaking Caribbean (specifically, Cuba and the Dominican Republic). Representatives of agricultural research institutions from countries in this region participated. *National* refers here to all of Panama.

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in Latin American agricultural research institutions.<sup>6</sup> The workshops were part of a larger cooperative project led by the International Service for National Agricultural Research (ISNAR). This project focused on providing research and intellectual leadership to those organizations interested in becoming involved in a process of institutional change. Several things became evident in this initial pre-fieldwork visit.

Because IDIAP was undergoing a process of institutional change, this was an opportune moment to study how the organization formulates research policy. The methods of the change process continually force administrators to reevaluate the role of IDIAP in the context of the globalization of agrifood systems. The diminishing role of the state in pricing policies, the lowering of barriers to trade, the opening of Panama's national markets, the concomitant pressures regarding environmental impacts of agriculture and poverty alleviation, and the increased role of the private sector in agriculture have all raised new, sometimes conflicting challenges to generate research and technologies that will allow producers to compete effectively in national and international markets, ostensibly in an environmentally sustainable way. Thus, during IDIAP's process of institutional change broad questions are continually raised about the role of research, what publics it should serve, and what the research agenda should be. This created a rich environment for policy research.

Yet, while IDIAP administrators and researchers might debate these policy issues, they do not do so in isolation. Rather, the organization is linked into a long network of actors who, with economic and political leverage, continually attempt to enroll IDIAP in their own

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<sup>6</sup>In particular the change process is aimed at bringing institutions in tune with their rapidly changing environments. Administrators develop the skills to continually transform their institutions through improved planning, monitoring and evaluation processes.



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projects, thereby negotiating and shaping IDIAP policies in the process. These actors include the Ministry of Agricultural Development (MIDA), the Panamanian state, the IDB, the World Bank and USAID. There are two points to make here. First, multiple and overlapping networks became visible as I became familiar with this project. These include everyone from farmers and producers all the way to the major development actors and multilateral organizations based in Europe that were funders and partners to negotiations. Thus, “development” could no longer be coherently grasped in a “national development” framework. Rather, development appeared as a process of international cooperation, conflict and negotiation with a number of organizations and individuals linked together, negotiating policy. Indeed, development, it seemed, might be fruitfully thought of as action – as people engaging in projects and advancing their interests.

Second, IDIAP’s process of institutional change can be considered under the rubric of *development* projects. The actors become involved as a means to pursue their own agendas, while simultaneously pursuing a normative agenda of planned progressive change. The project of focus in this study is the result of the simultaneous overlapping projects of a number of actors. In the early 1990s some of IDIAP’s planners and decision makers became interested in a program of institutional change because they were witnessing what was happening to similar institutions: privatization, restructuring and reengineering. Knowing that MIDA, with the Balleares administration<sup>7</sup>, had negotiated a \$48 million modernization program for the agricultural sector with IDB in about 1993, IDIAP’s leaders realized that a proactive project of institutional change might assure IDIAP a place within that program and

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<sup>7</sup>Ernesto Pérez Balleares was president of Panama from 1994-1999.

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possibly prevent a more drastic modernization from above. MIDA would be supportive of the project because they knew that the Balleares administration was under pressure by the World Bank and IMF to show progress toward “modernizing” the state through reform programs, thereby normalizing relations with the international finance community. MIDA leaders could then point to IDIAP – seen by many as the leading technical and intellectual institution in the agriculture sector – as an example of modernization efforts in the sector.

In 1994, IDIAP’s leadership became aware of the ISNAR project in Latin America on institutional change. After reviewing materials produced in the first phase of the ISNAR project on strategic planning (1992-94), comprising well developed conceptual tools and planning instruments, the director general and director of planning realized that linking up with the ISNAR project would not only be beneficial to the institution on the merits of improved planning, monitoring, and evaluation, but that it would also be a wise move strategically. In other words, IDIAP could avoid being modernized from above by proposing a proactive strategic plan for its own transformation. The ISNAR project could serve as a mechanism that would secure IDIAP’s place in IDB’s modernization project. Thus, there was in 1994 a decision by the upper management to initiate a process of institutional change in IDIAP based on (and building on) the core concepts developed through the ISNAR project. ISNAR would be supportive because ISNAR’s project leaders were interested in expanding the relevance of their own project throughout Latin America.

IDIAP’s project of institutional change is a current example of the ways in which development policy is shaped. Actor A enters into negotiations with actor B and attempts to enroll B into A’s vision of the project, to advance A’s interests. A, B, C, and other actors

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may have overlapping interests, a variety of funding sources, overlapping timeframes and even different understandings of what the project is and what it means. Yet, they negotiate and compromise, sometimes cooperatively, sometimes reluctantly, always spinning the project linguistically to reflect their interests and meet their needs. Moreover, the extent to which actors can flexibly interpret the project in documentation (e.g., research proposals, project plans, project reports and annual reports, etc.) and in verbal exchanges (e.g., presentations and interviews) is both expanded and constrained by the material objects that inhabit the same networks. Available technologies, laboratories, equipment, libraries, researchers, geography, climate, plants and animals all represent both constraints and opportunities. They are givens but also outcomes.

After the initial visit, a follow up visit was negotiated and I returned to Panama for about two months in 1997 to carry out fieldwork hosted by IDIAP. I turn now to describe the methods used in the fieldwork, the data collected, the analysis of data, as well as the documentary work and analysis. Since this study is presented in three narratives the discussion of methods and data are organized accordingly.

## **Methods**

*Entry.* In 1997, I wrote a research proposal to ISNAR in which I proposed to return to Panama for two months to study IDIAP's process of institutional change and policy formulation. With the assistance of ISNAR, a letter from IDIAP's Director General (DG) was negotiated inviting me to carry out the proposed research at IDIAP. The fact that I was simultaneously connected to the ISNAR project and Michigan State University (MSU)

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probably helped procure this invitation. Panama's profile (in the agricultural research community) was raised in the Central American and Caribbean regions by becoming a pilot case within the ISNAR project and by hosting research on its own change process. Inviting in an external researcher to review the project enhances the transparency of the process, and to some extent, therefore, its legitimacy. Moreover, the support IDIAP received from ISNAR depended in part on its cooperation and enthusiasm in advancing this project. Had IDIAP not wanted to become a pilot case or had they turned down our request to carry out research at their institution, it might have raised questions about their commitment to the change process. This could influence some of ISNAR's decisions, such as where to host the regional workshops, which administrators to invite to the pan-regional workshops, etc. In fairness, however, both IDIAP and ISNAR seemed genuinely interested in documenting IDIAP's process of institutional change.

As observed by other social scientists (Latour 1996, Latour and Woolgar 1979, Skladany 2000, Traweek 1988) the issue of how one enters into a research setting can influence the directions the research will take. Being hosted at IDIAP posed both tremendous benefits as well as some limitations. The official invitation from the DG was both necessary and very helpful as I met with directors of regional centers around the country as well as with officials at other institutions in the agriculture sector. Indeed, the DG paved the way for visits to regional centers with phone calls and letters that resulted in support in terms of open doors, interviews with the top administrators and researchers, transportation, bibliographic assistance at the IDIAP library, and numerous other instances of staff support. Clearly, this official association with IDIAP provided access to inside interview and



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documentary data that would have otherwise been extremely difficult to obtain. Had I approached IDIAP without the institutional affiliations of MSU and ISNAR, it is unlikely that such rich sources of information would have been readily available.

At the same time, being hosted around the country by IDIAP personnel, I was presented mainly with an official view of agriculture in Panama, though there was significant variation in viewpoints across staff, and many were even quite forthright with critical perspectives. I visited regional experiment stations, some of IDIAP's own experimental fields, demonstration fields that farmers had set aside (on their own land) for IDIAP to do on-farm trials, and of course the "star farmers" – those perceived by researchers to be innovative, adopting the advice and techniques recommended by IDIAP. Because of my close affiliation with IDIAP, it was more difficult, though not entirely impossible, to get the perspectives of those outside of that network. For example, marginalized ethnic groups, the very poor, uneducated farmers and those not connected to markets do not figure prominently on IDIAP's radar screen. Because both funding and the time available for fieldwork were limited, I was less able to explore the viewpoints of these groups and others (e.g., critical NGOs) that might have been able to provide alternative or critical perspectives on agricultural development in Panama. This would be a worthwhile endeavor, but it would also require additional time for fieldwork in order to develop the kinds of networks necessary to adequately explore and understand a broader range of viewpoints in Panama on agricultural development. In sum, my association with IDIAP limits to some extent the range of perspectives available for representation in this study.

*Fieldwork Issues.* The fieldwork consisted of three major activities. The first was

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interviewing IDIAP administrators and researchers at the central offices located in Panama City. The second was site visits to regional research centers in the far west, central and eastern sections of the country.<sup>8</sup> This included interviews with regional directors and researchers and also visits to experiment station fields, on-farm visits with producers, and visits with extension agents and leaders of producer associations. The third major activity was bibliographic work at IDIAP's central library in Divisa (center of the country) and their second library in Panama City. The central library in Divisa is quite well organized with a searchable electronic database. It is a document depository for literature from the relevant international agricultural research centers, as well as other major relevant research and development organizations, such as the Food and Agriculture Organization (FAO), the Instituto Interamericano de Cooperación para la Agricultura (IICA), the IDB, etc. Somewhat curiously, however, despite the fact that this is IDIAP's best library, it is located in the geographic center of the country in a very small town, which isolates it from the both the political-administrative center of Panama City, as well as the major agricultural region in the far west. The idea of locating the library and several important laboratory facilities in this central region was to avoid centralizing all the resources in Panama City. This has certainly been accomplished, even if some of the highly trained researchers expressed dismay at locating their families several hours away from the capital city. The second library in Panama City also has many good holdings, though it was in transition at the time and so disorganized as to be almost unusable.

As is well known, hierarchy is and has long been important in Latin America. Not

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<sup>8</sup>Geographically, Panama runs primarily east-west.

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surprisingly, this arises as an issue in carrying out research in a bureaucratic organization, though it is not an insurmountable one. While IDIAP's DG was a very generous host, and the leaders did provide a number of lengthy interview opportunities, it was often not possible to talk with those of higher rank more informally for longer periods because of time constraints. Yet, it was possible and quite informative to talk less formally – in addition to formal interviews – with mid-level administrators who have significant experience and knowledge of the institution but who are somewhat less constrained by time and status. In this way the hierarchy worked to my advantage by allowing me to identify the most important issues facing the organization and refine the interview guides before interviewing the top administrators.

The issue surfaced in other ways as well, especially around the question of access to working documents. In one case, when I asked some of the planners for current documents regarding the institutional change project – documents which I believed were central to the change process – they seemed to be unaware of some, others they were able to find later, and still others for which they referred me higher up in the hierarchy. This suggests that perhaps either they were uncertain about what they could share, or they were not well informed about the change process, for whatever reason.

Similar issues were manifested in interactions with some of the researchers. One example was with a group of researchers at one of the regional centers. After I was introduced to the group and discussed my purpose there was some discussion about whether to do a collective interview or do them individually. We began in a collective interview with four researchers plus myself. It became immediately obvious that this would not work, at

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least in that format. As a practical matter, as researchers began to describe their work I wanted to ask follow up questions. However, this would have meant a very lengthy process, causing the others to wait while their colleagues described work with which they were already familiar. The other issue, however, was that they were unlikely to freely express their views about the organization and change process for political reasons. Citing reasons of efficiency, we agreed to break off and do them individually. As one researcher later commented, the feeling in the institution was that one does not talk about things political because word gets around and one could be strongly reprimanded.

In a sense, the hierarchy issue can be traced throughout the organization and its clientele. I needed to strongly emphasize to researchers that it was important that I meet with producers. Perhaps this was difficult because of the social distance that exists between most researchers and producers. Not surprisingly, the producers that I was able visit were those with the least social distance – in terms of socioeconomic status, values, etc. – between them and the researchers. This is also where I began to note how race and ethnic relations are a factor in the Panamanian agricultural landscape, including the work of IDIAP. Panama is ethnically diverse, a fact that is also reflected in the agricultural sector. Many of the producers involved in growing and exporting high value vegetable crops are in the mountain region of the west and happen to be of European (e.g., Swiss, German, Yugoslavian) and some mestizo background. These farmers are at the wealthier end of the spectrum. Many of the large rice producers and cattlemen are of mestizo background. The majority mestizo group occupies the middle ground to the wealthy end of the spectrum. IDIAP does not have major programs regarding the agriculture of Panama's indigenous groups (e.g., Ngobe-



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Buglé, Kuna, etc.), which are at the bottom of the country's ethnic hierarchy and therefore receive the least amount of societal rewards. There was a palpable frustration in the institution as to what to do about the small farmer with no access to markets, and among this group the indigenous groups seem particularly marginalized.

#### *Methods: The Material*

*Questions.* The extent to which actors can flexibly interpret their projects in documentation – annual reports, project plans, research proposals, budgets – is both expanded and constrained by the material objects that inhabit the same networks. In the chapter dealing with the material determinist perspective a narrative emphasizing the material actors is presented. It is important, though by no means novel, to ask about the role of the material world in determining development outcomes.<sup>9</sup> Various existing models go a considerable way toward integrating the material and the social, for example co-determination (Barham et al. 1994), social-thermodynamics (Bunker 1985), coevolution (Norgaard 1994), co-construction (Busch et al. 1995), and political ecology approaches (Perkins 1997, Vandergeest et al. 1999). Other authors go further in pursuing material objects as actors (Callon 1986, Latour 1993, 1996). Their questions, which are appropriate for this study, problematize the categorization of the material and the social, and also ask how the translation process takes place between the material, the social and the discursive

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<sup>9</sup>As a recent article in the magazine of the IDB asks: “Is Geography Destiny?” (Hamilton, 2000). Yet, this is not a new question. For example, many advocates of the Green Revolution gave a great amount of weight to high-yielding varieties, fertilizers and other technologies as determinants of development outcomes.

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(especially Latour 1993). Also of interest are the moments of contestation when definitions are at stake (Callon and Latour 1992). In the chapter on the material determinist perspective the questions are posed: How is the material defined? What is the weight given the material in explaining development outcomes? How is the material marshaled in making arguments?

Finally, policy documents can also be considered as objects in a network. In the Latourian sense, a document is a material artifact that is a “harder” part of society. In other words it is a set of social relations that has been translated into a material object. It is “harder” in two senses: 1) in the world of senses it has moved from the intangible to the tangible, or from verbal language and social relations to an object; and 2) as a result it has shifted towards being more “black-boxed” because the production of the artefact (the policy document) specifically involves strategies intended to obscure the social relations of its production. In other words, many of the social relations involved in producing a policy document, for example, discussions, debates, disagreements, early drafts, changes in the drafts and the authors themselves, do not appear in the final document. Thus, final documents are “harder” than language alone because they require more archeological work to excavate the relations of their production. From this standpoint we might also ask – just as we might ask of an internal combustion engine – when does a policy document “work”, when does it fail and why, and what constitutes “working” and “failing”? These questions, emerging out of actor network theory, are the most innovative and fruitful for this study.

*Data – Documentary Resources.* Published documents from IDB, ISNAR, and the Panamanian government (primarily MIPPE, MIDA and IDIAP) are used in this analysis. Key documents from IDB, MIPPE, MIDA, and IDIAP and ISNAR were collected. These

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include two key documents that present IDB's view of the modernization program for Panama's entire agriculture sector (BID 1995, 1996), the principal documents outlining the program for development and modernization of the economy at the national level (e.g., MIPPE 1991, 1994), and MIDA's statement outlining the orienting framework for agricultural policy from 1994-1999 (Comisión de Reconversión Agropecuaria 1994). A wide array of published and current working documents were also collected. These include almost all of IDIAP's annual reports from the creation of the institute in 1975 to 1996, numerous documents of IDIAP's research projects, project proposals, budgets and national agricultural data for Panama. Also, as part of the data collection at IDIAP's library, numerous useful documents from other organizations providing external analyses of IDIAP and the agricultural sector were available. These include, for example, various overview reports and studies from the FAO, IICA and the World Bank. In different ways many of these documents provide an inventory of the material actors in this story: laboratories, buildings, equipment, bibliographic resources, Panama's geography, topography, climate, soils, crops, and primary commodities – in short, the material actors that are pertinent to the research system.

*Documentary Analysis.* The approach to documentary analysis can best be described as a combination of grounded theory (Strauss 1987) and ethnographic content analysis (Altheide 1996). The documents are treated as texts to be queried and analyzed to permit an understanding of how authors understand the material world and development processes, and based on this understanding, how they make a persuasive case. While the documents are scrutinized from a theoretically informed perspective, during the final analysis the conceptual

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developments are allowed to emerge from the data at hand, as in the grounded theory approach. The process of developing and testing concepts from the data was sufficiently flexible to allow for unexpected contingencies that might have affected the course of the research itself.

### *Methods: The Social*

*Questions.* As argued above, a material determinist analysis can only render a partial account. The language in development policy documents is given social force through funding, programs, implementation and actions. The chapter on social realist explanation endeavors to examine the processes of translation from discourse to the social and material. Why are some actors able to make stronger cases than others, thereby translating their program into plans of action? Why are some actors' development programs (and not others') implemented around the world, having a range of impacts? The predominant answer from development sociology has been: structure and power. Thus, from a dependency or mainstream political economy perspective one might argue that the World Bank dictates policy to nations thereby conditioning their development. Because of the power differential one actor capitulates to another. Power is used as the explanans.

*Social Structural.* Yet, both power and structure can only exist in specific instantiations, that is in specific social relations (Giddens 1979, 1984). Structure, argues Giddens, is best understood as a layering over time of actions and the meanings of those actions, rather than something that exists independently of social relations. The earlier accusation of "social realism" stems from the tendency of some political economy



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approaches to reify structure as something independent of social relations. A response in terms of methodology is to focus on specific relations in order to explain how one actor actually succeeds in enrolling another in the former's project. The questions of the chapter on the social realist perspective focus on those elements that come into play in a successful "enrollment" – the tools of enrollment or persuasion. The objective is to show how the rhetoric is given force. For example, funding for Panama's agriculture sector is conditional on its adopting a certain model, a certain group of policies. Also, how is IDIAP embedded in the agriculture sector? What is its location relative to other actors? Certainly, interest groups come into play. What are the interest groups, and what outcomes are they working towards? How are funds allocated and how are they spent? What is the relationship over time between the development models promoted by the major actors and the one adopted by Panama. I use the documentary and interview data (described below) to examine these questions.

*Actor-Orientation.* Among the "social" perspectives, actor-orientation (Long and Ploeg 1994) lends itself especially to looking at negotiations, showing how actors might negotiate the translation from the rhetorical to the concrete. Yet, in comparing what actors in this case study write and say with what they do, it appears that there is some room for manoeuvre. Why is this the case? Why can some actors present their actions in one way, while acting in another? A partial response is that the major actors – those that over time have won the most enrollment battles – cannot monitor everything. Thus, when IDB finances \$48 million for the modernization of Panama's agriculture sector, despite its best efforts it cannot monitor, or discipline in the Foucauldian (1978) sense, all subsequent actors

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after the project is underway. Actors in the Panamanian state, MIDA and IDIAP have some flexibility in how they present and represent (in spoken and written language) their practices. The trick rests on their ability to convince funders that their practices are sufficiently congruent with the model. In this section I will use the documentary evidence described above and interview data in order to look at the current *practices* of IDIAP.

*Data – Interviews.* In addition to analyzing what actors write, it is necessary to examine what they say. The second major source of data is interviews with farmers, leaders of commodity associations, extension personnel, researchers, planners, managers, and directors. I used the technique of in-depth, semi-structured interviews. No attempt was made to obtain a random sample of interviewees. Rather, the sample was purposive and theoretical (Altheide 1996). Informants were identified using a snowball technique. Interviewees were seen as key informants. The intent of the interviews was to maximize variation in responses so as to gain as complete a view as possible of the networks that make up the institutions and the process of institutional change and agricultural research policy (Strauss 1987). Approximately forty individual interviews were conducted in total. Since the interviews were semi-structured, the questionnaires were not rigidly followed. Rather, they were used as guides to probe for salient issues, and to provide structure when necessary. Interviews were arranged primarily with IDIAP personnel, though interviews with extension agents (MIDA), a high-level MIDA administrator, producers and leaders of national producer associations were also completed. Of course, many informal conversations also took place with ISNAR personnel, as well as some interaction with IDB representatives. For the purposes of the chapter on social realist explanation, I am interested in how actors describe

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the project of institutional change in IDIAP, how they view the processes of policy formulation in IDIAP, and I ask them to describe their own work and role in the institution (see questionnaires in Appendices 1 and 2).

*Data Analysis – Interviews.* Analysis of the interview data follows the guidelines laid out by Strauss (1987). They are analyzed to permit an understanding of how different meanings and concerns of various actors converge on the processes of institutional change and the policy formation process. While I began the data collection process from a theoretically informed position, I allowed conceptual developments to emerge from the data at hand. The process of developing and testing concepts from the data was sufficiently flexible to allow for unexpected contingencies that affect both the unfolding of IDIAP's institutional change project and the course of the inquiry itself — a grounded theory approach.

#### *Methods: The Discursive*

During the fieldwork, it became apparent that one of the things that connects actors together is policy documents. Policy ideas seem to flow in a network from actors such as IDB to the Panamanian government (MIPPE) to MIDA, to IDIAP. Along the way, policies are negotiated and transformed as they move through the networks from the promoters of development models to their articulation and translation into practice by agricultural researchers at IDIAP. Moreover, at the point of their initial creation in IDB, for example, policy documents emerge in a context of ideas about development – explanatory and prescriptive models – which are circulating in the academic literature. Thus, the question

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becomes: What is the process by which ideas about development are translated into specific policy programs, and subsequently transformed along the network of actors?

*Questions.* The questions that drive the chapter on discourse emphasize rhetorical strategies used by some actors to convince others that their version of development is the correct one. How does the language change over time? How do the actors interpret and describe development problems and prescriptions? How do they cast the language to reflect their interests and convince others that their prescriptions should be adopted? Querying policy documents allowed me to analyze the flow of policy ideas and examine the assumptions, values, and rhetorical strategies embedded therein.

There have been various poststructural critiques that have undermined the Western modernist metanarrative (e.g., Baudrillard 1983, Derrida 1982, Lyotard 1984). These writers and others raised the importance of looking at language and symbols as important aspects of the construction of reality, and as key components of the “power-truth-knowledge” complex (Foucault 1972). From an actor network approach, Latour (1987) more concretely shows how in the scientific literature scientists enroll numerous allies and authorities in order to convince readers and control how the reader reads, reacts and believes. In this chapter I pursue a similar strategy with policy documents. Such an actor network approach has not commonly been attempted in the development literature, and only infrequently has it been used in the agrifood systems literature, much less in agricultural development policy. In the cases where analysts have used actor network theory to study agrifood systems the approach has been either to follow a commodity (Busch and Tanaka 1996, Sousa and Busch 1998) or to focus on production of scientific knowledge (Busch et al. 1994, Juska and Busch 1994).



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These studies set important precedents, yet policy documents remain fertile and largely unexplored ground for research.

*Data – Documentary Resources and Analysis.* In addition to the documentary resources described above, published documents from the World Bank, USAID<sup>10</sup> and a host of IDIAP documents relating directly to the institutional change process initiated in 1994 are examined. In some instances even project related correspondence was available. Analysis of the documentary data is as described above, but also follows Latour’s rhetorical analysis in *Science in Action* (1987: 1-62).

*Interview Data and Analysis.* For the chapter on discourse the interview data discussed above is again examined. This data is (re)queried with the specific questions of the chapter in mind. In concluding the chapter entitled “Literature” in *Science in Action*, Latour asks rhetorically: Where is the ‘social’ in this chapter? His response is that “. . . the more technical and specialized a literature is, the more ‘social’ it becomes, since the number of associations necessary to drive readers out and force them into accepting a claim as a fact increases”(Latour 1987:62). The same is true for the frequently technical policy documents, as well as the spoken language used by its authors. This analysis of discourse should lead us to loop our questions back toward the material and the social, indicating the need for theoretical approaches capable of synthesizing the material, the social and the discursive. This brings us to a brief discussion of the potential contributions of this study.

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<sup>10</sup>Although USAID’s role is currently in decline, it was a major player in the Panamanian agriculture sector in the 1970s and 1980s.

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## **Contributions**

The main contributions of this study are: 1) the cross fertilization of development studies and science studies, 2) the advancement of actor network theory into policy realms, and 3) a linkage between theoretical perspectives and models of participation.

*Development Studies/Science Studies.* Development studies has now moved beyond the impasse identified by a number of scholars in the 1980s, and is moving into new areas conceptually. Of particular note are scholars who in various ways have attempted to integrate the material and the social into theoretical models. Yet, there is a significant gap in this literature, especially regarding a critical understanding of the role of scientific knowledge in developing countries, and the ability to move beyond a realist-constructivist dualism in accounts of development. In other words, there seem to be few alternatives between realist accounts (both social and material realism, which either reify the social and/or over-objectify the material), and critical deconstruction, which in the extreme tends to deny the reality of the material. Thus, there is a need for a critical analysis of the major approaches to explaining development that questions the current ontological categories and seeks new theoretical synthesis. Some science studies scholars have made significant progress on those questions (e.g., Brunel Sociology 1999), and it is precisely in this area where there is great potential for mutual enrichment of the two fields. Development studies benefits by becoming more dynamic theoretically – probing into the very bases of its own claims – and science studies gains by concerning itself with the less esoteric problems of the role of scientific knowledge in development policy. Bringing the two together proves to be a useful advance toward a more robust social theory of knowledge and development.

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*Actor Network Theory.* While there have been claims about ANT's virtues, there seems to be less published evidence demonstrating ANT's actual capabilities and weaknesses. Thus, there is significant space and need for studies attempting to advance ANT. This study provides a good opportunity to do so. What is promising is that ANT has been overtly interested in blurring the categories that those in the material and social camps largely retain. Certainly, ANT is not without its critics. Some have criticized it for minimizing the importance of power relations, for ignoring gender issues and for relying heavily on metaphors of war, among other things. In short, this study advances actor network theory by pushing it in new directions.

*Theoretical Perspectives and Participation.* Finally, it makes sense to ask: Why and to whom does any of this matter? The response to this question takes us back to Foucault's (1972) point that truth, power and knowledge are inextricable. Whose knowledge counts and whose knowledge is seen as legitimate does matter quite a bit to many people, including farmers and producers but also to the middle-level researchers and developing country bureaucrats. What I argue in the final chapter is each theoretical perspective leads to a unique set of recommendations, and moreover, implies different views on who should participate in the policy process and to what extent. Thus, I draw a link between the theoretical perspective and a disposition towards participation. Framed in this way, this study has relevance to academics, to policy makers and to development practitioners. While the empirical case is primarily limited to Panama, the findings of the study are relevant to researchers and practitioners in any geographical region where these same issues about knowledge for development are raised.

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## **Organization, Strategy and Style**

This study does not follow a conventional dissertation format. The reasons for this have to do with the nature and process of ordering, making sense of empirical facts, theoretical issues and reflexivity about my own telling of the story. The complications and challenges arise when the processes of ordering become part of the narrative (Law 1994). In an empirical sense, I collect and analyze data to develop a case study of agricultural research and development in Panama. Yet, this study is neither primarily about agricultural research nor about Panama. Rather, I develop the Panamanian case study as a way to more broadly examine the ways in which “convincing” development narratives are constructed. Therefore, the conventional dissertation structure, based more closely on a positivist model that typically tends to obscure rather than examine reflexivity issues, seemed inappropriate.

Accordingly, I arrived at an alternative structure of the argument, which was necessary in order to deal with the reflexivity issues. I first present an idealized version of the narrative to 1) tell the empirical part of the story that makes the case, and 2) present the narrative in order to be able to interact with it afterwards. As such, the following three chapters – two, three and four – each tell a part of the narrative of agricultural development in Panama. The second chapter approaches the story from the material determinist perspective, the third from the social realist perspective and the fourth from the discursive perspective. Each of these narratives is recognizable as a *standard narrative* in that perspective. Each of them stands as a coherent and credible rendering of the story to those familiar with that perspective. Yet, at the same time, in each chapter, the narrative is interrupted with a commentary in order to orient the reader as to what is happening



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theoretically. The intent is to examine the way arguments are constructed in each narrative, to show why it is a reasonable, convincing way to tell a story, but also to show why it is partial. It should hopefully become clear to the reader that there are multiple layers of reflexivity: the standard renderings of development narratives, my role in reconstructing these narratives, followed finally by a (meta) commentary on how different narratives are constructed and their effectiveness.

It is at these interruptions or commentaries in the narrative that I intend to engage the sociological literature relevant to the issue at hand. The idea is to engage the literature at the point where the reader is following the narrative, rather than in a traditional literature review as a separate chapter. This strategy keeps the theoretical issues at the fore. Since the sociological problems of interest can be illustrated and addressed with literature of this period, and since this also corresponds to the time frame of the case study, the study is limited primarily to the post WWII literature.

Chapter five then attempts to construct a new narrative that weaves together the material, social and discursive perspectives of the previous chapters. The effort here is to move beyond a realist-constructivist dualism in accounts of development. One objective is to advance ANT as one way to address the criticisms raised in the previous three chapters. In chapter six I discuss the conclusions and implications of the study.

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## **Chapter 2    Agricultural Development in Panama: A View Through the Material Determinist Lens**

As noted in the introduction, the strategy in this chapter and the two that follow it is to first present an idealized version of the standard narrative from this perspective. This is then followed by a commentary that reflects on both the idealized narrative and my own rendering of it. In order to produce the material determinist narrative that follows, I reviewed a number of accounts of Panamanian agricultural development from this perspective, and synthesized the basic structure and flow of logic of this literature.

### **A Panorama of Panama**

#### *Geography*

The Republic of Panama is long and narrow, running mainly east to west along its length. About the size of West Virginia, it is the narrowest section of the isthmus connecting North and South America. It is bordered by the Caribbean Sea along its northern coastline, and by the Pacific Ocean along its southern shore. It shares a border with Colombia in the east and Costa Rica in the far west. A relief map of the country reveals that Panama is distinguished by a mountain range that runs like a spine through much of the length of the country, reaching an elevation peak of some 3,475 meters in the highlands near the Costa Rican border, and much less in the eastern range in Darién province. The western highlands notwithstanding, much of Panama's territory is made up of hilly lowlands of less than 700 meters. As a rough picture, the country can be thought of as divided into four quadrants.

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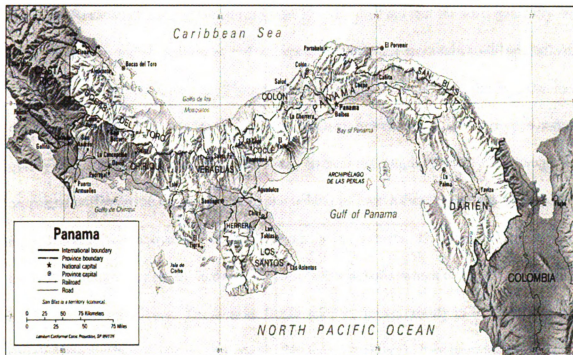
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The northern and southern quadrants are the respective watersheds on either side of the continental divide, which runs through the center of the country in the west, and closer to the Caribbean coast in the east. There is a break in the mountain range in the central lowlands, through which the canal was constructed. The canal can thus be viewed as the feature dividing the eastern and western quadrants.



**Figure 1: Relief Map**

*Land and Soils.* There are few large expanses of flat, fertile land in Panama, yet some argue that there is more than sufficient arable land available to significantly expand agricultural production (IICA 1992). According to a report by the Instituto Interamericano de Cooperación para la Agricultura (IICA), there are 1.3 million hectares of arable land and

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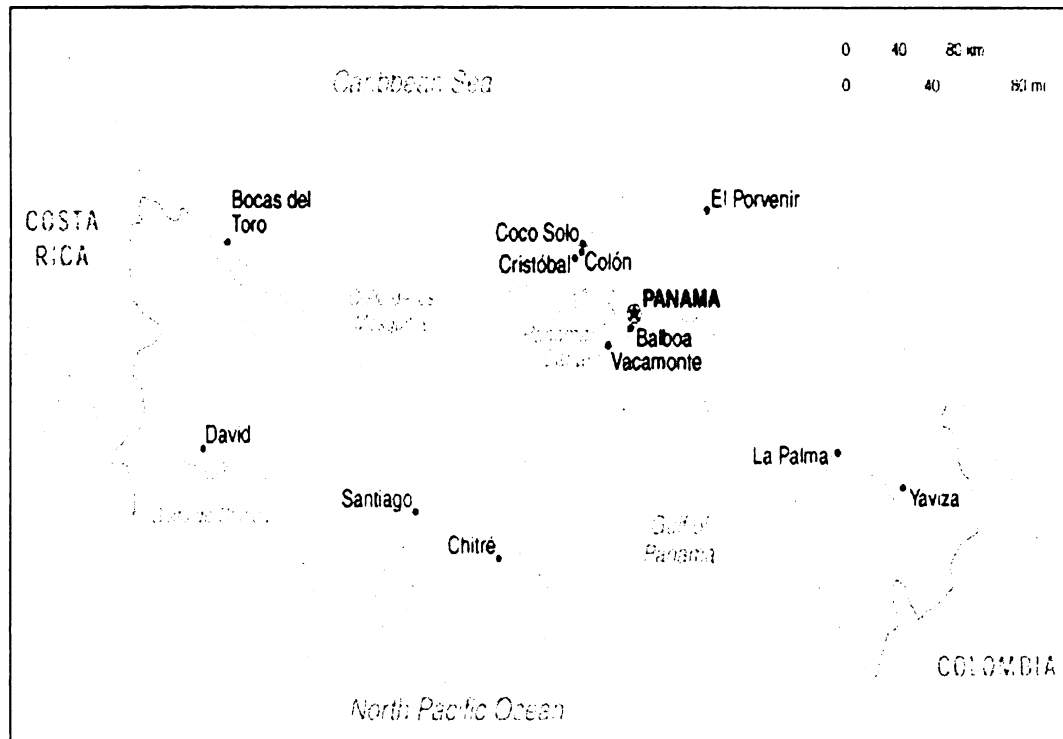
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4.6 million hectares of pasture and forests. The same report estimates that of the total area, about 44% of the land is in planted pasture, 24% is forested, 9% is planted in annual crops, 8% is fallow, 6% is in natural pasture, 5% in permanent crops, and 4% is in other uses (IICA 1992: 3).

The country's soils vary in fertility, tend to be acid and have a significant clay content. Reviews of Panama's soil resources have pointed out that the soils generally lack lime, potassium and phosphorous, and (except for the volcanic mountain soils) are deficient in nitrogen (BID 1995, Guzman 1956, Maddock 1945). In the highlands, the soils that have developed over time from volcanic ash have a high humus content, a loamy texture and are quite fertile. In the western highlands, many farmers raise high value fruit and vegetable crops and coffee on the mountain slopes and upland valleys in these soils, and they typically enjoy incomes well above the average for Panamanian farmers. There are also some fertile lowlands, though they are limited to the areas of alluvial soils, which develop from deposits left by streams and rivers. These more fertile soils are found mainly in the lower parts of river valleys and basins and near the coasts. The large commercial banana plantations around Puerto Armuelles (western Pacific coast) and in Bocas del Toro (western Caribbean coast) are located in these alluvial soils. On the poorer soils, a migratory, slash and burn agriculture is practiced (discussed below).





**Figure 2: Political Map of Panama**

### *Climate*

The climate in Panama varies on either side of the continental divide, especially in terms of rainfall. In the west on the more populated Pacific side, there are pronounced rainy and dry seasons, with the dry season lasting from January through April, and the rainy season from May to December. This region – for example in the agriculturally important Chiriquí province – receives about 45 to 90 inches of rain annually, while the Caribbean side of the mountain range receives between 60 and 140 inches. Moreover, the Caribbean side receives rainfall rather uniformly throughout the year in contrast to the Pacific side's marked seasons.

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In the eastern Darién province both coasts receive year-round rainfall. Despite some variation, the IDB correctly describes most of the country's lowlands as humid tropics (BID 1995).

The temperature patterns in Panama can be easily visualized by considering the altitudes in the country. In this way, three climactic zones can be identified. The first of these is a low, hot zone lying at altitudes below 700 meters. The coastal temperatures in this zone rarely drop below 78° F, even during the coolest month. Thus, vegetation and crops requiring high heat and humidity, such as rice, bananas and cacao, thrive in this zone, which makes up some 85% of the country's total territory. Second, there is a temperate zone at altitudes between 700 and 1,500 meters. Corn and some vegetables are grown in these regions. This zone makes up about 10% of the area. Finally, the coolest zone is found above 1,500 meters. Coffee and cool weather vegetables thrive in this zone, which covers less than 5% of Panama's total area.

### *Population*

Panama's population is now about 2.8 million, and is growing at an annual rate of about 1.34%. As in the rest of Latin America, the percentage of the population living in cities has grown rapidly in recent decades. Although the country became predominantly urban in the early 1980s, almost half (about 45%) of the population remains rural, with many living in isolated hamlets and engaged in subsistence agriculture. The densest rural population is found in the central-southern peninsula, and the most densely settled part of the country is the strip of land that crosses the country from Panama City to Colón – known

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It is commonly argued that because Panamanian governments have tended historically to rely on the canal as a source of revenue, other sectors of the economy have been relatively ignored in terms of investment and development. It can also be argued that the canal is an important factor in the development of a strong services sector, especially in international finance and banking. In large part due to Panama's unique history associated with the canal, three-quarters of the overall economy is now comprised of services, another 15% derives from industry, and agriculture represents about 11% of the economy. Moreover, as the services sector has become more developed, agriculture has decreased as a portion of GNP from 27% in 1950 to about 11% in 1991 (Cuéllar 1990, IICA 1992). Manufacturing has also grown quite slowly. Having said this, it should be noted that agriculture, despite its modest contribution to GNP, represents more than 60% of the total value of exports. In 1996 food, live animals, beverages, tobacco, vegetable oils and fats made up 71% of the total value of exports, with food and live animals making up the bulk of this (69%) (Wilkie et al. 2000). Moreover, with nearly half of Panama's 2.8 million inhabitants living in rural areas, agriculture remains an important part of the culture and of the daily experience for many Panamanians. Government statistics suggest that about 20% of the economically active population is employed in agriculture, a figure which excludes those employed in food-related industries (Dirección de Estadística y Censo 1996).

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of their contribution to GNP are bananas, shrimp, sugar cane, coffee, basic grains and pulses (rice, corn, beans), beef and pork (BID 1995, IICA 1992). Generally speaking, there are many smallholders throughout the country that produce basic grains, roots and tubers, and a small number of highly capitalized growers that produces surplus grains (especially rice) for the domestic markets, as well as traditional and non-traditional exports. There is also a group of relatively wealthy farmers with small land holdings which engages in truck farming and export of high value vegetable and fruit crops, which are increasing in importance. The two significant rice producing areas are in Chiriquí province in the west and Panama province near the capital. Otherwise, the basic food crops are grown throughout the country by small and medium size farmers. Commercial banana and sugar cane production are almost exclusively in the hands of transnationals (bananas) and other large agribusinesses (sugar), who maintain their own financing, technical support and marketing systems. Beef cattle and dairy production are important in the western and central provinces. Coffee is grown in the temperate highlands. Some of the important emerging non-traditional exports are cantaloupe, honey dew melon, watermelon, pineapple, onions and potatoes.

Production of the traditional food crops (rice, corn and beans) has grown over the last several decades, while the acreage dedicated to them (mainly rice and corn) has grown only modestly (see Figures 1 and 2). Thus, productivity in these crops (at least in terms of production per unit of land) has increased somewhat in rice and corn, with little apparent productivity gain in beans. Until fairly recently, the goal of rice production had been national self-sufficiency – to produce enough rice nationally so as to fully supply domestic markets and avoid the importation of any rice. This was congruent with the import substitution

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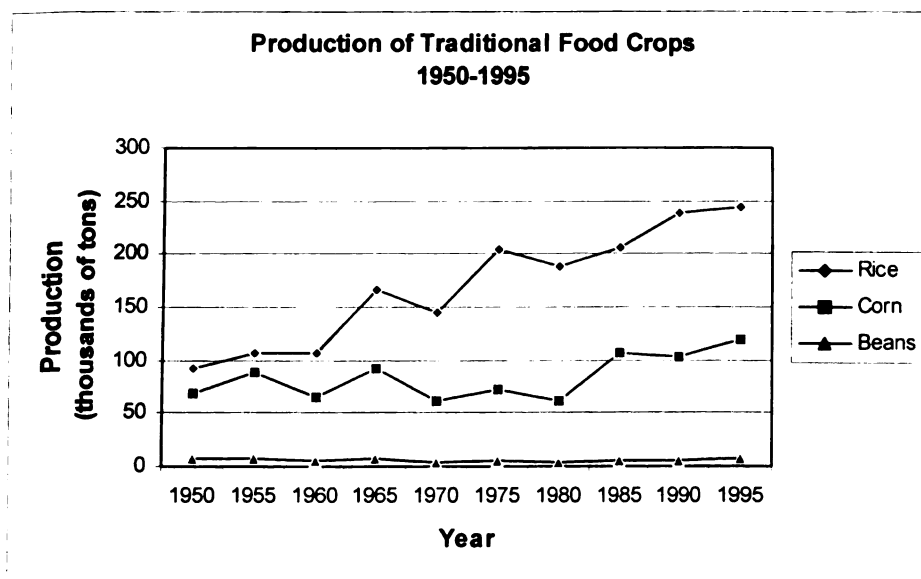
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**Figure 3**

Sources: Compiled from (BID, 1995; Dirección de Estadística y Censo, 1996a; Dirección de Estadística y Censo, 1996b; Dirección de Estadística y Censo, 1991).

**model** of development followed up until the 1980s, and it was fairly successful. Currently, **the focus** among research and producer communities is to make rice production competitive **in international** markets in order to enable Panamanian producers to successfully export. **Still**, traditional crop farming has lost some of its importance – in strictly economic terms – **while** cattle raising and high value export crops have gained in importance.

*Exports.* As was noted above, agriculture makes up the bulk of the total value of **Panama's** annual exports. Except for a significant dip in the mid-1970s to early 1980s, this **has been** the case for at least the past three decades, as is shown in the table below.

Table 1: A

Year
%

Source: *Status*

Area  
(thousands of hectares)

Figure

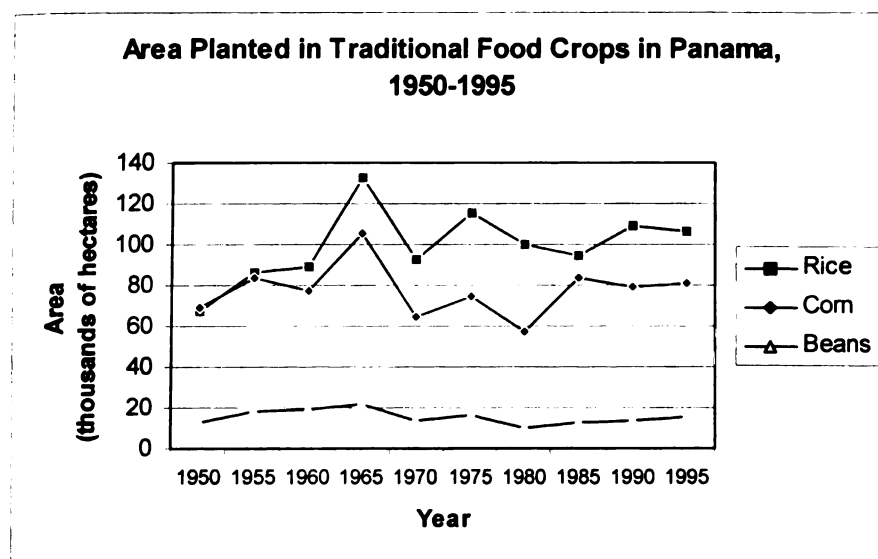
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**Table 1: Agricultural Exports as a Percentage of Total Export Value, 1970-1996**

Year	1970	1975	1980	1985	1990	1995	1996
%	68.6	29.4	36.4	56.6	53.9	63.9	60.6

Source: *Statistical Abstract of Latin America*, Vol. 36 (Wilkie et al. 2000).



**Figure 4**

Sources: Compiled from (BID, 1995; Dirección de Estadística y Censo, 1996a; Dirección de Estadística y Censo, 1996b; Dirección de Estadística y Censo, 1991b; Dirección de Estadística y Censo, 1991a).

The export crops that have long been an important part of Panama's total exports include banana, shrimp, sugar cane, coffee and cacao. For much of the period from 1950 to the present, bananas, shrimp and sugar were the agricultural commodities that made up the bulk of the total value of exports. In recent years shrimp has become increasingly important, while sugar and coffee have decreased in terms of relative value. Indeed, since 1985 bananas and shrimp have led the list as the two leading exports in percentage of total value (Wilkie

et al. 2000: 591

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As of 1998, the

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Table 2: Leading

Year	
1955	Bananas
1965	Bananas
1970	Bananas
1975	Refined P
1980	Refined P
1985	Bananas
1990	Bananas
1995	Bananas
1998	Bananas

Sources: Compiled from  
en Cifras: Años 1991  
Latin America, Vol. 3

et al. 2000: 591). As shown in the table below, for 1995 the principal export commodities in terms of total value were bananas (33%), shrimp (14%), coffee (6%) and sugars (3.1%). These commodities, along with beef, processing tomatoes and roots and tubers now make up more than 60% of the total value of Panama's exports (BID 1995, Wilkie et al. 2000). As of 1998, the two leading export commodities continued to be bananas and shrimp, though their percentage of total value was not available.

**Table 2: Leading Exports as a Percentage of Total Export Value, 1970-1998**

Year	Commodity / % of Total Value			
	Top	Second	Third	Fourth
1955	Bananas / 64.0	Shrimp / 25.8		
1965	Bananas / 49.8	Refined Petrol / 29.0		
1970	Bananas / 57.4	Refined Petrol / 18.8		
1975	Refined Petrol / 45.5	Bananas / 21.0	Shrimp / 6.7	
1980	Refined Petrol / 22.7	Sugar / 18.3	Bananas / 17.1	Shrimp / 12.1
1985	Bananas / 23.3	Shrimp / 17.8	Sugars / 8.1	Refined Petrol / 6.0
1990	Bananas / 47.8	Shrimp / 13.8	Sugars / 8.3	Coffee / 3.1
1995	Bananas / 33.0	Shrimp / 14.0	Coffee / 6.0	Sugars / 3.1
1998	Bananas / ~	Shrimp / ~		

**Sources:** Compiled from the *Statistical Abstract of Latin America*, Vol. 36 (Wilkie et al. 2000: 591), *Panamá en Cifras: Años 1991-1995*. (Dirección de Estadística y Censo 1996: 106-107) and the *Statistical Abstract of Latin America*, Vol. 32 (Wilkie et al. 1996: 624-626).

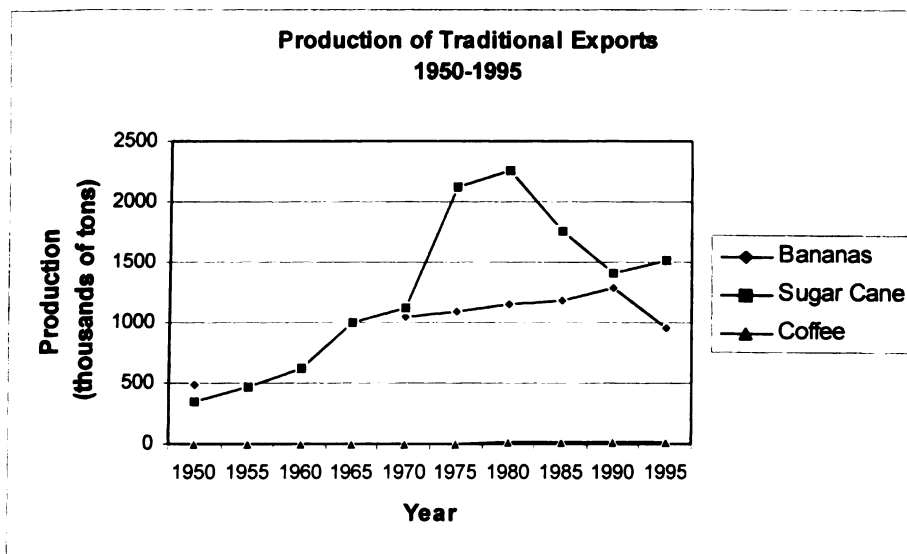
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Production  
(thousands of tons)

**Figure 5**

Sources: Compañía  
Estadística y Censo  
(Censo, 1991).

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**Figure 5**

Sources: Compiled from (BID, 1995; Dirección de Estadística y Censo, 1996; Dirección de Estadística y Censo, 1996; Dirección de Estadística y Censo, 1991; Dirección de Estadística y Censo, 1991).

As is shown in the figure below, bananas have experienced steady gains in production over the last several decades, though production did drop off in the 1990-1995 period. Sugar cane, while experiencing rapid growth from 1950 to 1980, has generally been in decline since then, a fact likely explainable by declines in world sugar prices. Though not as evident in Figure 3, coffee production has grown nearly four-fold from 6.2 million pounds in 1950 to 24.3 million pounds in 1995. This growth has occurred while the area devoted to coffee production has remained virtually unchanged since 1960.

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*The Structure of Agriculture.* The 1980 agricultural census registered about 150,000 “agricultural exploitations”<sup>1</sup> (or farms), of which 100,000 were considered to be less than 5 hectares, and only 1,500 of which were classified as being over 200 hectares. The 1990 census registers 214,000 farms, almost half of which (100,000) were less than 1 hectare, and some 75% were less than 10 hectares. This shift toward a greater overall number of farms, and greater number of small farms suggests increasing pressure on the land. IICA (1992) notes that as of 1992 about 7% of these farms occupied 66% of the area. The units within that 7% were 50 hectares and larger. Thus, in general, there is a large number of smallholders that occupies a fairly small percentage of the total area. Likewise, there is a small number of landholders that occupies the bulk of the agricultural area, many of whom are engaged in land-extensive beef cattle production.

As noted in the previous footnote, the estimates of farm size are made without regard to the form of tenancy. Thus, a family that lives on and works a 3 hectare farm for which it holds no title is included in the census, just as a family with holdings of 50 hectares for which it does hold title would be counted. Four types of tenancy are typically recognized: (1) title to the property is held (24% of farms), (2) the occupant/farmer has no title to the property (67% of farms or 50% of the land area), (3) the property is rented, or (4) some combination of the above (IICA 1992). Cuéllar (1990: 15) identifies four sectors of producers in Panamanian agriculture: the subsistence sector, the reform sector, the commercial sector

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<sup>1</sup>The census defines the term *explotación agropecuaria* as “. . . any extension of land utilized either totally or partially for agricultural and/or animal husbandry activities by a producer and the members of his family, without consideration of title, size or location. . . . The agricultural exploitation is known by the names of farm, roza, hacienda, garden, etc.” (Dirección de Estadística y Censo, 1981). In his reading of the census, however, Cuéllar (1990) uses the term *fincas*, which translates closely as “farms,” to refer to agricultural exploitation. For consistency, I will follow Cuéllar here.

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oriented towards internal markets, and the commercial sector oriented towards external markets. Let us look briefly at each of these in turn.

The *subsistence* sector comprises the majority of Panamanian farmers. Production in this smallholder sector is oriented primarily toward on-farm consumption and little is sold off-farm. In order to generate cash for the household, members of this group frequently sell their labor to larger producers, or engage in urban occupations if they live near a larger town or city. Most subsistence farmers do not hold title to the lands on which they live and work, in part due to the bureaucratic difficulties in gaining title to land – a process that takes two to three years on average, but may take as many as 25 (IICA 1992). Because they tend to be marginalized politically and economically, smallholders have little access to credit, and not surprisingly they tend to employ low levels of production technologies, at least in the conventional sense of agrichemical inputs and even mechanization. Often not organized into cooperatives or producer associations, this group enjoys little representation in political and economic spheres.

The *reform* sector is a creation of the state. It is the result of agrarian reform in the 1970s for the benefit of the landless *campesinos* and minifundistas. Agrarian reform created collective associations such as cooperatives, *asentamientos campesinos* or peasant settlements, and agrarian juntas in which production is organized collectively. The strategy was to provide these collective organizations title to their land, as well as other services such as access to credit, extension services and technologies, in order to encourage greater production and productivity and raise incomes. The reform organizations provided an entity – a structure toward which the state could direct agricultural and rural development efforts.

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The collective units in the reform sector are generally considered medium size producers. Although still relatively limited, they do have some negotiating power in the agriculture sector.

The *commercial* sector oriented towards internal markets comprises medium to large producers. These producers tend to be well organized into associations – especially in rice and beef cattle – and therefore they have substantial negotiating power in the sector. This results from their significant participation and representation in political and economic spheres. The two most salient examples are the Association of Rice Producers of Chiriquí and the National Association of Cattlemen. Their position in the sector gives them direct access to the research organizations. They tend to seek out research information directly from IDIAP, and they also hire private technical experts – some of whom are IDIAP employees who consult during their private time – as intermediaries for seeking out information and implementing new technologies in their production systems. While they have this access, it does not necessarily mean that their production systems are always highly capitalized. The beef producers, for example, often engage in extensive cattle raising, which does not necessarily require high levels of technology, though it may involve the use of improved pasture grasses.

The *commercial* sector oriented toward export markets consists mainly of large producers, some of which are transnational corporations. These producers have the highest negotiating power in the sector. They have access to domestic and international credit and tend to use high levels of technology. Examples of producers in this group are the transnational corporations and large agribusinesses that dominate the banana and sugar

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*Practices.* The practices in each of these sectors vary, though there is no clear distinction or rule that determines the kinds of practices and technologies that will be employed by producers in each group. Indeed, there are no clear and definite boundaries between the groups. Having said that, in the subsistence sector the *roza y quema* (slash and burn) system is common. *Roza* is a term used to refer to a set of practices that begins with a new piece of ground being cleared and burned each year. A crop is planted in and successive crops can be raised for two to three years, when productivity typically drops off. At this point the land is left fallow for a few years until its fertility is restored. The cycle can then be restarted. This results in migratory patterns of agriculture, and can be sustainable where population pressure is low. The more common scenario, however, is that growing populations exert increasing pressure on the land, which tends to lead to shortened fallow periods, decreased soil fertility and therefore decreased productivity.

As might be expected, the other sectors employ greater levels of conventional technologies. The collective organization of the reform sector allows farmers to receive technical assistance from the extension services and purchase and use greater levels of inputs. In the commercial sector, almost all of the crop production is mechanized. Among the large rice producers technologies such as laser leveling are common, as are high-yielding varieties.

### *Infrastructure: General and Agricultural Research*

*General Infrastructure.* Panama's infrastructure to move agricultural commodities

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internally and also to export them is reasonably good. A strategic advantage of the country is its control of the canal and its consequent easy access to shipping to either the Pacific or Atlantic side of the US. As stipulated in the 1977 agreement with the US, the canal, canal zone and remaining US military bases were transferred from US to Panamanian control on December 31, 1999. Although Panama has some 14 ports, those at Balboa (the Pacific entrance to the canal) and Cristóbal (the Caribbean entrance to the canal) are by far the most important. Despite its shipping advantage with the canal, Panama was slow in the 1970s and 1980s to make the investments to convert its ports to handle container traffic efficiently. To some extent it missed an opportunity to capitalize on the containerization revolution in shipping, and lost significant business to competing ports in the mid 1980s (World Bank 1985). The most important internal mode of shipping is trucking. The country has a total of 11,258 km of highways, of which 3,783 km are paved and 7,475 km are unpaved. There are also some 355 km of railways, though some have argued that the rail system is slow and inefficient (World Bank 1985).

*Agricultural Research Infrastructure.* There are a number of organizations that make up the national agricultural research system in Panama. While IDIAP is the most important of these, and will be our focus here, it is worth mentioning that the FACA (Facultad de Ciencias Agronómicas de la Universidad de Panamá) also contributes to the national research effort and especially to the teaching and training of undergraduates in the agricultural sciences. FACA members and IDIAP researchers collaborate on projects, mentor students, and intern students for eventual work in IDIAP or for graduate studies. Two other sources of research and collaboration that contribute to the sector are agreements with a host of

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<b>2) Central</b> (Veraguas a
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<b>4) Genetic</b> (Penonomé
<b>5) Eastern</b> (Panama Ea

Source: IDIA

international organizations, such as the international research centers, and finally the private sector. Nestlé, for example, carries out research on processing tomatoes and United Brands carries out its own research and development for bananas.

Some of IDIAP's infrastructure was inherited from MIDA and other organizations in the sector when IDIAP was created in 1975 (Cuéllar 1990). It has research infrastructure throughout the country, though efforts are concentrated in the important agricultural regions. IDIAP has its main offices in Panama City, where it houses its administrative, planning, finance, computing, other support staff and a library. Currently, IDIAP is organized into five regional research centers: the Western, Central, Southern and Eastern centers, and the Genetic Resources Center. Each of the centers has its own infrastructure, as is shown in Table 3.

**Table 3: Regional Centers and Their Components**

<i>Regional Centers</i>	<i>Regional Subcenters</i>	<i>Experiment Station</i>	<i>Experimental Farms and Fields</i>
<b>1) Western Research Center</b> , in David (Chiriquí and Bocas del Toro) (comprises 5 subcenters, 1 experiment station and 6 experimental farms)→	Alanje, Boquete, Caisán, Cerro Punta, Progreso, Santa Marta	Gualaca	Changuinola, Rio Sereno, Barú, Gualaca, Chiriquí
<b>2) Central Research Center</b> , in Divisa (Veraguas and Herrera)	Calabacito	~	Arenas, Ocu, Soná
<b>3) Southern Research Center</b> , in La Villa (Herrera and Los Santos)	El Ejido	~	Tonosí
<b>4) Genetic Resources Research Center</b> (Penonomé y Panamá West)	Rio Hato	~	El Coco, Las Zanguengas, Ollas Arriba
<b>5) Eastern Research Center</b> , in Chepo (Panamá East, Colón y Darién, San Juan)	Tanara	~	Santa Fe, Buena Vista

Source: (IDIAP 2002a).

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The Western Research Center has the most developed infrastructure, with five subcenters, IDIAP's only experiment station, and various experimental farms and fields.<sup>2</sup> The intensity of the investment and effort in the West reflects the importance and diversity of agriculture in this part of the country. Because the region has major rice, beef cattle and dairy areas, as well as the important highland vegetable and coffee growing region, a variety of research activities are carried out in the region. The Cerro Punta highlands subcenter, for example, has a phytopathology laboratory, which does diagnostics of pests and diseases, and a phytonematology laboratory, which undertakes analyses and identification of nematodes in soils and plant tissues. In addition, this subcenter has greenhouses, potato seed storage facilities, and a small weather station, all on some four hectares of land. The important achievements of this subcenter include research on disease resistant potato seed, integrated management (IM) of highland onions, mechanized rice, plantain production, minimum tillage beans, and dairy and beef production.

Not all of the subcenters in the region are as advanced as Cerro Punta. While other subcenters, such as Boquete, Caisán and Santa Marta, have basic offices for their researchers and technicians, they carry out much of their work in farmers' fields. Caisán, for example, has been recognized for its successful program in On-Farm Client-Oriented Research (OFCOR), which is largely focused on small farmers who produce basic grains (Cuéllar 1990). Santa Marta focuses on animal husbandry and small dairy operations. The Gualaca Experiment Station serves beef cattle and dairy constituents, with research on improved

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<sup>2</sup>Information on IDIAP's infrastructure is drawn from BID (1995: 99-105) and IDIAP (2002).

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pasture grasses, dairy operations and animal health. The station has basic offices and about 450 hectares of land where researchers carry out trials and run an experimental farm. Similarly, the Chiriquí Farm runs an experimental dairy operation on 200 hectares of land. All of the activities for the Western Research Center are coordinated, organized and supported from the central offices in David, which also has a library and computing center.

Despite its somewhat remote location, the Central Regional Center in Divisa is in some ways the heart of IDIAP's presence in the country. Its location in the geographic center of the country, the concentration of the most advanced laboratories, and the location of IDIAP's main library were part of an original plan to make the Divisa facilities the technical heart of IDIAP. Moreover, its location was intended to provide a balance of resources, avoiding the concentration of too much of the organization's facilities and personnel in Panama City. Having the main library in Divisa also makes it equally available to those in the West and East. Divisa's strength is in its laboratories, which specialize in bromatology, soils, tissue culture, rice quality, phytopathology, entomology and biotechnology (IDIAP 1991 b) (see the table below for more detail on the laboratories). Projects underway at Divisa include genetic improvement in peppers and tomatoes, plant biotechnology, sustainable production and post harvest management of cassava, yams and taro and beef production. It also has at least one subcenter at Calabacito and a 200 hectare experimental farm at Arenas.

The Southern Research Center has a subcenter at El Ejido with 100 hectares of land, and experimental fields at Tonosí. Projects underway at this center include IM of melons, watermelon, and zapallo for export, IM of mechanized corn, research on processing tomatoes, and dairy and beef production. The Genetic Resources Center at Rio Hato has two

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experimental farms at Rio Hato. Rio Hato Sur has equipment and about 50 hectares of land, while Rio Hato El Bajo has offices, dormitories, seed storage and about 90 hectares of land. The Center also has experimental fields at El Coco, Las Zanguengas, and Ollas Arriba (15 hectare experimental farm). Projects under way in this center include genetic improvement in corn and rice, IM in mango and irrigated rice, and IM in pineapple for export. The other important component in this region is the Seed Unit. This is a small plant with a laboratory for seed analysis, and equipment for cleaning, drying, classifying and treating seed. The seed unit is responsible for producing basic and registered seed, and providing processing and storage services to the private sector (IDIAP 1991b: 11).

The Eastern Research Center serves the region east of Panama City, including Colón and Darién province. This region has a subcenter at Tanara, where the 50 hectare Tanara-Chepo Experimental Farm is located. Subcenters are also at Santa Fe and Buena Vista. The work in the Santa Fe region is well into Darién province, which is primarily subsistence farming, some of it with minority ethnic groups. The Buena Vista area has a small plant protection laboratory and 35 hectares of experimental fields at Chichebre-Chepo. This is an important rice growing region, mixed with subsistence farming. Many of the rice growers in this area are absentee farmers who live and own businesses in nearby Panama City, and grow rice for the urban market for additional income. Projects underway in this region include IM in rice, agroecotoxicology, dual-purpose dairy/beef production and research on sustainable systems in Darién. Table 4 summarizes IDIAP's laboratory facilities.

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**Table 4: IDIAP Laboratories**

Scope	Technical Capacity	Location
1. Bromatology	–analysis of animal feeds –services/research/support	Gualaca Experiment Station
2. Bromatology	– elaboration and analysis of agroindustrial projects –research/services/support	Central Research Center, Divisa
3. Soils	– soil analysis, fertilizers, lime –research/services/support	Central Research Center, Divisa
4. Applied Genetics	– micropropagation and callogenesis for phenotype selection in musaceas, flowers	University of Panama, Panama
5. Tissue Culture	– micropropagation of roots, tubers and fruits –research/services/support	Central Research Center, Divisa
6. Rice Quality	– analysis of eating and milling quality of rice –research/services/support	Central Research Center, Divisa
7. Phytopathology	– analysis and identification of nematodes in soils/plant tissues –research/services/support	University of Panama, Tucuman
8. Phytopathology	– clinic and diagnostic of disease agents (fungus) in crops	Central Research Center, Divisa
9. Virology	– diagnostic of viral diseases – germplasm evaluation for virus resistance –research/services/support	MIDA, Tucuman
10. Entomology	– diagnostic and pest control – research/services/support	Central Research Center, Divisa
11. Entomology	– diagnostic and pest control – research/services/support	Western Research Center, David
12. Agroecotoxicology	– behavior, content and evaluation of pesticides	MIDA, Tucuman
13. Phytopathology	– diagnostic of pests / diseases	Subcenter of Cerro Punto
14. Phytonematology	– analysis and identification of nematodes in soils / plant tissue	Subcenter of Cerro Punto

Source: Adapted from (IDIAP 1991b: 9-9a).

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Finally, a brief comment of IDIAP's personnel is in order. In a 1992 report, IICA noted that "... despite having the smallest agricultural sector in Central America, Panama has the greatest number of agricultural researchers in the public sector with post graduate degrees . . ."(IICA 1992: 61)<sup>3</sup>. As of 1997, between researchers and mid- to upper level administrators IDIAP employed about 130 people with university degrees, including 10 PhD's, 46 MS's, and 74 BS's (IDIAP 1997). Including the laboratory technicians the total number of technical personnel rises to 152. The total number of employees, including support, manual laborers and others is about 450. Among the 152 employees mentioned above, 12 are top administrators, 89 are researchers, 12 are in technology transfer, 21 are in planning, and six are in finance.

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### *Narrative Commentary*

To this point the beginning of a typical materialist narrative has been presented. In the technical, policy oriented literature on agricultural development the narrative generally follows this logic. It begins with a material inventory of the country – geography, climate, agriculture, infrastructure – a simple listing of the physical, technical, human and financial resources of the country. Like an inventory of a business, it focuses on those things available for use. The purpose of an inventory is never to merely describe, but to describe, define, survey, measure and enumerate with a specific purpose in mind. To represent and quantify an inventory of material things is also to exert some control over them. Even though people

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<sup>3</sup> All quotations from sources in Spanish are my own translations. This includes quotations in later chapters from the interview data.

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are commonly discussed in such inventories, they are typically quantified as a human-technical resource. The control in this case is under the rubric of improvement and development, which of course requires intervention. A critical reading of this standard narrative suggests that for the author the intervention is assumed and unproblematic. A more skeptical interpretation might argue that the subtext here says, “these are the available resources to use to carry out our project.”

The next step in argument then says: given this inventory, the country has organized **i**n the following manner in order to develop its resources, under these policies and with these **t**echnologies. The subsequent turn hinges on demonstrating a gap between existing policy **i**n the country and the author’s theoretical framework which provides an explanation for how **d**evelopment really occurs. For example, analysts from the mid 1980s to the present make **t**he case that Panama still relies on import substitution policies while the obvious rational **m**ove is toward market liberalization. Extant policies are variously described as distorting **a**nd politically motivated rather than based on a rigorous and objective understanding of **m**arkets. Existing technologies are portrayed as traditional and inefficient. Based on this **d**emonstrated gap the author proceeds to argue that the only rational solution is to follow the **P**olicy and technology prescriptions promoted by the organization for which he is a **S**pokesperson. In the next section, we take a closer look at these issues. Specifically, we will **s**ee the analysis turn from description to prescription, based on the completed inventory.

Several significant studies of Panama’s agricultural sector were carried out by major actors in agricultural development circles during the period from 1985 to 1996. Among these are one by the World Bank, which is a country study that attempts an overview and diagnosis

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of the structure of Panama's economy as a whole (World Bank 1985). A second study, conducted by the FAO, focuses specifically on IDIAP with the objectives of analysis, evaluation and recommendations (FAO 1985). In a study published by ISNAR, Cuéllar (1990) focuses on IDIAP's activities in on-farm client-oriented research, but also reviews agricultural technology policy in Panama in historical context. An analysis of Panama's agricultural sector was published in 1992 by IICA. This study intends to diagnose the main problems of the sector and offers policy remedies to resolve them (IICA 1992). Finally, two sizable reports by the IDB take measure of Panama's agricultural sector and propose a specific program to modernize the entire sector (IDB 1995, 1996). Although all of these studies recommend a set of policy measures based on their diagnoses, the reports by the World Bank and IDB have more explicit implications for programs of intervention. FAO and IICA, primarily policy research organizations, generate information that feeds into the analyses of the development organizations. Given the biophysical context, the resources and infrastructure discussed above, how is Panama organizing its resources to produce research and technologies for the agricultural sector? Under what policy guidelines? Let us look briefly at these organizations' views of Panama's agricultural technology policy.

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### *Technology Policy and Development*

Panama experienced strong economic growth in the 1960s, including in the agriculture sector, which grew by 5.3% annually during the decade. From 1960 to 1965 production of rice, corn, beans, and bananas grew. Agricultural exports were robust, with bananas making up fully half of the total value of exports in 1965. Beef and shrimp were

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also strong export commodities. Although limited prior to the 1970s, there were some research efforts on genetic improvement in rice and corn in the Escuela de Agronomía, which became FACA in 1965. The main objective of research in this period was to find and develop new varieties of the basic food crops that adapted well to local conditions. Under the import substitution model of development, research would produce technologies to help to replace imports thereby contributing to the development of local agricultural industry and also saving foreign exchange.

According to the World Bank (1985) growth in the agriculture sector during the 1960s was due to a development strategy in which the state exerted relatively little control in the sector, especially in terms of pricing policy, production and commercialization of agricultural products. In contrast, from 1969 to the early 1980s the state became heavily involved and growth dropped off during this period. In part, the drop in growth was due to a series of external and domestic events, including the increase in world oil prices, related inflation and general world recession, and the decrease in national revenues due to the drop in canal activities related to Vietnam. The government compensated by deficit spending, and by the end of the 1970s the external debt had reached nearly 80% of the GDP (World Bank 1985).

State activities in the sector in the 1970s were significant. From 1969 to 1973 the government undertook an ambitious program of agrarian reform, creating collective Production units in the form of *asentamientos campesinos*, *juntas agrarias* and cooperatives. The idea was first to alter the structure of agriculture through the reform and then create state institutions and programs to direct services at the reform sector to raise production and

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productivity, with the end of creating an economic base for these groups. Moreover, if the government could generate significant economic activity in rural areas it would create employment for the rural poor and help to stem the flow of people from rural areas into Panama City and Colón. In combination with the reform the state did several things. First, it created an array of institutions to serve the sector, including MIDA (1972), the Agricultural Development Bank (1973), and the Agricultural Marketing Institute, the Agricultural Insurance Institute and IDIAP, all in 1975. These institutions were intended to provide an entire package of services to the agricultural sector, including credit, marketing services through which the state guaranteed purchase of the production and supplied domestic markets, insurance services and agricultural research and extension services. While these institutions were intended to serve the entire sector, up until the early 1980s "... much of these institutions' efforts were directed towards assisting the *asentamientos* ..." (World Bank 1985: 75).

In addition to the institutional matrix, the government established in the same period a protectionist regime for agriculture. Price supports were put in place for rice, sugar and most other commodities. Controls were placed on agricultural imports and exports to protect domestic producers and consumers. Through the Institute for Agricultural Marketing the government controlled pricing and marketing policy for most agricultural products.

The role of technology in this development strategy was primarily to increase production and productivity in order to replace imports and, where possible, achieve self sufficiency in the production of certain commodities. The state also had an interest in supplying food for the populace at reasonable prices. In addition to supporting production

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from the *asentamientos*, the other significant part of the state's strategy to reach the goals of self sufficiency and low cost food supply was to become directly involved in production. In the 1970s several production enterprises were created, the most important of which were the Bayano Development Corporation (rice, cattle and timber), the Chiriquí Citrus Company (orange juice concentrate) and La Victoria Sugar Corporation. Indeed, the fact that sugar production more than doubled from 1970 to 1980 (Figure 3), and that sugar became the second most valuable export, and the top agricultural export in 1980 (Table 2), is explainable in part by the involvement of state farms and the reform sector in production. Also the state agricultural enterprises were another part of the strategy to create employment for the rural poor and curtail rural to urban migration.

By the mid- to late 1970s the goal of self sufficiency had been achieved in a number of commodities, including rice, poultry, potatoes, onions and tomato products (World Bank 1985: 59). By 1982, Panama had reached a surplus position. Agricultural research and technology was so important to the state in achieving these goals that in 1979 the government signed a major agreement with USAID for the financing of the Technology Development Project. The objective of this project was to strengthen the physical infrastructure of IDIAP, as well as to provide support for the training of personnel. Over the next few years funds went to constructing installations such as research centers, subcenters, offices, and laboratories, as well as supplying these facilities with the necessary machinery and equipment for research and training, including laboratory equipment and vehicles.

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Yet, by the mid-1980s the major actors were pointing to serious flaws in Panama's development policy. According to Cuéllar (1990: 6), the reason for the deceleration in economic growth was "... the exhaustion of the model of economic growth based on import substitution." Indeed, despite the expansion of the public sector to create employment, Panama was faced with high unemployment in 1982. Moreover, much of public sector expansion in the 1970s was financed with external debt, and in the early 1980s Panama was servicing an external debt larger in terms relative to its own economy than those of Argentina, Brazil or Mexico (World Bank 1985: 4). This, combined with general impact of regional and world recession, led Panama to restructure its debt through agreements with the international finance community. In 1983, Panama entered into a structural adjustment program with the World Bank.

In agriculture, the principal problems were defined in terms of development policy and technology. Following an import substitution model meant that the goal of self-sufficiency remained the basis for the agricultural strategy. To this end, the state had in place a structure of incentives which was intended to encourage production in targeted crops (e.g., rice, poultry, potatoes, onions and tomato products). These incentives consisted of price supports that the state would pay producers for their product. Then the state would supply domestic markets with these products at a reduced price, effectively subsidizing a lower cost food supply. The criticism of this strategy is that it leads to inefficient production systems, because domestic producers do not face competition from producers outside the country, and therefore have little incentive to become more efficient. Absent this incentive structure, Producers tend not to invest in technologies that will increase productivity, so eventually

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investment and growth in the sector tend to drop off. This also limits the possibilities of growth in employment (World Bank 1985). Having achieved self sufficiency in a number of commodities in the first half of the 1970s led to “. . . a (de)stimulus in production and an alarming absence of investment in the sector” in the second half of the decade (FAO 1985: 31).

Moreover, through the early 1980s the government retained control over the prices of most agricultural inputs and outputs and over foreign trade in agricultural and agroindustrial products (World Bank 1985). The only agricultural export to experience substantial growth in this period was sugar, which was accomplished through direct state intervention and involvement in production. As Cuéllar summarized the situation in the late 1980s, “. . . state interventionism is considered as one of the causes of the stagnation of the agriculture sector” (Cuéllar 1990: 17). The principal constraints in the sector, as seen by the major actors, were pricing policy, subsidies, tariffs, high production costs, inefficient technologies and inadequate infrastructure.

The technological problems deserve further mention. The relatively low productivity in Panama’s “technologically backward” (Cuéllar 1990: 17) agricultural sector was seen to be partly due to “distortions” caused by the incentive structure, but also due to ineffective research and technology transfer (World Bank 1985). Low yields in Panama in corn, beans, rice, coffee, cocoa, potatoes point to a breakdown somewhere in the technology generation system, which is partly an infrastructure issue. FAO also points to the “low levels of technology” in the agricultural sector (FAO 1985: 113). High production costs in the sector also suggest a lack of cost saving technologies. Climate, soil conditions and disease are also

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identified as factors limiting growth in fruit and vegetable production. The most promising crops are melons and plantains. Bananas are a stable export crops, though exports in 1984 were very low due to greater incidence of Sigatoka negra, a disease that attacks banana plants. Finally, all of the studies point out the lack of technologies and infrastructure for irrigated cropping systems.

In 1982 a number of changes were put into place to “dynamize the sector and improve its efficiency” (Cuéllar 1990: 17), and moreover to “. . . create greater incentives for private investment through greater profitability in an environment of more liberal prices and markets, and to reduce subsidies to the sector in line with the austerity program and fiscal discipline adopted by the government (FAO 1985). In sum, these included:

- eliminating distortions and inefficiencies resulting from price controls in the domestic markets . . . and to diminish the control and the direct participation of the public sector;
- orienting the agricultural sector more toward production for export;
- reducing protection against the external sector;
- reducing producer subsidies and subsidies for state agricultural corporations (e.g., the least efficient of the four state sugar mills was closed, and state subsidies to the agricultural development corporation and the citrus processing plant were eliminated);
- increasing productivity through more effective and selective research and technology transfer;

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- revising the role of public institutions in agriculture to achieve these objectives.

### *Recommendations*

These measures were pursued in the early 1980s. In addition to these, a number of recommendations emerged from the various major studies of the sector in the mid- and late 1980s. The main recommendations of these reports are summarized below. In general, they call for both a broadening and deepening of the structural adjustment reforms begun in 1983, as well as measures geared towards technology and infrastructure:

#### *General*

- Overhaul of the structure of incentives which is currently geared towards import substitution
- Open the economy to international competition in order to reverse the bias toward import substituting activities
- Encourage a leaner, more efficient public sector
- Encourage new private investment to expand export-oriented, employment intensive activities, with much higher output per unit of capital spent
- Improve infrastructure and equipment for exports, increase operating efficiency in export operations

#### *Agriculture*

### *General Policy*

- Revamp the agriculture sector policy in order to permit greater liberalization of market mechanisms
- Reduce the participation of the state in agricultural production and commercialization in order to raise agricultural productivity
- Reduce price controls on agricultural and agroindustrial input and outputs, especially price supports for rice
- Reduce and eventually eliminate subsidies to state institutions and inefficient producers
- Stimulate private investment by stabilizing the “rules of the game” long enough to ensure investors a reasonable rate of return on investment
- Increase production of commodities in which there is comparative advantage (e.g., bananas, grass-fed beef, pond-bred shrimp)

### *Technology*

- Orient research toward medium and small farmers, stimulating domestic cattle raising and irrigated agriculture
- Generate better technologies to achieve comparative advantage in fruits and horticulture
- Pay immediate [research] attention to those nontraditional commodities which can be exported (e.g., flowers, citrus, melons, watermelons, ginger, pineapple, yams, papaya, and strawberries) where producers will need



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- Strengthen efforts in irrigation and crops suitable for irrigation (e.g., small scale labor intensive vegetable and fruit crops) in order to increase productivity
- IDIAP should test varieties (e.g., especially in melons) to help ensure local adaptation and reduce risks to producers.

### *Infrastructure*

- Government should stimulate competition and investment by providing the essential physical and service infrastructure which the private sector is unable to provide (e.g., agricultural research and extension)
- Reorganize and strengthen the capacity of IDIAP to increase practical research capabilities more geared to farmer's needs (e.g., use USAID funding to finance the construction of buildings and lab equipment)
- Improve the organization of IDIAP's administration, physical resources and human resources
- Strengthen the link between research and extension

The above definition of problems and proposed solutions from the World Bank, FAO and others provides us with a portrayal of the issues from the mid to late 1980s. Two more recent studies – from IICA and the IDB – define the problems in essentially the same terms and propose solutions that are an intensification of the policy direction chosen from 1982 on.

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Generally, restrictions to development and the removal of these restrictions are in terms of policy, technology and infrastructure. There are some unique points of emphasis in the early to mid 1990s. For example, IDB stresses a closer integration of the private sector in priority setting in agricultural research (BID 1995). Both IDB and IICA urge the strengthening of a deficient production, transport and ports infrastructure. IICA, in particular, attributes low yields in a number of commodities (e.g., rice, corn, coffee) to inadequate research and technologies. In short, while the studies of the mid 1990s recognize some advances in government policy, they continue to recommend moving toward market liberalization policies coupled with increased efforts in technology generation and the expansion and improvement of infrastructure as the primary solutions to factors limiting development in the sector.

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*Narrative Commentary*

Creating a narrative is essentially a process of ordering (Law 1994). Basically, ordering means to selectively gather together messy and complex bits of the empirical world and to impose an order on them such that they ultimately hold together to tell a coherent narrative. It is necessarily a selective process because no one from any perspective can say everything about a particular topic. They may try to do so, but it is unlikely the end result will be coherent or even accessible. It is not that the world has no order whatsoever. Rather, the world can be ordered in numerous ways, each of which has substantial but not complete

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The material determinist account is one example of an ordering that is often quite effective, if one measure of effectiveness is whether documents are credible enough to be implemented in policy. Material determinist accounts have frequently served as the basis for development policy around the world. What explains their success? In part, rhetorical strategies contribute to their effectiveness. Authors in this perspective are careful not to speak of *ordering*; rather they speak of *order*. *Ordering* is a subjective and often unruly process in which the narrator is making choices, interpreting ambiguous data, negotiating the final document with collaborators and compromising. The strategy of authors in this perspective is to obscure those processes – to distance themselves from those subjective processes of production. The authors are silent on their own telling of the story, and are often even nameless when reports are written by a corporate author or committee. The success of these accounts is as much due to what is hidden as to what is shown. The material determinist account also uses an objectivist language. *Order*, in particular material-social order, is something that exists objectively and can be revealed in a neutral account. *Ordering* allows that there are numerous possible interpretations of any pool of data, while the material determinist message, in contrast, is “this is the objective account of *the* real material-social order.” In the account represented above, politics, conflicts and struggles are not visible, nor is the fact that the policy prescriptions and new technologies will benefit some segments of society, while hurting others.

Thus, the power of this narrative derives in part from rhetorical strategies, but these strategies themselves derive legitimacy from their association with the scientific model and

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the current stature of objectivist accounts. The analysts imagine that they are to markets and society what natural scientists are to nature – simply revealers of true “natural” processes. Moreover, this is part of an ideology that is largely shared by the readers of resulting policy documents. This allows the authors to make assertions with little or no evidence, e.g., the inherent inefficiency of the public sector, that in other circles they would be required to demonstrate with customary rigor.

For the above reasons it was often difficult to represent this perspective in its strongest form. In some places, there was a tendency to shift voices in order to attribute ideological statements to another author. So the statement, “growth in the agriculture sector during the 1960s was due to a development strategy in which the state exerted relatively little control,” is attributed to the World Bank.

To revisit the logic of the material determinist narrative discussed earlier, I argued that the narrative begins with an inventory of the biophysical, technical, organizational and infrastructural resources of the country. Then the analysis turns to the policy framework under which the country is using and developing those resources. Typically, the argument is made that the policy is causing inefficiencies and distortions in the “natural” functioning of markets. This diagnosis leads to a prescription with three major components: policy change, new technologies and infrastructure development. This is the formula that has been applied in Panama, and it is the one that I have attempted to represent in the first part of this chapter.

One might raise the question: If the material determinist argument says that development is primarily explained by changes and “improvements” in the biophysical



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world, then why should policy change, (e.g., pricing policy, tariff policy, etc.) be included in this discussion? The response to this is twofold. The first part of the response is that many of the policy recommendations from the major actors have to do with technology and infrastructure policy. The second part of the response is that in the studies reviewed above, the market is treated essentially as a mechanistic object. Society in general is treated as one would discuss a machine, embodied in a “market.” Thus, all one need do is plug in the right elements – air, fuel, compression, spark – and the machine will run perfectly. Intervening or tampering with the mix of elements will disturb the natural equilibrium of the way the machine runs. Thus, interventions such as agrarian reform to benefit the landless, protectionist policies for domestic producers and consumers, state farms to create rural employment, are all seen as politically motivated acts that only distort the natural market.

The irony is that the “market” view, while portrayed as apolitical, is in fact thoroughly political. The assumption is that all that needs to be done is to get the pricing policy, technologies and infrastructure right, and the appropriate kind of development will follow naturally. In the machine metaphor, prices are simply lubricants that will determine the behavior of other components of the machine, namely actors. It assumes that the analyst knows how each actor will respond because actors behave rationally, responding to price signals. Society can thus be fixed with the appropriate (i.e., liberated) price regimes. Yet, in the prescriptions that are offered, there is very little of society and politics. There is no discussion of the role of different interest groups, or how social groups will be differentially impacted. There is no discussion of who will win and who will lose as a result of the new policy. There may be an adjustment period, but it is assumed that the new policy regime will

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benefit everyone. Moreover, one never sees the social processes involved in making technology choices. It is these gaps in the material determinist narrative that also make it difficult to fully represent.

Technical determinism is an important part of the material determinist view. Technology is seen as both autonomous from society and as having determinate effects on society. It is autonomous in the sense that it appears independent and unconstrained from the context of its production. Thus, in the studies by the World Bank, IDB and IICA, the social processes and choices that guide the production and use of technologies are hardly discussed. Nor are the alternative possible paths and the social arrangements that they might imply discussed. The theory that shapes the analysts' views is not discussed explicitly, yet it does draw on prevailing ideas in the more theoretical literature. To better understand this perspective it is useful to briefly review some of the ideas that helped to shape it.

*Naturalistic Theories.* To further illustrate what I mean by a material determinist reading it is perhaps useful to consider first some salient examples where social outcomes are seen as determined by the biophysical, such as in environmental determinism or social Darwinism. For example, nineteenth and early twentieth century theorists such as Spencer drew on evolutionary biology for explanatory power, using an organic metaphor to understand the structure and function of societies, and how they evolved or developed. Naturalistic theory saw societies as determined by their material environment. In its strongest (most deterministic) forms this theory argues that nature creates people with unequal potentials, for example with unequal intelligence, and that those with greater natural endowments will produce greater levels of development. In its weaker forms, naturalistic

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theory holds that different resource environments produce societies with varying endowments and therefore unequal potentials for development. Spencer and others thought that the most advanced societies – areas of “innovation, development and civilization” – derived from rich natural environments, just as an organism thrives in a nutrient rich, environmentally favorable context. These environments, the argument goes, permit high population densities, “. . . thereby increasing economic specialization and division of labor, thus promoting greater political size and armed might . . .” (in Peet 1999: 66). Social Darwinism – the notion of the survival of the fittest societies – combined with its contemporary idea of Manifest Destiny, provided an explanation for US development, a prescription for further developmentalist/expansionist policies and a justification for both. In both the stronger and weaker theses the basic argument was that biophysical things determine which societies will successfully develop. As Peet (1999: 13) notes, “this is often extended into the notion that the strong have to exploit the weak in order to survive or, more benignly, to bring progress to the world.”

Yet, for those early twentieth century thinkers who had great faith in the ability of science and technology to progressively push back the limitations imposed by the material world, naturalist theories must have seemed overly pessimistic. For them, human rationalism would allow societies to “. . . escape the structuring influences of natural necessity” (in Peet 1999: 68). For example, in Germany Max Weber saw the rise of a certain ethic and rationalist thinking as elements that would allow that society to increasingly control and develop its material resources. For Parsons, societies were social systems that would evolve through differentiation and progressive control of the biophysical environment by rational

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humans. This would take these social systems from more primitive to more modern forms, based on the society's ability to master its environment. Following this line of thought any society could, in theory, develop along the lines of the West, given certain important conditions. These conditions were that the non-West embrace "Western" notions of rationalism, entrepreneurial spirit, and market institutions, but also that they adopt "harder" material things from the West, such as technologies and infrastructures. On this latter point, it was crusaders like Norman Borlaug, a plant breeder with the Rockefeller Foundation program in Mexico, who thought that modifying the material world (e.g., improving crop varieties) would lead to the resolution of social problems such as overpopulation and malnutrition, or at least these modifications would bide time until other solutions could be found. As Perkins (1997) notes, Borlaug<sup>4</sup> was something of a proselytizer for the cause of higher yields through plant breeding. In contrast to this emphasis on the biophysical, modernization theory combines the material and social (cultural) in its determinants to explain development. I discuss it next as somewhat of a bridge between material and social explanations of development. It is worth discussing here briefly because of its links with the current modernization narrative being applied in Panama and elsewhere.

*Modernization Theory.* Modernization theory emerged in a post war context in which European and Japanese empires had ended and the Cold War was beginning to take shape. As world leaders like Truman brought attention to "underdeveloped areas" of the world, one of the unknowns was with which of the two dominant economic systems would these nations

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<sup>4</sup>Norman Borlaug is considered by many as one of the figures who laid the groundwork of the Green Revolution with his work in Mexico supported by the Rockefeller Foundation. He was effective in arguing to policy makers for policy changes that would push up yield levels.



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align themselves. Indeed, the term “third world” was first used by the independent left in France, and was later taken up by some Third World leaders, to indicate a “third way” or “third path” that would lead between capitalism and communism, embracing neither (Kiely 1995: 35). Modernization theory, then, was an attempt mainly by western scholars to explain the social realities of less developed areas of the world after WWII, but also to promote and prescribe ways for those countries to make the transition from “traditional” to “modern” – based on a Western norm – in order to ensure their alignment with the capitalist nations. This thrust of modernization theory is suggested in the subtitle of Rostow’s (1960) classic volume, *The Stages of Economic Growth: A Non-communist Manifesto*.

Proponents of modernization theory generally held a linear, progressive view of development as a series of stages through which all societies must pass on their way to modernity. Each stage would be increasingly complex technologically and institutionally. The norm, or the visualized end point, of this progression was seen to be the “advanced,” industrialized west. The goal of “the rest” of the world was assumed to be to catch-up to modern society. Rostow argued that there were five stages through which all societies passed: 1) the traditional stage, 2) the pre-conditions for take-off, 3) take-off, 4) the drive to maturity, and 5) high mass consumption. Developing countries were seen as being at the traditional stage, and therefore it was felt they needed to implement policies to encourage the pre-conditions for take off. The process of transition to modernity was to be spurred by the transfer of knowledge and technology and increasing involvement in commodity markets (Rostow 1960), a tenet that remains at the core of the material determinist narrative.

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intrinsic part of the modernization discourse was a critique of the political, cultural, and psychological dimensions of “traditional” societies. All things traditional would now come under question and would generally be seen as obstacles to modernization. As Kiely observes, “The modern, Western world of social mobility, equal opportunity, the rule of law, and individual freedom was contrasted with traditional societies, which were based on ascribed status, hierarchy and personalized social relations”(1995: 37). Developing country governments were seen as politically unstable and in need of shoring up. Traditional societies were also seen as lacking the cultural and psychological characteristics necessary for modernization. For example, McClelland (1964: 161) asked:

What accounts for the rise in civilization? Not external resources (i.e., markets, minerals, trade routes, or factories), but the entrepreneurial spirit which exploits those resources – a spirit found most often among businessmen.

McClelland argued that “need for achievement” among individuals leads to the generation of economic movement and ultimately national achievement. While he seemed to think that this entrepreneurial spirit was an inherent cognitive characteristic of some individuals, it could also be stimulated. The prescription followed closely behind: “How can foreign aid be most efficiently used to help poor countries develop rapidly? . . . by using it in ways that will select, encourage, and develop those of their business executives who have a vigorous entrepreneurial spirit or a strong drive for achievement” (McClelland 1964: 161).

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Contemporary material determinists are more subtle on this point, opting instead for the language of training and capacity building, which are forms of socialization into the world-view of the development financiers. McClelland's ominous conclusion was certain to grasp the attention of policy makers of the time: "Unless we learn our lesson and find ways of stimulating that drive for achievement under freedom in poor countries, the Communists will go on providing it all around the world"(1964: 174). Obviously, the political landscape is now dramatically different, though ideology continues to play an important role in the current modernization narrative.

In the discourse on agricultural development, the voice of agricultural science has been particularly dominant. Beginning, for example, with Edmund East<sup>5</sup> and later Borlaug, spokespersons for the agricultural science community have argued for support for agricultural research based on the Malthusian scenario that population growth will always threaten to outstrip the supply of food.<sup>6</sup> The response from agricultural science proponents to the Malthusian problem has been to argue that strong support of agricultural research could dramatically increase agricultural productivity, thereby addressing the food supply aspect of the problem, and lead toward general social improvement. While there might be periods of "adjustment," (the price of progress), these would be temporary detours from the general trend toward social improvement (Ruttan 1982). Problems associated with technologies are usually attributed not to their developers, but to resistance or ignorance of

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<sup>5</sup>Edmund Murray East, known for his work in developing hybrid corn, followed Malthus, arguing that the ability of the earth to produce food would be outstripped by population growth if birth rates did not decline.

<sup>6</sup>Unchecked population growth, Malthus (1798) argued, would proceed geometrically, while the food supply could only increase arithmetically.

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the intended end users who are said to use technologies inappropriately, unethically, or to ignore them entirely or reject them (e.g., Rogers 1983). For example, the authors of the FAO report, discussing the lack of interest in irrigation technologies in Panama, note that “The slow progress observed comes not from a lack of water or adequate land, but from the absence of an innovative mentality and of initiative to confront the new situation” (FAO 1985: 19). In short, the modernizationist models of agricultural development have generally seen science and technology as unalloyed social goods.

*Critiques of Modernization Theory.* There were a number of bases on which modernization theory was challenged, and these critiques helped to form the foundations of the later neomarxist approaches. Prebisch (ECLA 1950) and Frank (1966) both recognized the failure of modernization theory to grasp the power relations in the global economy, resulting in its fundamentally acritical view of the existing world order. Prebisch, a structural economist, argued that the terms of trade for primary producers tended to decline against those of first world manufacturing producers. This, he argued, was primarily because 1) the center is able to capture more benefit from technical progress than is the periphery, and 2) during capitalist cycles, the periphery (countries producing primary goods) is hit harder, being less able to absorb the deleterious effects of economic downturns. His solution, ironically in agreement with modernization theory, was that the periphery needed to industrialize to produce substitutes for the goods they were importing (import substitution industrialization). The main problem Prebisch saw in modernization theory was its inability to recognize inequality and conflict in the global economy, leading to a conservative and acritical attitude towards the global order.



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Other critiques of modernization theory were aimed at its evolutionism, its functionalism, and its technological determinism. The evolutionism in modernization theory tended to lead to analyses of third world societies based not on their existing realities, “but rather on the basis of a future Western norm” (Kiely 1995: 5). Moreover, the notion that societies would evolve (as a social system) toward the Western model suggested a natural inevitability that reduced developing country history to a mere copying of the Western experience. The evolutionary analogy also biased the perspective of development toward notions of equilibrium and unidirectional change. Neo-evolutionists like Parsons (1964) came under criticism by Frank (1969) and others who noted that neo-evolutionary thinking missed the historical connection between development and underdevelopment.

The basis of the critique of functionalism was that modernization theory’s acceptance of the institutions “necessary” to make the transition from traditional to modern (e.g., transnational corporations) was “largely predicated on the basis of their functionality in the process of ‘modernization’” (Kiely 1995: 5). For example, while Prebisch (ECLA 1950) was critical of the global order he argued that foreign capital (and therefore the institutions of foreign capital) would temporarily be necessary to stimulate internal industrialization.

Finally, the technological determinism in modernization theory is best understood by considering the example of the Green Revolution. Modernization theory assumed that the diffusion of agricultural technologies would determine social outcomes, even as the heterogeneity of (highly unequal) local social structures was ignored. Shiva (1991: 14) argues that the Green Revolution was conceived as a “techno-political strategy that would create abundance in agricultural societies and reduce the threat of communist insurgency and

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agrarian conflict.” Modernization theory would predict that this diffusion of agricultural technologies into developing countries would have a “civilizing” effect. That is, the diffusion of new technologies would increase order and reduce conflict by producing abundance, it would increase well-being, it would educate people about the value of western technologies, and it would perhaps even spur entrepreneurial spirit. However, Shiva (1991) and others argue that the Green Revolution in the Punjab region of India has produced new conflicts, new inequalities, new scarcities, ecological destruction, and ultimately social violence, especially towards women.

*Conclusion.* The material determinist narrative tends to give primacy to technology, infrastructure and associated policies for explanations of development. The “stronger” forms of this approach suggest that technology and infrastructure will determine social outcomes. The purpose of briefly reviewing modernization theory here was to illustrate its close connection with the material determinist narrative. Indeed, its technical determinism – the notion that the transfer of technology to developing societies would spur economic development – is central to the current material determinist account. The initial critiques of modernization theory formed the basis for a variety neomarxist theories of development, which taken together constitute the critical stance on development in the last three decades of the century. These perspectives are discussed in the next chapter.

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### **Chapter 3    Development Models and Agricultural Research: The Social Realist Narrative**

*... the agriculture sector policy is in need of important revamping that would permit greater liberalization of market mechanisms . . .*

– FAO

*This is not to say that success is guaranteed; on the contrary, an export-oriented, market based strategy is by definition a step into the unknown.*

– World Bank

*The organizational phase is continuous . . .*

– IDIAP

As with the previous chapter, the strategy in this chapter is to first present a synthesized version of a standard social realist narrative. This is then followed by a commentary that reflects both on the idealized narrative and my own rendering of it. In order to produce the social realist narrative that follows, I review a number of historical and current accounts of Panamanian agricultural development, and then retell the story as seen through a social realist lens.

A review of public agricultural research in Panama over the last several decades

suggests a strong relationship between the development models being promoted by the major actors and the country's research model. This finding supports Souza Silva's thesis that "the rise and decline of public institutions is strongly associated with the rise and decline of development models" (Souza Silva 1997: 95). Thus, as a new theory of development is picked up by national leaders and policy makers, new institutions are created to apply the theory in society. At the same time, those institutions associated with the previous paradigm are restructured to serve the new model, or they are cut back, privatized or eliminated. The activities of the major actors in Panama – USAID, the World Bank and IDB – can be understood in light of this process. The objectives of these actors are mainly about implementing new models of development, reinforcing an existing model with which they agree, or subverting an existing model with which they disagree. The tools at hand to accomplish these objectives are the conditions placed on loans, direct donations, and technical assistance, as well as a variety of other forms of cooperation and non-cooperation. The more cooperative a developing country is with respect to conforming to the model being promoted, the more they are in favor with the international finance community. This process has been played out in Panama and in the developing world generally over the last fifteen years, as public institutions have been undercut, while institutions to promote the neoliberal model have been created or reinforced.

Of course, the negotiations about development cooperation result in pressure on recipient governments to reformulate and recast their national development plans to reflect the philosophy, goals, values, framework and strategies of the models being promoted. Doing so increases the likelihood of receiving international development funds, whether in

the form of loans or donations. In turn, the central government pressures the organizations that make up its own national institutional matrix to reformulate their goals and strategies to reflect the new orientation being adopted by the government. These institutions either conform to the new model or face what is sometimes euphemistically referred to in Panama as “modernization from above.” Thus, in contrast to the notion of induced institutional innovation, in which the impetus for institutional change is seen as primarily endogenous (Ruttan and Hayami 1990), the evidence in this chapter shows that the stimulus for institutional change in Panama has in large part come from the major development actors who use their financial leverage to encourage adoption of new models. Where the induced innovation model tends to ignore power relations in the global political economy, here they are emphasized as a key factor shaping development processes and outcomes. In order to better understand this dynamic in Panama it is necessary to view the formation of agricultural research in Panama in historical context.

### *Background*

Significant state involvement in the improvement of agriculture in Panama has its beginnings in the 1950s within the context of an import substitution model of development. Prior to this period the main strategy for the agricultural sector was the export of unprocessed primary goods to more developed countries. Yet, as the structural economist Raul Prebisch argued, the terms of trade for exporters of unprocessed primary products tended to decline against those for industrialized countries (ECLA 1950). This is because countries of the center are able to capture more benefit from technical progress than those of the periphery.



This situation could be turned around, it was thought, by giving priority to developing internal industry to produce substitutes for manufactured imports. Industrialization would take place via import substitution (ECLA 1950). In agriculture this idea translated into strategies to achieve self sufficiency in the primary food crops in order to reduce dependency on imports, and to spur the development of the local agricultural industry. Technology played a central role in this strategy. The prevailing theory at the time held that developing countries could overcome technological “deficiencies” by importing technologies already available in advanced economies, and adapting them to local conditions (Schultz 1964). Based on this notion, the main thrust in Panama in the 1940s and 1950s was to begin to construct an institutional framework to modernize the agricultural sector by importing and adapting new technologies to local conditions.

Although efforts were somewhat limited, agencies of agricultural extension within the Ministry of Agriculture, Commerce, and Industry (MACI), sought to deliver imported technologies such as improved seed and agrochemicals to farmers. Prior to 1951, MACI attempted in various ways to spur agricultural development, including the invitation of specialists and technicians from Spain, Peru, Puerto Rico and the USDA to plan and guide the development of the sector. *Fomentos*,<sup>1</sup> similar to rural extension agencies, were organized in some of the provinces, but they served mainly as equipment holding houses and sometimes as retail outlets for agricultural inputs (University of Arkansas 1957).

A critical factor in shaping and reinforcing the early agricultural development model in Panama was US missions of technical cooperation such as those conducted in the 1950s

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<sup>1</sup>From the verb *fomentar*, to promote the growth of.

through the University of Arkansas and the Servicio Interamericano de Cooperación Agrícola de Panamá<sup>2</sup> (SICAP, created under the auspices of the USDA). In a 1950 annual meeting of the Association of Land-Grant Colleges and Universities, University of Arkansas officials were approached by representatives of the USDA and the Technical Cooperation Administration (Department of State), about organizing and administering an agricultural mission to Panama. University of Arkansas officials agreed, and sent an exploratory committee of three to Panama in 1951 consisting of the Dean of the College of Agriculture, the Associate Director of the Agricultural Experiment Station and the Associate Director of Extension. As a result of this exploratory trip and previous discussions it was agreed that the University would elaborate a comprehensive mission, with the objectives of “. . . developing a sound program of resident instruction, research, and extension in agriculture” (University of Arkansas 1957: 2).

Indeed, the University developed and implemented a mission directed at “. . . all phases of agricultural life – including the organization of government functions . . .” (University of Arkansas 1957: 8). The mission was based on the US land-grant model of teaching, research and extension, with the implicit aim of applying this model in Panama along with the concomitant “educational and public-service philosophies and methods of the Land-Grant system of higher education” (University of Arkansas 1957: i). As evidence of the impact of the Arkansas mission on Panama’s organization for agricultural development,

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<sup>2</sup>SICAP was created and supported through the Office of Foreign Agricultural Relations, USDA. The SICAP and University of Arkansas missions were for a time functioning simultaneously in Panama, until conflicts and procedural differences led the University of Arkansas to terminate its mission in the late 1950s. I focus on the University of Arkansas mission here as an example, because it was one of the most significant missions during this period.

the main accomplishments of the program included the reorganization of the resident instruction program at Panama's National Institute of Agriculture (INA), the development of an experiment station and the establishment of various extension programs. The reorganization of the resident instruction program involved: a) raising standards for the selection of students and instructors; b) revising and broadening the curriculum; c) raising the standards for academic work; and d) reorganizing the administration of the school (University of Arkansas 1951). Leading these changes at the INA were two American directors. The first of these, appointed in 1950 (nine years after the founding of the school), was previously head of the USDA agricultural mission to Panama. His successor, also an American, was simultaneously on the faculty of the University of Arkansas and director of that University's mission to Panama.

While there was an experimental farm in operation at the time of the Arkansas mission, members of the team concluded that “. . . its operation did not embrace any form of organized agricultural research such as that found at Agricultural Experiment Stations in the United States” (University of Arkansas 1957: 9). Thus, the mission's efforts with regard to developing agricultural research programs in Panama focused on developing an experiment station and training Panamanians as technicians and research assistants. These efforts resulted in the following claim made by the University at the end of its mission in 1957 (University of Arkansas 1957: 20):

Agricultural research in Panama really had its beginning with  
the arrival of the Arkansas staff in 1951, for prior to that time

the experimental farm at the National Institute of Agriculture was essentially a demonstration and production farm and a practice farm for the students in the vocation agricultural school. The Mission staff introduced the experimental plot technique, and the Panamanians proved to be enthusiastic and apt pupils in the art of agricultural research, with the result that the Panamanian staff now includes several good observers – men with excellent experimental minds.

Much of the work in research consisted of studies to test crop varieties developed elsewhere to see which of these adapted well to local conditions. The mission staff collaborated with Panamanians to publish results of these studies, which covered a range of topics including fertilizer experiments, insect control, plant disease control, feeding and management of livestock, irrigation, grain storage and economics. Moreover, the mission produced a series of monographs on the production of important crops for use in the INA curriculum (1953a, 1953b, Instituto Nacional de Agricultura 1953c, 1954). Finally, mission members produced two rather comprehensive studies on the marketing of Panamanian agricultural products. These studies identified the major obstacles to development of the agricultural sector, including production, preparation and assembly, transportation and communication, market outlets and pricing strategies, and proposed modernization on all fronts (University of Arkansas Agricultural Mission to Panama 1953a, b).

Finally, in extension the mission expanded on the original efforts of the *fomentos*,

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organized “4S” clubs based on the 4H model in the US, and transmitted to homemakers the “Elementary facts of nutrition, cooking, sewing, gardening, furniture making, improvement of home equipment, and sanitation . . .” (University of Arkansas 1957: 22). Studies were carried out on these topics and the publications were made available to homemakers and their organizations. In sum, the University of Arkansas mission in the 1950s implemented an idealized version of the land-grant model in Panama, hoping that the straightforward transfer of this organizational framework and value system would produce results similar to those in the US context. Certainly this mission helped to set the organizational framework for teaching, research and extension, and indeed to establish the model for agriculture in Panama. Yet, in spite of these efforts, Cuéllar (1990) describes agricultural research in the 1960s as generally fragmented and quite limited, with only about fifteen researchers working nationally. These research efforts were organized by the Ministry and by the Agronomy Faculty (established in 1965) in the various regions of the country. Through the 1960s research focused on plant breeding in the staple crops, in search of higher yielding and more resistant varieties that could adapt to local conditions. Understanding why this was the focus requires a brief discussion of how agricultural research fit into the national development strategy, and therefore an understanding of the Green Revolution.

The Green Revolution is a term often used in a narrow sense to refer to the dramatic gains in productivity and production that resulted from plant breeding programs in wheat and rice, which were begun by the Rockefeller Foundation in Mexico in the mid 1940s. Yet, in a broader sense, the Green Revolution is better understood as having several important dimensions: technological, economic, political and demographic. The Green Revolution was

a US post war response to dealing with the developing world, soon to be known as the “third world.” It was not clear in the immediate post war period which of the two dominant models the developing world would follow – capitalism or communism. Much of the developing world faced serious poverty, and lacked adequate infrastructure and trained technical capacity to address the issues faced by its populace. Moreover, most were still primarily agricultural societies. Thus, the Green Revolution was a technopolitical strategy to raise production and productivity through plant breeding programs that would generate high yielding varieties of the basic food crops. Increasing food production would stave off food shortages, hunger and discontent among the population, thereby avoiding social and political instability due to food security crises. From the US perspective, the more dire the conditions for the poor in developing countries, the greater the likelihood they would see the communist path as an attractive alternative..

Moreover, as Busch (2000) argues, by the end of the Second World War demographic concerns were also well established on foundation and government agendas. Drawing on the Malthusian scenario that population growth would outstrip the growth in food production (because the population increases geometrically, while food production can only increase arithmetically), agricultural scientists were arguing that research to increase agricultural productivity was urgent in order to prevent mass famine, or at least to bide time while other solutions were found for the population problem. Perkins (1997) has brought together these various dimensions in his population-national security theory, which Busch (2000: 61) has summarized concisely:

... poverty and misery were now [1960s] said to be caused by population growth. This, in turn, led to discontent and political instability. The instability could be and was used by the communists to provoke revolutions. The solution to the problem lay in increasing agricultural productivity so as to permit widespread industrialization and a prosperous agriculture at the same time as fertility decline would be encouraged through dissemination of birth control methods and devices. Birth rates would decline, poverty would cease to be a major problem and communists would have little support.

In other words, unchecked population growth would lead developing country leaders, some of whom had leftist leanings, to see the communist alternative as a viable option to address the discontent among their people, thereby producing a national security threat for the US. The US government picked up the theoretical framework and began to apply it in the developing world. Indeed, the University of Arkansas agricultural mission in Panama was supported through the Point Four program established under Truman. As is noted in the Arkansas documentation, the Point Four program was intended to assist the developing world by carrying the land-grant mission (i.e., by transferring the land-grant model) to countries in need. The unstated objective was to eliminate the specter of communism by establishing aid programs around the world with a strong emphasis on agricultural research.



This is the geopolitical context in which agricultural research programs were established in Panama. Moreover, it is the embedded differential power relations in the global political economy that provide a basis for explanation for the shaping of agricultural development (and therefore agricultural research) models in Panama from the 1950s through the 1970s.

*Military-led Reformism, 1968 to 1981.* Interestingly, this role for agricultural research was quite compatible with the development strategy embarked on by General Omar Torrijos, who came to power in a military coup in 1968. The rationale advanced by the Torrijos regime for a new direction in economic development – in spite of the fact that the economy was clipping along at an 8% annual growth rate in 1968 – was a populist one. Torrijos argued that, while the country was experiencing economic growth, the benefits of the growth were being realized by only a very small economic elite. Increasing landlessness, poverty and rural to urban migration were indicators that the import substitution model did very little to incorporate the lower classes into the economic life of the country. One of the goals of Torrijos' reforms, which he knew would also help him politically, was to expand the benefits of economic growth to the rural sector. Thus, he launched a modernization program in the late 1960s that emphasized a number of populist programs, including renewed attention to agrarian reform,<sup>3</sup> rural infrastructure development (e.g., hydroelectric dams, roads, ports), expansion of social services in health and education, and in the mid 1970s, direct government involvement in agricultural production.

The development strategy was to modernize the productive sectors, improve

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<sup>3</sup>Part of the agrarian reform in the Torrijos era included a significant divestiture of lands by United Brands, which by 1976 had amassed some 200,000 acres of estates for banana production in Panama (Barry, 1990).

infrastructure, and create rural employment thereby expanding the domestic market. Moreover, similar to Castro's early efforts to base the Cuban economy on sugar exports, Torrijos created state farms and processors to produce, process and export sugar. In fact, through this strategy Panama was able to dramatically increase its production and export of sugar in the 1970s. These populist reforms helped him to consolidate a rural political base in addition to supporters in the private sector who benefitted from the increased economic activity. Indeed, Torrijos was able to create a new alliance between the rural peasantry, capitalists in the agriculture sector and the state (Barry 1990). The latter two shared the goal of capitalist modernization of agriculture. Therefore, emphasizing agricultural research to increase production and productivity fit well with the Torrijos development strategy as well as that of the private sector.

The state began to strongly support agricultural research in the 1970s, when the government launched a major effort to increase the productivity of this sector and increase its participation in the national economy. It was a decade of significant change for the agricultural sector. The government made a major attempt to restructure agriculture with the primary objective of incorporating into "the economic life of the country . . . small and medium size producers through an increase in their production and productivity" (Cuéllar 1990: 20). The state attempted to do this in two primary ways. First, agrarian reform was combined with the organization of small and medium size farmers, the beneficiaries, into collective associations such as *asentamientos campesinos* (peasant settlements), agrarian juntas and cooperatives. At the same time the state developed, through pricing and subsidy policies, a protectionist regime to benefit domestic producers and consumers.

The second major strategy was to create an institutional matrix within the agricultural sector to support and pursue the objectives of raising the production, productivity, and income of the newly organized farmer associations. First, in 1970, agriculture was given a Ministry of its own, the Ministry of Agriculture, rather than being combined with Industry and Commerce. This signified agriculture's new importance. In 1972, it became MIDA, the Ministry of Agricultural Development, which marked the beginning of a new policy emphasis on science and technology as the progressive motor which would drive and *develop* the sector. Finally, within the next few years there was an intense effort toward creating support institutions in the sector, with the Agricultural Development Bank created in 1973, and the Agricultural Marketing Institute, the Agricultural Insurance Institute, and the Panamanian Agricultural Research Institute (IDIAP), all created in 1975. These measures were all part of the Torrijos strategy to simultaneously modernize the sector while also directing many of these services toward the campesino settlements to enable his regime to make the claim that the reforms were an effort to address the social issues of the rural sector and the equity issues associated with development in the 1960s. While populist in rhetoric, Torrijos never closed the private sector out of these developments, though he may have succeeded in shifting some of the state alliances from the urban economic elite to the rural private sector in agriculture.

#### *The Formation of IDIAP's Initial Research Model*

The research model that resulted from IDIAP's first years of activities emerged in a context of on-going research programs within the Ministry and the Agricultural Sciences

Faculty. It also emerged already linked into a network of actors interested in promoting various agricultural development agendas. At the same time, IDIAP's own creation and development, as well as the linkages chosen and supported, began to shape a new context of agricultural development.

A review of annual reports<sup>4</sup> and other supporting documentation, allows us to construct a view of the formation of IDIAP's research model in its first several years. It is apparent that research problems were largely defined internally by scientists, just as the resulting technologies were also designed internally. Researchers worked within a general framework of problem definition, yet within that framework they were afforded some discretion in defining the problem of interest. For example, the general objectives of the institution were defined as, "... raising production and productivity, as well as the income level of farmers, with emphasis on the small farmers" (IDIAP 1979: i). The commodities of top priority were rice, corn and beans, although others were also given some attention.<sup>5</sup> Within this framework the actual problem definition depended on the researchers' disciplinary training. This was reflected in the programs and sub-programs that predominated in IDIAP's early years. The most important program was genetic improvement, which emphasized the introduction and evaluation of new genetic material from CIAT (Centro Internacional de Agricultura Tropical) and IRRI (International Rice Research Institute). Research was geared toward evaluating imported lines and varieties in

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<sup>4</sup>IDIAP's first annual report was published in October of 1977. It covered activities of the institution from 1976 to 1977. The first year of IDIAP's existence, 1975, was primarily a year of organization and planning.

<sup>5</sup>Some of the priority commodities identified in 1977 also include sugar cane, beef, milk, sorghum, tomatoes, onions and potatoes.

local conditions, looking for resistance to various pathogens and pests (IDIAP 1977). Of special import in this kind of work were higher yielding varieties for “monocultural production systems” in the various regions of the country (IDIAP 1979: 2). This approach to research was consistent with the Green Revolution model which predominated at the time.

The close links with the International Agricultural Research Centers (IARCs) suggest that they also played a role in shaping the agenda of IDIAP researchers. In 1977, IDIAP had formal agreements with both CIMMYT and CIAT, and was receiving consultancies from CIP. CIMMYT was central in developing the Caisán<sup>6</sup> project in the late 1970s. CIAT was involved through consultancies on rice and bean production. CIP (the International Potato Center) was involved with IDIAP through a donation to support nematode research in potatoes. All three of these IARCs had on-going training projects for IDIAP researchers through short courses (IDIAP 1979: 29). In 1981, CIAT was noted as the “principle entity that supplies us germplasm from rice and beans” (IDIAP 1981: 36). While it is difficult to conclude that there is a direct causal link here (i.e., that because of their relatively greater prestige and resources the IARCs were able to impose their own agenda on IDIAP), it is clear that there was a close association with the IARCs, and that they played a strong role in shaping IDIAP’s research program. Trigo and Piñeiro (1983) have argued that while the IARCs were initially set up to complement the national agricultural research systems, because of their strength in research and resources, they often became important elements in the productive systems of each country. In some cases, they argued, the IARCs became

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<sup>6</sup>The Caisán project was a pilot project for an On-Farm Client-Oriented Research (OFCOR) program. It has been touted as an effective example of bringing new technologies and practices to small scale producers of corn and beans (Cuéllar, 1990).

like interest groups attempting to direct the activities of the national research systems to be more consistent with their own programs and mandates. Given IDIAP's limited resources relative to the IARCs, and its close association with the IARCs, this argument would seem to hold for the Panamanian case.

The discipline-driven nature of research at that time was revealed by the structure of the research programs. For example, the Crop Protection program of 1977 was divided into the sub-programs of entomology, nematology, phytopathology, and weed control. This suggests that research problems, rather than emerging out of concerns of clientele, emerged out of the problems, concerns, and history of various disciplines. Moreover, since many of IDIAP's leading researchers received their post graduate training outside of Panama, typically in already established laboratories, they were socialized into research within a context where the problem was already defined by the principal investigator. When the first cadres of researchers returned to Panama to develop its agricultural research system, they had already been socialized into a research model in which the potential clientele was probably a remote consideration. Research problems emerged from the laboratory. In this model, the clientele appear detached from the system. This contributed to another important element of IDIAP's model – the lack of significant participation of the clientele.

It is clear that from the outset farmer participation in the institution's research was minimal. In the early years, it is likely that researchers had more contact with farmers because they did not have at their disposal an infrastructure of experiment stations, subcenters, experimental farms, or even many adequate fields that belonged to IDIAP in which they could carry out trials. Thus, while some research took place in experimental

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fields of the institution, much of it also took place in the fields of “. . . the settlements, agrarian juntas, cooperatives, [and] individual farmers,” in short, in the fields of those farmers and associations that were willing to let their fields be used for research and demonstrations (IDIAP 1977: 2). This was consonant with the state’s strategy in the 1970s to direct services towards the reform sector.

Yet, doing research in the fields of farmers is not tantamount to meaningful farmer participation in research, in which farmers are involved from the earliest stages in defining the problem, the objectives of research and the design and implementation of trials. In principle, farmers’ experiences and ideas were at least taken into consideration. As the Director General noted in the 1979 cover letter for the annual report, the institution distinguished itself by (IDIAP 1979: ii):

. . . taking into consideration the technology that the farmer uses and his facilities to realize technical changes. With this as a departure point, through research at experimental centers and in the farmers’ fields, we look for solutions and technological alternatives to factors that limit production. This design allows the participation of *técnicos* and farmers, achieving research that is more consonant with reality. Moreover, it facilitates the transfer of experience and technologies.

However, it becomes obvious that this communication between researcher and farmer is primarily one-way, with the researcher simply transmitting information to the farmer.



Even in the Caisán project, touted as highly successful because of the rate of adoption of cultural practices and technologies, some of the most important activities involving farmers were described as “periodic meetings with the corn and bean farmers . . . to communicate the advance of the research program and ascertain farmer receptivity” (IDIAP 1980: 32). In fact, the institution was quite clear as to the way in which information was to flow between researcher and farmer. As noted in the 1977 annual report (IDIAP 1977: iv):

As an element of research we can cite the communication of technology. Toward this end we have organized seminars with instructions to farmers about the norms of production. In this way we transmit the achievements of the Institute to those who should benefit from technological advances to improve profit margins.

Being more specific about the flow of information, the institution’s training efforts are discussed in the following terms (IDIAP 1977: 47):

. . . we think that training the extension agents, who are the technical personnel most in contact with the farmer, makes the transfer of knowledge more efficient . . . moreover, the communication arrives to the farmer through the correct channel, through his agent of change.

Thus, the communication model of the institution years was along the traditional lines

as discussed by Rogers (1983). That is, information flowed from the researcher through the extension agent to the farmer. In the case of IDIAP there was an occasional opportunity to complete the feedback loop at meetings when researchers would return to transmit the results to farmers and attempt to gauge their receptivity. In sum, researchers formulated their problems largely in isolation from farmers. They assumed they knew the problems of farmers, perhaps because they also assumed that they knew and understood farmers' primary objectives.

Interestingly, in IDIAP's documentation from 1975 to 1981 there is virtually no discussion of international markets, competitiveness, or of market driven research. Rather, the general picture that emerges is a strategy that can be characterized as a supply-driven model of research and technology closely related to the Green Revolution model, and closely linked with the IARCs. Moreover, IDIAP's financing was largely dependent on the state until 1979, after which it depended on the state and the major international development agencies. The major elements of IDIAP's model are summarized in Table 1.

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**Table 1**  
**Major Elements of IDIAP's Initial Research Model**

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***Supply driven model of technology***

- Problems defined internally
- Research/technology designed internally
- Researchers closely linked with IARCs.

***Disciplinary***

- Research programs organized around disciplines
- Problems emerged out of discipline's history
- Problems emerged out of disciplinary training and socialization into research

***Communication***

- One-way transmission of information to Extension
- Little participation of potential clientele

***Financing***

- Depended on the state until 1979, then on both state and large development organizations
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***The Relationship Between Development Models and IDIAP's Research Model***

A major intervention in IDIAP's trajectory occurred with the signing of an agreement in 1979 with USAID to launch a five-year Institutional Strengthening Project.<sup>7</sup> USAID agreed to lend IDIAP \$6 million and donate \$1 million to support the project. This represented a major influence on IDIAP in the ensuing years, considering that the average annual financing from the USAID project (\$1.4 million) was greater than IDIAP's annual budgets between 1975 to 1978.<sup>8</sup> The thrust of this project was to strengthen the physical

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<sup>7</sup>In addition to this project there was another, apparently separate, USAID project from 1980-1987. The project, entitled Agricultural Technology Development, involved a \$9 million loan (Cuéllar, 1990: 35). Unfortunately, no further documentation regarding this project was available.

<sup>8</sup>IDIAP's annual budgets in 1976, 1977, and 1978 were \$839,069, \$979,000, and \$1,099,768, respectively (IDIAP, 1979: Figure 2).

infrastructure of the institution, as well as to provide support for the training of personnel. Over the next few years funds went to constructing installations such as research centers, subcenters, offices, and laboratories, as well as supplying these facilities with the necessary machinery and equipment for research and training, including laboratory equipment and vehicles (IDIAP 1979, 1980, 1981). Additionally, IDIAP sent personnel abroad for post graduate degrees in countries such as the US, Mexico, Brazil, Chile, and the Philippines.<sup>9</sup>

IDIAP's official position behind this kind of strategy appears to have been fairly straightforward: the leadership felt that the institution was greatly underfunded by the government, and saw it as their responsibility to bring in additional resources by negotiating with other actors who they might be able to enroll in the efforts of the institution. As is argued in the annual report (IDIAP 1979: 14):

The fact that the initial level of IDIAP's financing was inadequate and only slowly increasing in the first three years, forced the Institute to orient a great part of its efforts, supported by MIDA and MIPPE [i.e., supported by government funding], toward actions that would permit the capture of external funds, while a modest but effective program of agricultural research was developed.

By "actions" the writer is referring to agreements for various projects of international

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<sup>9</sup>In 1980 IDIAP had five people working toward post graduate degrees, two of whom were in the US (IDIAP, 1980: 4). In 1982, IDIAP had eight people studying abroad, five of whom were in the US (three at the Ph.D. level, two at the M.S. level) (IDIAP, 1982: 6).

cooperation into which IDIAP entered in search of additional funding. While the USAID project was not the only international cooperation project in which IDIAP was engaged in 1979<sup>10</sup>, it was by far the largest financially. The above quote is important because it indicates that the leadership drew a distinction between research activities developed through external funds on the one hand and the “modest but effective” agricultural research program supported through government funds on the other. It is as if the two were perceived as separate trajectories.

To what extent did this initial five-year USAID project influence IDIAP’s model as an institution of agricultural research? It was the largest and most influential project of *cooperación técnica* in which IDIAP was engaged up through the mid-1980s, as evidenced by its size and the amount of coverage it received in the annual reports from those years. The increase in these years of permanent USAID consultants at IDIAP, from zero in 1981, to one in 1982, to four in 1983-84, is an indicator that suggests a growing USAID presence in IDIAP’s decision making ranks. A significant portion of IDIAP’s current infrastructure was constructed with funding through this project. USAID’s interest was in promoting a US style system of research and extension in Panama. The likely USAID logic on this strategy was: a) to be a more “effective” the system it should physically look like and be organized like the US system, and b) a research system with a more developed and expansive infrastructure will be more input intensive and therefore will require the purchase of more US goods and

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<sup>10</sup>Besides the *cooperación técnica* with the IARCs mentioned above, other projects included a dual-purpose livestock project with a donation from ICRD, a milk production project with funding through CATIE and IDB, a regional research project for small farm production systems with funding through CATIE and ROCAP, and a nematode research project in potatoes with funding through PRECODEPA (IDIAP, 1979: 15-16).

services, especially vehicles, laboratory equipment, and agricultural inputs. The above points are based on the well known and documented USAID objectives of increasing the sale of US goods and services through overseas projects. These were quite common USAID practices at the time (see, e.g., Busch 1988).

The evidence suggests that the USAID project contributed to shifting IDIAP research away from on-farm research toward research done in IDIAP's expanding facilities. As the institution's research facilities expanded with the project, researchers were drawn to carry out more of their experiments "in house" where conditions were better and more control could be exerted over the experiments. Moreover, the institution needed to demonstrate that its personnel had the scientific ability and capacity to fully utilize the upgraded equipment and infrastructure. Most researchers would go along with this shift because laboratory-based research – or research closer to the laboratory – was (and is) perceived as more prestigious than on-farm research. This is because the latter involves more applied agronomic work with an emphasis on cultural practices, while the former, though also generally applied, is at least closer to basic research and is largely carried out in the institution's facilities.

This shift toward research in IDIAP's facilities is alluded to as early as 1980, a full year into the USAID project, when it is noted in the annual report that the institution began in this year "a new focus of research in [IDIAP's] experimental fields, in order to complement research done in the areas" (IDIAP 1980: 7). Research in "the areas" refers to experiments carried out in the fields of farmers in the region of a particular project. Discussing the USAID project in the 1981 annual report, the writer notes (IDIAP 1981: 37):

. . . the ultimate objective of this project is to equip the Institute with the adequate capacity in human and physical resources, in addition to the appropriate organization to be able to carry out research.

Here it is plainly stated that one of the primary objectives of the project was to shape the organization of the institution. Clearly, developing a particular infrastructure necessitates a certain type of organization. The kind of infrastructure that the USAID project encouraged fit well with an *idealized*<sup>11</sup> version of the US model of research and extension, in which research is conceived and carried out in the institution's facilities, usually in isolation from farmers, and the information and technologies are then "extended" or "transmitted" to farmers through an extension agent, as depicted below:

Researcher → Extension Agent → Farmer

It is arguable that the USAID project at least reinforced and probably helped to entrench this model in Panama through encouraging an infrastructure that was itself historically part and parcel of the above model. Finally, as noted above, the training component of the project served, on the one hand, to develop scientific talents within IDIAP through post graduate training abroad, while on the other hand it was a way of socializing those researchers – who would go on to become among the most influential in the institution

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<sup>11</sup>I say "idealized" because in the actual US model influential farmers and farmer associations made research demands directly to scientists and indirectly through legislators who could influence research through the Agricultural Experiment Station budget.

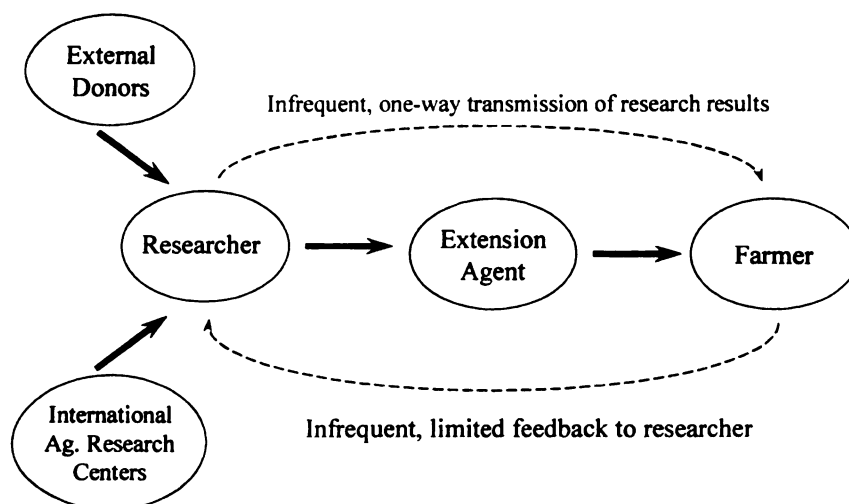
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– into this very model of research and extension. IDIAP’s research model by the 1980s is depicted in the following figure.

**Figure 1:**  
**IDIAP’s Research Model (1979 to late 1980s)**



### *Liberalization and the Model of Agricultural Research*

By the 1980s indicators began to appear that raised concerns about the import substitution model of growth. The manufacturing sector was growing, but at a slow rate, and there was an overall deceleration of economic growth (Cuéllar 1990, FAO 1985). Combined with this there was pressure from the IMF and the World Bank to pay back the debts – loans that were originally encouraged by the international finance community – that had

accumulated from large investments by the Torrijos regime in health, education, and other social programs in the 1970s (Inter-American Development Bank 1979: 11). This reality began to shift government policy away from large social investments in order to service the debts. Writing with the advantage of hindsight, Moreno Villalaz asserts that, “By 1982-83, Panama’s economic development model was exhausted, which was indicated in two letters of intention to negotiate structural adjustment loans with the World Bank” (Moreno Villalaz 1994: 48).

By the end of 1983, the government had negotiated a structural adjustment loan agreement with the Bank – an agreement that served as the basis for designing its 1984-85 economic program. As noted in the 1985 FAO study, this program was oriented principally toward, “the reorganization of the public sector, the reactivation of the industrial sector, the reform of pricing policies, and the raising of productivity in the agricultural sector” (FAO 1985: 10). As discussed earlier, when a major financial and policy commitment like this is taken on by the government it will pressure the institutions that make up its national matrix to reform along similar lines. This process was fairly evident in the Panamanian agricultural sector. Beginning in the early 1980s, a number of actors emerged with recommendations for various reforms, reorganization, and revamping of the agricultural research system.

Discussing the policy changes in the sector beginning about 1982, IDB, in its *Informe Económico de Panamá* (1984)<sup>12</sup> notes that the changes were intended to:

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<sup>12</sup>The full text of this document was not available. However, the section of the report that dealt specifically with the agriculture sector is reproduced, nearly in its entirety, in the FAO study (FAO, 1985: 34-38).

. . . create greater incentives for private investment through greater profitability in an environment of more liberal prices and markets, and to reduce subsidies to the [agricultural] sector in line with the austerity program and fiscal discipline adopted by the government.

Moreover, the structural adjustment strategy – to rectify what the Bank considered economic stagnation due to the inward-looking approach of import substitution – promoted an export-led development, where exports were seen as the new engine of economic growth (Moreno Villalaz 1994). This had important implications for the agricultural sector, since it already accounted for a major portion of the nation’s exports. The question was how to accomplish the objectives of promoting more agricultural exports, further raising production and productivity, and raising incomes of farmers.

The IDB proposed a medium term plan of action which included a “revision of pricing policy,” and production incentives in line with the new objectives for the sector. Moreover, IDB’s plan included a (FAO 1985: 36-37):

reorganization and strengthening of agricultural services, giving priority to . . . the generation and diffusion of improved technologies (research, technical assistance . . . ) with the primary objective of carrying out projects of technological improvement in the areas that already have adequate

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agricultural infrastructure.<sup>13</sup>

The FAO argued that agricultural sector policy was in need of “important revamping that would permit greater liberalization of market mechanisms.” Specifically, these fundamental changes assumed (FAO 1985: 11):

. . . the adoption of important measures, such as diminished participation of the state in agricultural production and commercialization; the reduction of price controls and subsidies to inefficient producers; a clear . . . distinction between agricultural production policy and social policy for rural well being; restructuring and strengthening of public institutions in agriculture, [and] reduction and eventual elimination of subsidies to state institutions. . . .<sup>14</sup>

Barry (1990: 47) aptly summarizes the transition in agricultural policy in the early 1980s:

In return for support from AID and the World Bank, the government agreed to eliminate its direct role in the agricultural sector, to promote agroexports, to rely on the free market to determine commodity prices, and to embrace the

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<sup>13</sup>IDB proposed a number of other steps in its program, including the introduction of agricultural technology and intensification of land use, the improvement of agricultural commercialization, the evaluation and development of renewable natural resources, and improvement of the peasant settlements (cited in FAO, 1985: 36-37).

<sup>14</sup>It should be noted that these types of proposals were made while both the US and the EU countries maintained high agricultural subsidies.

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economic dictates of comparative advantage.

Thus, from the early 1980s, we see the major actors begin to use their financial power to destabilize one development model and implement a new model.

### *Institutional Change, 1982-1993*

Three observations can be made about changes in IDIAP's policies and practices from 1982 to 1993, which allow insights into the shift in its institutional model. First, IDIAP generally stayed its course with respect to its strong basic grains program focused on the improvement of genetic material. At the same time, there was a broadening of the research agenda, which was closely connected to IDIAP's *cooperación técnica* with international actors. Finally, the beginnings of a shift to research based increasingly on market considerations became apparent, e.g., a new emphasis in research on non-traditional agricultural exports. Let us look briefly at each of these points in turn.

*Maintaining the core research program.* While over the years IDIAP has done research in animal husbandry and milk production, the core of its research program has historically been its basic grains program, along with some research in roots and tubers and fruits and vegetables. The priority of this program has been to generate new genotypes with desirable characteristics. For example, in 1984 through a collaborative project with CIAT, some one thousand lines of rice were evaluated (IDIAP 1987: 14). The justification for this strategy in basic grains was framed within the language of import substitution (IDIAP 1987: 16):

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The importation of corn represents a loss of foreign currency for the country of more than seven million balboas<sup>15</sup> annually, despite the fact that in recent years, with the use of mechanized plantings, corn yields have increased.

Moreover, in the mid-1980s FAO (1985: 33) identified the substitution of imported products as one of the primary policy objectives of the agricultural sector. Interestingly, despite the market rhetoric this focus remains largely unchanged, yet the language of import substitution has been replaced by the language (justification) of food security (e.g., IDIAP 1997: ii).

*Expanding the research agenda.* Furthermore, there was a broadening of the research agenda, which was closely connected to IDIAP's *cooperación técnica* with international actors, and entailed frequent reorganizing around these additions to the agenda. For example, in 1982 it was argued in the annual report that the institution had to expand into new research areas and commodities in order bring the institution's efforts in line with national policy as established by the Ministry. To take on this task of broadening the scope, the Department of Special Programs was created. It was to be responsible for research programs including agroindustry, agroforestry, toxicology, and environmental protection (IDIAP 1982: 3). This new department entered IDIAP's "organic schema" because of the "necessity of getting into other fields of research." Each new subprogram required new efforts and resources for organization. There was enough reorganizing around these activities to lead the author of one annual report to comment that, "The organizational phase is continuous . . ." (IDIAP

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<sup>15</sup>One balboa equals one US dollar.

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1982: 21).

Linkages to national and international institutions were crucial to IDIAP's financing, since for example, 27% of its budget came from external resources in 1982, 24% in 1987, and 48% in 1990 (IDIAP 1982, 1988a, 1991a). Not surprisingly, this was an explicit strategy of the institution, as is reflected in the listing of IDIAP's most important activities in the prologue to the 1987 annual report. One of these activities was the (IDIAP 1988b: i):

Formulation of research projects to capture technical cooperation and financing from regional and external institutions and countries, such that those projects which cannot be financed internally can be done with external support.

The agenda was expanded in other areas as well. In the mid-1980s the Ministry set among its objectives the broadening of the range of agricultural export products to include non-traditional exports such as citrus, melons, watermelon, pineapple, and yams. The 1990 annual report discussed efforts to strengthen research in these and other non-traditional crops in order to "break into the international market" (IDIAP 1991a: 18). Moreover, in the early 1990s, other research concerns and approaches entered into IDIAP's lexicon and agenda, such as sustainable agriculture (1992), farming systems research (1993), and agricultural biotechnology (1993). These are all themes that had begun to be addressed in the policy documents of the major actors from the mid 1980s onward.

Some of these new themes were introduced into the research agenda in the prologue

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of the 1993 annual report (IDIAP 1994b: v):

During 1993 an ample discussion was carried out . . . which led the institution to introduce in its programs the focus of sustainability and environmental protection. Thus, the first activities in farming systems research were begun, with the proposition of testing agricultural technologies in field conditions, just as the farmer does.

*Liberalization and agricultural research.* Finally, the structural adjustment programs of the 1980s and the implementation of more liberal economic policies by the government began to bring IDIAP's model of research under question. In 1986, IDIAP's director of planning discussed a "new focus" which brought agricultural research policy within the framework of government economic policy, and implied "the operation of market economy mechanisms as a style of development," and in turn, "the revision and adjustment of the planning, programming, and organization of research to make compatible human and financial resources . . . with the new focus" (Wynter 1986: 4). From about 1987 forward, tensions and contradictions emerged about the model of research. On one hand, there were the goals of the import substitution model, and on the other there is the pressure to produce technologies that would allow farmers to compete in an environment with fewer market barriers. This resulted in a research agenda that mixed together the major elements of both models, as reflected in the 1987 annual report (IDIAP 1988b: ii):

All the technology generated and validated by IDIAP is so that our country can . . . achieve internal self sufficiency through an increase in productivity, substitute imports, and moreover, to be able to compete in the international market. . . .

A shift in the model of research also raised questions about who the clientele of the institution were. This is another tension that became apparent in the late 1980s as IDIAP began to struggle to redefine its clientele. Discussing IDIAP's mission in the 1989 annual report, the author pointed to the raising of production and income levels of "farm workers, principally those that are marginalized, and small and medium size farmers" (IDIAP 1989: 2). Yet, in that same report the author noted that (IDIAP 1989: 1):

. . . IDIAP oriented its activities toward generating technologies appropriate for commercial producers, with emphasis on medium and large farmers. The absence of projects for marginal producers impeded the development of technologies adequate for an ample sector of the rural population.

In 1990, "small farmers and marginalized *campesinos*" were again emphasized in the mission statement. This illustrates that there was an awareness of the contradictions of the changing model of research. One of the major challenges facing the institution was identified as raising productivity, such that "structural adjustment policies of liberalizing prices and opening markets will not imply the marginalization of great numbers of farmers" (IDIAP

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1991a: 1).

Yet, despite the introduction of structural adjustment policies in the early 1980s, and changes in the agricultural sector, in 1990 Cuéllar (1990: 17) identified pricing policies, subsidies, and tariffs as some of the principal problems of the sector. This suggests that as the major actors began to force a shift from one model to another, actual changes in both thinking and practice did not occur immediately in the institutions of the sector. Rather, there was a transition period in which there were tensions, contradictions, negotiations, and compromises as elements of the declining model are de-emphasized and elements of the new model are implemented. Yet elements of both models necessarily co-existed in the same institution. Some elements of IDIAP's initial model were in decline, while those of the new model began to be established. The relationship between the development models promoted by major actors and IDIAP's model is depicted in Figure 2. In the figure, the development models promoted by the major actors are depicted above the time line, and the corresponding model of agricultural research in Panama is depicted below the time line.



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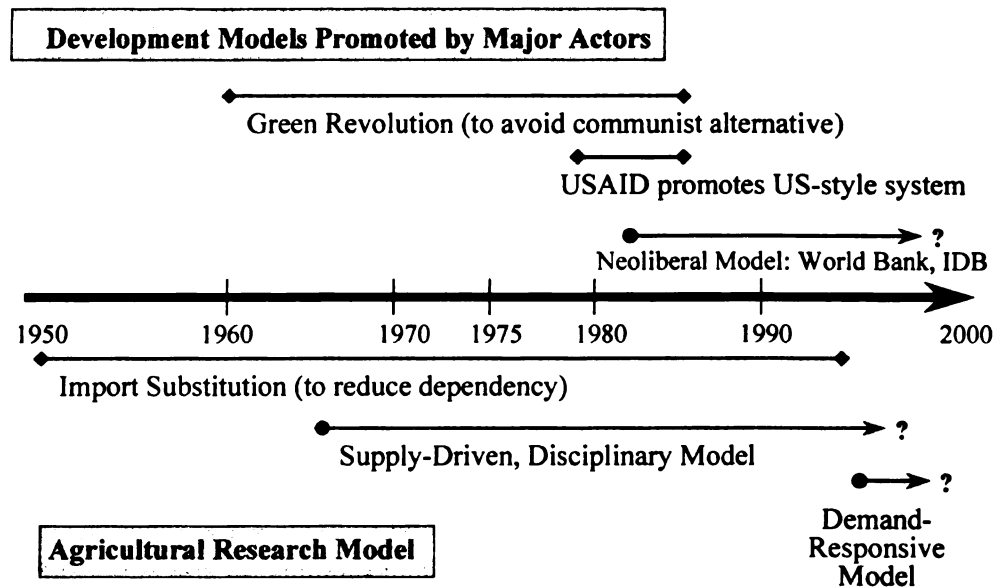
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**Figure 2: Development Models Promoted by the Major Actors  
and Panama's Agricultural Research Model**




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### *Conclusions*

The shift in IDIAP's research model from import substitution and supply orientation to market orientation has been strongly related to the promotion of new models of development by USAID, the World Bank and IDB. As one development model falls out of favor among the major development agencies, these agencies begin to de-emphasize and eventually destabilize elements of the model, while simultaneously implementing and supporting elements of the new model. The primary policy tool that the major actors use to accomplish this is their financial leverage. This has been the case in Panama historically.

In the particular case of IDIAP, the model of research under a statist strategy of development was destabilized and a new, market oriented model of research focused on technologies for export, demand driven research, etc., was supported by the World Bank and the IDB. *Indeed, USAID and the Bank had previously supported the supply-driven, import substitution model of agricultural development, but withdrew support for that model when their own views on development changed.*

This can be visualized as a continuous process of *implementation and destabilization*. The major actors implement a new model through policy directives, while destabilizing the old model (now in decline). Because of the differential economic and political power of the major actors over Panama, the country has little choice but to continuously reorganize and (re)present itself if it wants access to international financing. This is not to argue that Panama's development policy has been entirely at the whims of the major actors. Indeed, its political and economic elite have often been willing accomplices in the pursuit of international funding for development. More specifically, leaders of IDIAP have been quite explicit about their strategies to “capture” international funds. One consequence of this reorganizing and remaking the image of the institution is that these activities consume a great amount of energy and resources. Moreover, it may divert the institution's attention from core problems, such as food security and natural resource issues. In some cases the reorganization may be beneficial to the institution – all institutions need to change and remain relevant to their context – but it also may force the institution into spending scarce resources on continuously reorienting themselves around new themes emerging from the development agencies. In the next chapter, we will look at how IDIAP is dealing with current pressure

to bring the organization in line with the views of the government and external donors.

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*Narrative Commentary*

Social realism is the assertion that social reality, and social structures in particular, have an existence independent of our perception of them. In other words, in a social realist narrative, social structure has a reality beyond the existence of individual actors. Structure does not appear as relational, but rather as something autonomous from individual actors. Often it is portrayed as an external force bearing down on groups (e.g., interest groups, ethnic groups, countries), restraining their ability to act and their range of choices. Since it is autonomous and external it is something over which they have little control. Also, in a social realist narrative structure may be portrayed in the form of inexorable historical, economic or political forces, which produce outcomes in the world, even when no individual actors are in view. Individual actors are presumed rather than shown in action, making specific choices.

I have tried to cast the above account of the shift in development models (and agricultural research models) in Panama in such a narrative. The general picture that emerges is one of the behemoths foisting new policy directives on Panama, which must comply because of its weaker power position and its dependence on international financing. While “actors” and “authors” appear, they are abstract, corporate actors. Rarely do individuals come into view. In the above narrative the explanation for development processes and outcomes in Panama comes from the differential power in the international political economy. Those with the power are able to impose their views and shape the

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development of those with less power who are dependent on the resources of the powerful. The first part of this chapter can thus be seen as a conventional macrosocial argument from a sociological perspective, emphasizing differential power.

I used the same approach as in the previous chapter in order to produce this distilled narrative. I reviewed a number of historical and current accounts of Panamanian agricultural development. Then I recast the story as seen through a social realist lens. In the previous chapter the primary documentation used was essentially material determinist in perspective, and so the synthesizing process was “material → material.” In this chapter the primary source documentation was also from a material determinist perspective, because so little “critical” social realist literature exists on agricultural development in Panama. Thus the synthesizing process was, in contrast, “material → social.” Therefore, the ordering process here was one of reviewing the documentation through a social realist lens and imposing a critical, neomarxist argument on the empirical case. Perhaps not surprisingly, in some ways this is a more comfortable task for a sociologist, since sociological training usually sensitizes us to power differentials as explanans for people's life chances. Thus, sociologists are likely to feel at home in this perspective. Yet, from the point of view of my argument in this study, the social realist narrative is also flawed in that it shares some of the same assumptions of the material determinist perspective.

What we have seen thus far is two major readings of development. First, are the material determinists who, by and large, tend to be neoclassical in their orientation. This perspective is represented in the vast majority of the publications of the major development financiers. These tend to be team-written by individuals with training in the neoclassical

economics world-view. Beginning in the 1960s, these authors were critiqued by those in the second group – the social realists, which tended toward neomarxism in perspective.<sup>16</sup> However, in their critique of the neoclassicals the neomarxists were equally realist. Just as the material determinists were objectivist in their understanding of the biophysical world and of markets (as machines), so too were the social realists objectivist in their understanding of social structure and power.

Moreover, these two perspectives were similar in their approach to rhetoric. Both used objectivist rhetoric effectively. Just as we saw in the previous chapter, authors in the social realist perspective also do not generally speak of *ordering*, but of a social *order*. For the social realists, social order is purified of biophysical elements. They tend to maintain, for example, a clear dichotomy between human action in the foreground with nature in the background. Likewise, they tend not to be transparent about the processes of producing their narrative. Authors usually distance themselves from the processes of production, which are thus obscured. In terms of legitimacy, it seems that what has largely happened is that authors in both of these perspectives – material determinist and social realist – have found legitimation from within their own circles. This has led to the current situation in which the two perspectives have little need to interact, and generally find each other's narratives of little use. There are a number of approaches to social realist narratives, and it is worth briefly reviewing some of them in order to better understand their strengths and weaknesses.

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<sup>16</sup>We could identify here another group of authors who are essentially atheoretical in their telling of development processes. They focus matter-of-factly on the empirical business of development practice. Although they may have a working theory of economic and social development, they tend not to be explicit about the framework in their writing.

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### ***Structural Approaches***

*Dependency Theory.* The basic dependency thesis is captured by Dos Santos: “Dependence is a conditioning situation in which the economies of one group of countries are conditioned by the development and expansion of others”(in Kiely 1995: 47). Dependency theory divided the world into groups of countries, referring to the group of economically dominant countries as the metropole, and the group whose development was conditioned by the metropole as satellite countries. Writers in this school challenged the dualistic (modern/pre-modern) view of the modernizationists, arguing that we must see the world as evolving in a single process of capitalist development since the sixteenth century. All sectors are drawn into the capitalist system based on production for the market, and the metropole captures the economic surplus of the satellites producing primary goods. In this model, underdevelopment is not seen as an original condition of developing countries; rather it is seen as the outcome of several centuries of capitalist development. The industrialized nations were able to industrialize at the expense of the periphery. Underdevelopment in the periphery is created in the capitalist process, and therefore must be seen as just as much an product of the advance of capitalism as the cosmopolitan centers (Frank 1966).

The credibility of early dependency theory was significantly undermined by the economic growth of some developing countries in the 1960s and 1970s, and especially the rise of the newly industrializing countries (NICs) in the 1970s and 1980s. Critics argued that this approach neither predicted nor explained the rise of the NICs due to their assumption that development occurred in the periphery because of the process of capitalist accumulation

in the core. Thus, the core was seen as the engine of change – the only logical place from which change could emanate – and the periphery countries were treated as somewhat of a residual, passive category. What was lacking, argued Cardoso and Faletto (1979), was an understanding of development in which capitalist formations in developing countries are seen as an outcome of a dialectical process between “external” historical/structural transformation and internal processes of class formation and social struggles. Thus, as Chilcote (1974: 9) notes, Cardoso and Faletto emphasize the determinacy of internal forces over external forces, while recognizing a dialectic between the two. They elaborated a more nuanced view of the construction and stabilization of global structures that recognized the ability of social movements, conflict, and struggles to eventually transform structures. In doing so, they avoided two weaknesses in the literature: “. . . a belief that the internal or national socio-political situation is mechanically conditioned by external dominance; and the opposite idea that all is due to historical contingency”(Cardoso and Faletto 1979: 173).

*World Systems Theory.* World systems theorists are interested in looking at economic and social history as a way to understand and explain the rise of capitalism and the formation of the capitalist world system (e.g., Wallerstein 1979). Like dependency theory, the central dynamic in the system is the hierarchical power relationship between core and periphery, with the essential driving forces of change emanating from the core. The transition from a system of production for local consumption to a system of expanded accumulation was possible because of 1) an expansion of geographical size of world, 2) the specialization of labor, and 3) the growth of strong nation states (to assure transfer of surplus to core) (Kiely 1995: 45). Proponents of WST complemented dependency thinking by arguing that the

development of the world capitalist economy has been characterized by unequal exchange between the core and periphery, and that as long as periphery countries remained linked into the capitalist world economy, development would be extremely difficult, if not impossible, for them. More recent scholarship in this area has challenged the Eurocentrism of world systems theory, and has proposed extending its analysis much further in time and space (Frank and Gills 1993).

*Political Economy.* The political economy literature is vast, with a number of branches marking numerous internal distinctions. I will only discuss a few of the more prominent lines of research in this area. These share a number of general similarities, and are frequently categorized together as neomarxian political economy. They tend to share a conflict perspective which is concerned with the exploitative, extractive dimensions of development processes, and how the deeper incorporation of developing areas into world markets tends to displace local social relations with unequal capitalist relations, tying countries into a “web of economic and political dependency”(Long and Ploeg 1994: 63).

*Modes of production and New International Division of Labor.* Modes of production theory argues that capitalist development in the periphery is distinct from capitalism in the core because it is coexistent and articulated (or mixed) with local non-capitalist modes of production (ref). The early work in the new international division of labor (NIDL) (e.g., Frobel et al. 1980) emerged as a way to explain the rise of the NICs in the 1970s and 1980s. The NIDL represents a rise in industrialization in developing countries, which was driven by transnational corporations relocating manufacturing processes to third world export processing zones to take advantage of cheap, mostly unorganized, and therefore easily

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controllable labor forces. In agriculture for example, Friedmann (1991) argues that agri-food corporations are increasingly becoming intermediaries between producers of raw agricultural products and the final consumers: “Instead of crops destined for the kitchen pot, agriculture increasingly supplies raw materials to the food processing industry for the production of durable foods. These raw materials, like oil or aluminum, become subject to global sourcing and to technically developed solutions” (1991: 66-67).

*Regulation Theory.* Regulation theory (Aglietta 1979) uses the concept of regime of accumulation to explain development. The central argument of regulation theory is that the 1960s saw a crisis in the Fordist regime of accumulation, which was based on mass production of standardized products for mass consumption. When this regime began to lose its labor productivity, capital was forced to develop flexible production processes, which in addition to technical improvements, included shifting parts of the production process overseas in search of cheap labor markets. The successor regime of accumulation – referred to as neo-Fordist, post-Fordist, or Sloanist – is marked by its flexibility of production and labor, which includes the growth of labor intensive manufacturing overseas.

*Political Economy of Agriculture.* In the 1970s social scientists saw the root causes of the crisis in agriculture – economic crisis and the demise of the family farm – as primarily structural problems related to “larger structural cycles within capitalism” and the emergence of a new international division of labor in agriculture (e.g., the Soviet-American grain deal and the increasing transnationalization of agriculture) (Friedland et al. 1991, Friedmann 1982). Having defined the problems in this way these scholars drew on the neomarxian development literature of the time (e.g., peasant studies, dependency theory, world systems

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theory) for a framework to help them explain what was occurring in agriculture. As such, economic concentration and concentration of production in increasingly larger units was an issue of interest (e.g., Bonnano 1987, Heffernan 1974, 1984). A corollary to this was the debate over the “demise versus persistence” of family farming in the face of economies of scale being captured by large agricultural interests. Those approaching the issue from a structuralist perspective tended to emphasize demise due to larger capitalist processes (Buttel and Newby 1980). Similar questions were also posed in studies of peasantries (de Janvry 1981, Goodman and Redclift 1982). Friedland and Kappel (1979: 4), recognizing the role of US institutions of science and technology in the changing structure of agriculture, criticized the agricultural research system which tended to produce or encourage “. . . concentration, increased size of production units, chemical-, capital-, and energy-intensivity.” Busch and Sachs (1981) were interested in the role of agricultural science in capitalist accumulation. Later, scholars showed how agricultural development, and especially technical innovation, is heavily influenced by the unequal distribution of wealth and power, and tends to reflect the dominant interests in agribusiness (Berlan and Lewontin 1986, Deo and Swanson 1991, Kloppenburg 1988). Yet, it became increasingly clear that a global food system was emerging, which was coordinated by a “fairly stable set of international arrangements,” and which was characterized by grain surpluses, US food aid policy to dispose of the surplus, downward pressure on grain prices, the opening of new grain markets in developing countries, and their subsequent dependence on cheap grain (Friedmann 1982: 249-251). The Friedland et al. (1991) volume on the new political economy of agriculture marks a new sensitivity in the literature to global trends, namely the emergence of a “highly

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industrialized and capitalized food sector which utilizes generic inputs for the production of durable foods . . . . [in other words], a system in which “farming” is giving way to “. . . vertical and horizontal integrated production, processing and distribution of generic inputs for mass marketable foodstuffs”(1991: 3-4).

*Commodity Studies.* The approach to commodity systems analysis outlined by Friedland utilized production as “the critical analytic entry point, marking the application of a paradigm of long-standing antecedents in Marxian analysis . . .,” especially in industrial sociology (1984: 222). Beyond the production entry point, commodity systems analysis focused on “grower organization, labor as a factor in production, scientific production and application, and marketing and distribution systems”(1984: 222). Yet, while the methods of commodity studies varied, the theoretical orientation remained largely a neomarxist political economy approach. Some of the pioneering work in this subfield was carried out by Friedland and his colleagues on tomatoes and lettuce (Friedland and Barton 1975, Friedland et al. 1981). Friedland and associates have highlighted the distributive justice issues that emerged within a commodity system, and they have shown agricultural science as a tool to be captured and utilized by interest groups. Heffernan’s work on the broiler industry has been concerned with the impact of the restructuring of that industry on rural areas dependent on broiler production (1974, 1984, 1994).

*Globalization Studies.* The political economy of agriculture literature organized around the theme of globalization (e.g., Bonanno et al. 1994, Goodman and Watts 1997) can be read primarily as an extension of the new political economy of agriculture advanced by Friedland et al. (1991). Essentially, the trends in the agrifood system that are the central

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problematic of the Bonnano et al. volume are an intensified version of those trends identified in the Friedland et al. volume. These are: 1) a new international division of labor characterized by a “. . . redistribution of productive activities and investments around the globe . . . [and] an increased concentration of the control of financial resources and research capabilities” dominated by a small number of TNCs and advanced nations (1994: 1); 2) a shift from Fordism (mass industrial production destined for mass consumption) to Sloanism (flexible production for differentiated markets); and 3) a declining economic significance of the nation state. Let us now consider some of the strengths and weaknesses of the structural approaches taken together.

### **Strengths and Weaknesses of Structural Approaches**

*Strengths.* A number of strengths of the structural approaches can readily be identified. First, much of this work is rooted in a neomarxist tradition with a strong bent toward historical analysis. Analyses of historical processes have enriched our understanding of the transformations of capitalist development (de Janvry 1981, Frank and Gills 1993, Goodman and Redclift 1991, Goodman et al. 1987, Kloppenburg 1988, Wallerstein 1979). Second, this literature has the conceptual tools to elaborate powerful explanations of the very complex processes of capitalist accumulation and the impact of these processes on social life. In Friedmann's (1982, 1991) work on the emergence of an international post war food regime the reader can readily envisage the various elements of the food regime (e.g., state policies, corporate interests, diets) coming together to form an interlocking and relatively stable set of relationships. This is a powerful conceptual and explanatory tool. Moreover, the

neomarxist grounding of this literature may further sensitize writers to unequal exchange and the production of inequality.

A third strength of this literature is its ability to clearly recognize the global character of development processes, and to be able to theorize the connections of global processes to local outcomes (e.g., Gouveia 1994). Finally, commodity systems analysis has a number of advantages. It brings us considerably closer to actors “on the ground” than does mainstream political economy, where actors are often more abstract constructions, such as “the nation-state,” “class interests,” and “global capital” (Friedland 1984, Wells 1996). We get the sense that commodity studies point us to the crucial points in the filieres, where social interactions take place: negotiations, compromise, conflicts. In this sense, I see commodity studies – while still primarily in the political economy tradition – as somewhat of a bridge between mainstream political economy and more actor-oriented approaches that emphasize agency. It removes some of the layers of abstraction and can bring us closer to the actors.

*Weaknesses.* A number of weaknesses of the structural approaches have been pointed out. I want to discuss four of them here: 1) deductivism, 2) structure-agency dualism, 3) macro-micro dualism, and 4) nature-society dualism.<sup>17</sup>

*Deductivism.* The main thrust of Booth’s (1985) critique of neomarxist perspectives on development is that they share a “common metatheoretical commitment to ‘necessity’

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<sup>17</sup>Since all of the potential issues cannot be addressed within the space limitations here, it is necessary to focus on those most closely related to the explanation of development theme. However, see Scott (1995) for a critique of development theory regarding its general failure to address the social construction of gender differences, and see Friedland (1991) and Reynolds (1991) for a discussion of gender relations in the political economy of agriculture.

arguments”(in Buttel and McMichael 1994: 45). This means that structural change processes can be understood and explained by deduction from the “laws” of capitalist development. Kiely (1995) points out that at the extreme, for example in world systems theory, class and state formations could be explained as a consequence of the “needs” or logic of the system. Similarly, Buttel and McMichael (1994) point to a tendency toward functionalism in this literature where the global economy is seen as a grand system driven historically by capitalism in the core. The system has needs that must be met in order for it to survive. New formations and processes in the third world are then explained in terms of the needs of the system. Thus, both NIDL and regulation theory explain the shift of manufacturing processes to cheap labor markets overseas in terms of the needs of capital to search out cheaper labor, i.e., in terms of the systemic function they serve.

In the agrifood systems literature, Whatmore (1994) notes that political economy concepts such as food regime “impose a categorical logic on the restructuring of the production and consumption of food representing it as a coherent process determined by the structural requirements of capital accumulation”(in Ward and Almås 1997: 617). As such, agrifood system development could be explained using a generic, generalizing account of global capitalist development (e.g., Friedmann 1982), resulting in a tendency to gloss over the many heterogeneous formations of capitalist agriculture. In other words, the specificities of the empirical diversity of agriculture risk being lost in broad brush accounts of development processes. Yet, Friedland et al. claim that the new political economy of agriculture has addressed this criticism, becoming less deductivist and more accepting of the notion of “there being multiple processes and routes of capitalist penetration and

transformation of agriculture”(Friedland et al. 1991: 25). Indeed, this is one of the important contributions of commodity systems analysis – that is, by comparative analysis of commodity systems analysts are able to show the variation and heterogeneity in the social formations of capitalist agriculture across different commodities. Each commodity chain, because of its idiosyncracies, raises different issues about the organization of production processes, the way growers are organized, concentration in the industry, relations with labor, the organization of labor, etc.

*Structure-Agency Dualism.* Discussing a lack of empirical grounding, Booth (1994: 5) notes that neomarxism emphasized structure to the extent that it “seemed to neglect or even to deny much of what is specifically human about human societies: action and interaction, history, culture and the ‘social construction of reality.’” One of the drawbacks of remaining at a fairly distant/abstract level of analysis is that one misses the sense of why actors actually do the things they do. The “larger” narratives, such as the comparative historical macrosociology promoted by Buttel and McMichael (Buttel and McMichael 1994) seem to aspire to serve as the metanarrative while the more actor oriented work appears relegated to the status of substories with little explanatory power. Yet, the structure-agency dualism is about more than the subordination of agency to structure in analyses. While it has long been recognized in social theory that there is a continuous dialectic between processes of structural determinacy and individual agency – i.e., that structure both enables and constrains action, while at the same time it is continually produced and reproduced by actors (Berger and Luckmann 1966, Giddens 1984) – demonstration of this in empirical studies seems to be lacking (an exception is Wells 1996). Moreover, the very categories of

“structure” and “agency” are typically assumed rather than problematized.

*Macro-Micro Dualism.* Structural approaches to development have also tended to maintain the perennial distinction between micro and macro. It is an a priori assumption about the way the world is in which “. . . each position presupposes the existence of its opposite. Microeconomics assumes a world in which organizations, states and classes exist, while critical political economy assumes the existence of atomistic individuals within those very groups”(Busch and Juska 1997: 690). At the extremes, for adherents to a micro perspective, the micro determines the macro, and the reverse could be argued for an extreme macro perspective. Thus, for example in world systems theory, people seemingly disappear since they have little role to play other than to be recipients of the impacts of system change. In the political economy of agriculture literature there seems to have been a tacit division of labor between those adhering to one or the other of these positions. For example, micro studies have focused on the persistence of family farming theme and told us about the subjectivity of actors (e.g., Mooney 1988). While this renders rich empirical specificities, little is revealed about why the current global division of labor emerged. Meanwhile, the dominant macro perspective helps us to understand the logic driving globalization, but tells us little about how this process actually plays out among specific actors (as opposed to abstract actors, such as “global capital,” “the state” or various “class interests”). Busch and Juska (1997: 689) summarize the key problem with maintaining the a priori micro-macro distinction:

. . . both micro and macro approaches divide the world in a way that obscures

the interactions among a wide variety of political, economic, social, cultural, technological and natural phenomena that extend across localities, regions and nations and that together define globalization.

*Nature-Society Dualism.* Little mention is made in the development literature on how structural approaches deal with nature. Some have taken political economy to task for regarding nature as a passive background with human action in the foreground (e.g., Busch and Juska 1997). These authors critique the notion that nature is seen as a passive resource to be used in the accumulation process. While it has become more common in the agrifood systems literature to show the co-production of nature and society (Busch et al. 1994, Busch et al. 1995, Skladany 2000), less attention has been given to the issue of who decides, and at what moment is it decided, what is nature and what is society. Just as this is a key issue in understanding scientific knowledge claims and controversies (Callon and Latour 1992), so too to is it key in understanding and analyzing development processes.

## **Conclusions**

The social realist narrative presented in the first part of this chapter argues that the major actors in Panama have used their financial power to implement new models of development while destabilizing those models no longer in favor, thereby conditioning the character of development in Panama. To accomplish this they have used their financial leverage over development programs. This support is conditional on whether the government and its institutions adopt economic reforms and policies that are consonant with



the development being promoted by the major actors. Similar to the structural political economy literature, the social realist narrative here divides the world into center (the Bank and IDB are institutions of the center) and periphery (e.g., the government of Panama, IDIAP). Actors tend to be institutions or nations, while individual actors are assumed. Power is seen to emanate from the center, which is the motor for change and (conditioned) development in the periphery. The central dynamic in the narrative is the hierarchical, unequal relationship between core and periphery. In contrast to the structural approaches, the dynamic is not so much driven by the logic of capital accumulation as it is the interests of the major actors.

Finally, the social realist narrative treats language as a way to camouflage interests. So, for example, the appearance of sustainability and environmental concerns in the documents of the Bank is in part to conceal the political and economic interests of the Bank. The interests and power relations are there in the background, but the rhetoric is hiding or attempting to hide them. In the next chapter we will look more closely at how discourse is used in development narratives.

## **Chapter 4    Making the Case: Rhetoric, Development and the Strategic Use of Language**

*“... the generation of technologies [is] designed to raise production and the income levels of farm workers, principally those that are marginalized, and small and medium farmers.”*

– IDIAP’s mission, 1989

*“Strengthen the national technological base to contribute to food security, competitiveness and the sustainability of agribusiness, in benefit of the Panamanian society”*

– IDIAP’s mission, 2001

### **Introduction**

Development policies are based on claims about how development takes place. Underlying any prescriptive policy is a theory – implicit or explicit – about how societies “progress” towards greater food security, higher incomes and better standards of living, and about how best to organize the productive resources of society in order to achieve that progress. While the policies being promoted by the major actors at a given point in time can be seen as the dominant development model – for reasons noted in the previous chapter – these models do come in and out of favor. This raises the question: If the major actors possess the knowledge about how development takes place, and about the most effective policies to promote it, then what explains the change in their models over time?

An important indicator of the rise and decline of such models is the shift in the language associated with them. This language can be found in policy and project documents and in the spoken language of practitioners. While it is important to analyze the “stuff” of this language shift, it is equally important to ask: How do some actors convince others that their particular organization of language represents the *real* version of how development takes place? How do some actors succeed in persuading others that their version of reality is the correct one? In short, how do they make their narrative *the* narrative? This chapter takes a Latourian approach to this question. First I review the substance of the shift in language associated with the rise and decline of development models. To do this I show the change in language use over time in the annual reports of IDB and IDIAP. Then, in order to better understand the relationship between the language shifts of IDB and IDIAP, I examine the rhetorical strategies used by the authors, following Latour’s approach to rhetoric (1987: 21-62). “Rhetoric” is used here to refer to all those means utilized by an author or speaker to persuade an audience in a given situation, i.e., to convince another actor that the presented version is not only the correct version, but the only possible version. It is through rhetorical tactics that “readers” are kept in line, directed and controlled. The analysis of rhetorical strategies is extended beyond IDB and IDIAP to include the chain of actors between these two organizations that link them into a policy network. On the one hand, a better understanding of rhetorical strategies can help provide a more instructive account of the major actors’ source of influence in defining development and the directions it takes. On the other hand, analyzing the rhetoric of the other actors in the policy network (e.g., the government of Panama, MIPPE, MIDA, IDIAP, etc.) also reveals how actors at each link

interpret and translate policy language to reflect their own interests. Finally, analysis of interview data examines how individual actors interpret and translate policy change in everyday language.

### *Shifting Language*

To begin, let us compare two sources of development language: annual reports of IDB and IDIAP, respectively. The shift in language can be readily observed in the table of contents of the annual reports of IDB. A systematic review of the table of contents provides an indication of IDB's emphasis at any given point in time, and how the Bank has framed categories of import and interest. Table 1 contains a listing of the substantive categories in the table of contents of available IDB annual reports from 1968 to 2000. By "substantive categories" I mean those headings in the table of contents that indicate a substantive category of interest and activity on the part of the Bank, such as "Environment" and "Women in Development." These categories signify that in that year the IDB organized a subset of its lending activities around a specific rubric. The point here is not that a change in language necessarily indicates an associated change in the substance of practices. It might be, for example, that a new linguistic framework does not relate strongly to a change in practice. Categories left out of Table 1 include those which appear to deal solely with the operations of the bank, such as "Evaluation and Internal Audit," "Borrowings," "Terms and Conditions," etc.

**Table 1: Categories in the Table of Contents from IDB Annual Reports, 1968 - 2000**  
(Available years)

<b>Year<sup>1</sup></b>	<b>Table of Contents Categories</b>
1968	Technical Assistance
1973-1979	Economic Integration, Technical Cooperation
1980, 1981	Economic Integration, Technical Cooperation, Financing for Small Projects, Support for Low Income Groups
1982	Technical Cooperation, Financing for Small Projects, Support for Economic Integration
2e+07	Coordination of Support for Central America, Technical Cooperation, Financing for Small Projects, Support for Economic Integration, Support for Low Income Groups
2e+07	Technical Cooperation, Financing for Small Projects, Support for Low Income Groups, Support for Economic Integration, Environmental Aspects
1987, 1988	Technical Cooperation, Financing for Small Projects, Support for Low Income Groups, Support for Economic Integration, Environmental Aspects, Support for Women in Development
1989	(same as 1988, except “Environmental Aspects” becomes “Environmental Activities”)
1991	Technical Cooperation, Social Sectors, Low Income Groups, Microenterprises, Women in Development, Environmental Activities, Economic Integration and Trade Development, Enterprise for the Americas
1992, 1993	Social Sectors, Sector Lending, Economic Integration, Cofinancing, Microenterprise, Low Income Groups, Environmental Activities, Women in Development, Technical Cooperation
1994	(same as 1993, except “Sector Lending” and “Low Income Groups” dropped)
1995	Poverty Reduction and Social Equity, Social Sectors, Private Sector, Economic Integration, Environmental Activities, Modernization of the State, Microenterprise, Women in Development, Technical Cooperation, Cultural Activities, Cofinancing
1996	Poverty Reduction and Social Equity, Social Sector Reforms, Private Sector, Economic Integration, Environment, Modernization of the State, Microenterprise, Women in Development, Indigenous Groups, Technical Cooperation, Cultural Activities, Cofinancing,
1997	Poverty Reduction and Social Equity, Modernization of the State, Economic Integration, Environment, Private Sector, Technical Cooperation, Cultural Activities, Cofinancing
2000	(same as 1997, except “Cultural Activities” dropped)

Table 1 gives a fairly complete listing of the substantive table of contents categories.

This provides a sense of the range of language used from 1968 to the present in order to

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<sup>1</sup>Entries for “Year” separated by a comma indicates that the two years have identical categories in the table of contents. Entries for “Year” separated by a hyphen indicates that all the years in the range have identical categories.

describe categories of interest. While some categories show remarkable endurance over time, e.g., “Economic Integration” (1973-2000), others disappear almost as suddenly as they appear, e.g., “Indigenous Groups” (1996 only). Other categories, such as “Women in Development,” have an intermediate life span (1987-1996). Table 2 below summarizes some of this data to show the shift in language over time. Again, the year and category are presented. A check mark indicates that the category appeared in the table of contents of the IDB annual report of the year shown. A number of changes are instructive. From the earliest annual reports, the emphasis on technology as a linguistic framework for organizing development efforts is obvious. “Technical Assistance” (1968) changed to, “Technical Cooperation” by 1973, then remained unaltered through the 2000 report. Given the ebb and flow of development language, the persistence of this particular rubric for more than twenty years is suggestive of the strength of the belief in technology as an important approach to resolving development problems.

Two categories that endured throughout the 1980s were “Financing for Small Projects” and “Support for Low Income Groups.” Interestingly, soon after “Financing for Small Projects” disappeared from the table of contents (after 1989), the term “Microenterprise” appeared (1991), and remained through 1996. “Microenterprise” is arguably more in tune with a focus on the individual entrepreneur, in contrast to the “small projects” language, which is more suggestive of collective projects. Moreover, “Financing for . . .” places the emphasis on what the IDB is doing “for” some group, as opposed to “microenterprise,” which shifts the focus to the activities of the *enterprising* individual. In 1991, what was “Support for Low Income Groups” becomes simply “Low Income Groups,”

which may seem inconsequential, but it certainly is less of an advocacy stance. The latter is dropped altogether in 1994.

**Table 2: Language Shift in IDB Annual Reports, 1968 - 2000**

Selected Categories, Table of Contents	Year	1968	1973	1975	1976	1977 - 1979	1980, 1981	1982	1983, 1984	1985, 1986	1987, 1988	1989	1991	1992, 1993	1994	1995	1996	1997, 2000
"Technical Cooperation"		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
"Financing for Small Projects"							✓	✓	✓	✓	✓	✓						
"Low Income Groups"							✓		✓	✓	✓	✓	✓	✓				
"Environment . . ."										✓	✓	✓	✓	✓	✓	✓	✓	✓
"Women in Development"											✓	✓	✓	✓	✓	✓	✓	
"Microenterprise"													✓	✓	✓	✓	✓	
"Indigenous Groups"																	✓	
"Modernization of the State"																✓	✓	✓
"Private Sector"																✓	✓	✓

The environment entered the IDB table of contents for the first time in 1985, where it remains to the present. Prior to 1985 there was no indication in the table of contents of an interest in the environment. Its debut was as "Environmental Aspects," a decidedly objective wording, which by itself leaves interpretation quite open. Whether the funded activities included research, intervention, or ameliorative action is not obvious in the wording itself. "Environmental Aspects" became the more action-oriented "Environmental Activities" in 1989, and simply "Environment" from 1996 on. "Women in Development," entered the

table of contents in 1987, two years after the environment, and remained a category for about a decade, after which it was dropped. The inclusion of women in the table of contents was not the first time that a specific group had appeared as a category. “Low Income Groups,” (1980-1981) “Central America” (1983-1984) and “Indigenous Groups” (1986) are other groups that emerged as specific categories.

Two of the most recently added categories, perhaps the clearest indicators of the shift in language toward the neoliberal model, are “Modernization of the State” and “Private Sector.” In contrast to the minimalist language of other categories in the late 1990s, such as “Private Sector” and “Environment,” “Modernization of the State” is action-oriented, and less neutral in tone than the others. It is more clearly suggestive of a development agenda. If the decade of the 1980s is representative of an approach to development by IDB that emphasized support for marginalized groups (low income groups, small projects, women), then the language in IDB’s table of contents from 1995 on in particular is representative of the linguistic shift toward the rubric of the neoliberal model (e.g., “Modernization of the State” and “Private Sector”).

A similar shift is discernible in IDIAP’s documentation from 1979 to 2001. Table 3 contains excerpts from IDIAP’s annual reports from 1979 to 2001. The reports were reviewed systematically in order to treat reports from all years uniformly. The excerpts – usually from the first few pages of the report where the mission and objectives of the organization are discussed – were selected only if there was explicit reference to either IDIAP’s mission or objectives. Reference to mission and/or objectives was chosen because of the high likelihood that issues, themes and goals important to IDIAP would be expressed



in these statements.

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**Table 3: IDIAP's Statements of Mission and/or Primary Objectives, 1979-2001**  
(from annual reports, selected years)

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(1979) “. . . to raise the production and productivity, as well as the income level of agricultural producers, with emphasis on small producers” (IDIAP 1979: I).

(1984) “. . . design, promote, stimulate, coordinate and execute research activities to generate knowledge and technologies for agricultural development” (IDIAP 1987).

(1989) “. . . to administrate public resources and orient private resources destined for the generation of technologies to raise production and the income levels of farm workers, principally those that are marginalized, and small and medium farmers” (IDIAP 1989: 2).

(1990) (objectives include): a) “Design, promote, stimulate, coordinate and execute research activities to produce knowledge and technologies for agricultural development; b) Raise production and productivity by commodity or priority agricultural products to improve domestic supply as well as export possibilities; c) Raise the income levels of producers, with special attention to small producers and marginalized *campesinos*, facilitating their incorporation into the economic and social activity of agriculture; d) Conserve and use rationally agricultural resources” (IDIAP 1991a: 2-3).

(1992) “The generation and validation of agricultural production technologies appropriate for our small and medium producers” (IDIAP 1993).

(1992) “. . . contribute to the achievement of food security for our population . . .” (IDIAP 1993).

(1994) “. . . to generate technological options for the sector that optimize the use of the factors of production in the short and medium term . . . to respond to the needs of the producers and the demands of the market”(IDIAP 1995a: 3).

(1994) (objectives include) a) “Increase the supply of technological innovations so that producers have various production alternatives; b) Increase economic and productive efficiency, such that the desired levels of sustainability are guaranteed; c) Promote the adoption of innovation . . . ; d) Ensure the participation of the sector (producers, industrial suppliers, public and private entities) in the process of generation of technologies so that the technologies generated are consonant with the reality of the producer; e) Promote the industrialization of the sector, such that production alternatives are expanded”(IDIAP 1995a: 3).

(1995) “Provide solutions and solid, feasible, desirable, and safe opportunities to agricultural producers” (IDIAP 1996: I).

(1996) “Strengthening the technical base of food security, and of agribusiness in benefit of the Panamanian society” (IDIAP 1997).

(2001) “Strengthen the national technological base to contribute to food security, competitiveness and the sustainability of agribusiness, in benefit of the Panamanian society” (IDIAP 2002b).

(2001) (objectives include) a) generate, adapt and transfer agrotechnologies that respond to the demands of the clients, users, and beneficiaries of the institution; b) contribute to increasing efficiency, competitiveness, and equity of agricultural activity; c) contribute to the environmental sustainability of agricultural activity, minimizing the deterioration of natural resources (IDIAP 2002b).

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There are at least three key linguistic transitions evident in these excerpts that deserve mention: 1) the shift in IDIAP's language defining its clientele, 2) the shift from a narrow to a broad definition of objectives for IDIAP, and 3) the shift from the language of supplying technologies to responding to client (market) demand for technologies. Let us briefly consider each of these in turn.

*Redefining clientele.* As shown in Table 3, in 1979 the primary clientele was identified as agricultural producers, “. . . with emphasis on small producers.” This early definition of clientele is consonant with the populist state agricultural policy at the time, which focused attention on the reform sector and the rural poor. In the 1989 annual report, IDIAP's mission statement identifies “. . . farm workers, principally those that are marginalized, and small and medium farmers” as the primary beneficiaries of research efforts. Even though medium size farmers appear in this definition, it is somewhat surprising that marginalized farm workers would have appeared in the mission statement, given that Panama was under structural reform programs by that time. Yet, even as late as 1990, producers, and especially “. . . small producers and marginalized *campesinos*” were the stated target of IDIAP's efforts. In 1994 the shift became more obvious, with the clientele constructed more broadly, in terms of “producers.” Moreover, one of the specific objectives in that year was to “Ensure the participation of the sector (producers, industrial suppliers, public and private entities) . . .” in the process of generating technologies. Finally, in 1996 and 2001, the mission statement identifies “agribusiness” as a main clientele, with a

reference to broader benefit for “Panamanian society.”<sup>2</sup> In the statement of objectives, “clients, users and beneficiaries” are also mentioned. Thus, in IDIAP’s own language, the range of definition of its clientele is from “small producers” in 1979 to “agribusiness” in 2001. This certainly reflects the shift from a state-led development model to the neoliberal model, which emphasizes the role of the private sector in spurring the growth of the sector.

*From narrow to broader objectives.* In IDIAP’s early years, the clearly defined objectives were to carry out research programs leading to knowledge and technologies “... to raise the production and productivity, as well as the income level of agricultural producers ...” The basic language of production and productivity remained fairly stable, while the end goals of research progressively broadened. For example, in 1990 research was not only to increase production, productivity and incomes, but to “improve domestic supply as well as export possibilities.” In the same year conservation and rational use of agricultural resources (i.e., environment) enters into the language of objectives. The 1990 objective of improving “domestic supply” is supplanted from 1992 on by the somewhat weightier objective of achieving “food security.” Now agricultural research will be responsible not for merely improving domestic supply, but for achieving food security. The objectives become still broader. In 1994, increased economic and productive efficiencies from new technologies are to guarantee “desired levels of sustainability.” In that same year, no longer focused on just agricultural producers, IDIAP stated one of its objectives as: “Promote the industrialization of the sector.” Thus, agricultural research was now claiming broader responsibility for the

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<sup>2</sup>Indeed, during the field work in 1997, one of the issues being debated in the organization was management’s decision to eliminate altogether any reference to “small producers,” “subsistence farmers” or “*campesinos*” in the mission statement.

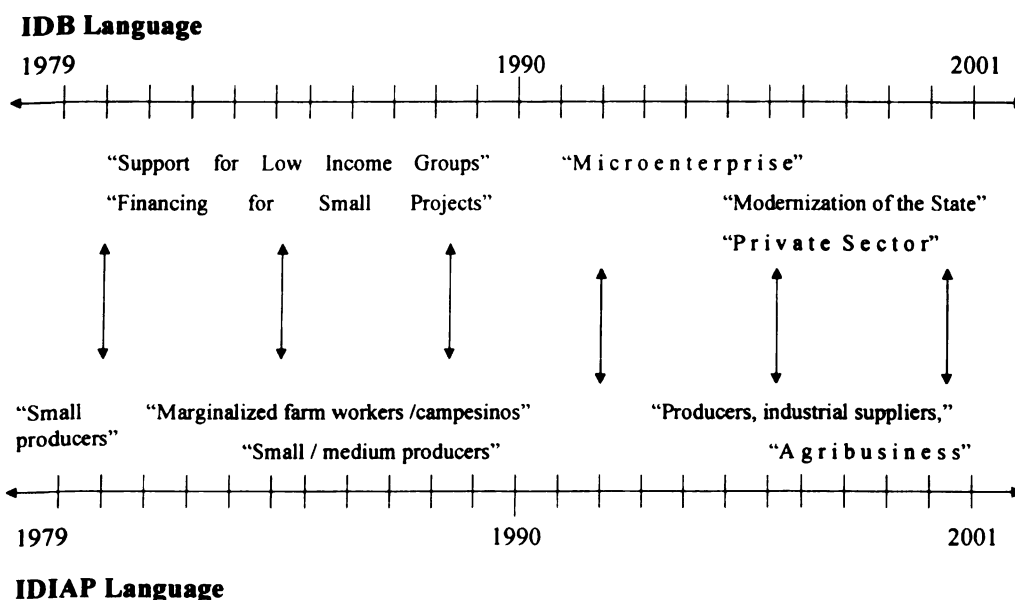
growth of the whole agricultural sector. Finally, in the latter half of the 1990s, included in IDIAP's mission statement was its broadest framing of goals: to contribute to "... food security, competitiveness and the sustainability of agribusiness in benefit of the Panamanian society." The scope of IDIAP's mission and objectives has shifted from raising production and productivity to benefit small agricultural producers to agricultural research that will benefit the entire society! It is not necessarily that the actual research or its impact changed, but that the claim of societal benefit was broadened. This broadening of objectives is partly a response to increased and broadened demands on agricultural research organizations. I will argue below that their linguistic response is a sign that in an era of "modernization of the state" they are increasingly being forced to "make the case" for their own existence. An important part of making the case is broadening their claims through stronger rhetorical strategies, in order to show that they are beneficial not just to a group of producers, but indeed to the larger society.

*From supply to demand orientation.* Evident in the 1984 and 1989 mission statements is the notion that IDIAP was supplying the agricultural sector with technologies. No mention was made of the demands of the clientele. The clientele seems to be "out there," rather distant from the organization. IDIAP presumed to know the needs of producers, and saw its role as generating technologies for producers, in what appears to have been a largely internal process. On its own, IDIAP will "... design, promote, stimulate, coordinate and execute research activities to generate knowledge and technologies..." (IDIAP 1987). The shift towards seeing the clientele as "demanders" of technologies, to which IDIAP should respond became apparent in 1994. In that year, part of IDIAP's objectives was to "...

respond to the needs of the producers and the demands of the market.” Moreover, since at least 1990, part of the mandate of the sector has been to increase agricultural exports. In order to compete in international markets, farmers need to be competitive. Thus, the logic is that (a) Panamanian producers are trying to compete in international markets, (b) to do so they need cost-reducing technologies and technologies that will help them produce commodities that will meet the standards of international markets, (c) producers know what technologies they need in order to compete in these markets, and thus (d) by responding to the demands of the producers and others down the commodity chain (e.g., processors, traders), IDIAP is in effect responding to the market. This keeps it closely in line with the government’s development model for agriculture – growth through export of non-traditional commodities. Indeed, in 2001, IDIAP’s objectives include “respond[ing] to the demands of the clients, users, and beneficiaries . . .” and “contribute[ing] to increasing efficiency” [and] competitiveness . . .”

*Summary.* What the analysis has done thus far is simply to show a shift in language use in two organizations, IDB and IDIAP. The shift at the IDB has been from language that emphasized support for marginalized groups (low income groups, small projects, women), to the language of the neoliberal model (e.g., microenterprise, modernization of the state, private sector). The shift at IDIAP has similarly been from language that emphasized a clientele of small producers, marginalized campesinos and farm workers to language that emphasizes the private sector (e.g., producers, industrial suppliers and agribusiness). Figure 1 depicts the relationship between the language shifts in the two organizations, with IDB's language on the upper time line and IDIAP's language on the lower time line.

**Figure 1: Relationship Between Linguistic Frameworks at IDB and IDIAP, 1979 – 2001**



During the same years that the IDB language reflects an interest in support for low income groups and small projects, IDIAP defined its clientele as small producers, marginalized farm workers and marginalized campesinos. Likewise, during the same years that IDB language showed a shift toward emphasis on microenterprise, modernization of the state, and the private sector, IDIAP defined its clientele more in terms of private sector interests. Yet, to say that there is an association between the language shifts in the two organizations does not go very far in terms of explaining the shift. There appears to be a relationship, but understanding causation remains elusive at this point. The next section examines the rhetorical strategies – of these two organizations as well as others that are linked to them – as a way to better understand the language shift associated with changing

development models.

### *Rhetorical Strategies*

To what extent can we look to rhetoric to explain development outcomes? The questions that shape the remainder of this chapter emerge from the observation in the first section that there is an association between the shift in language at IDB and the shift in language at IDIAP. In other words, at about the same time that the development language and themes are changing at the IDB, similar changes in language are observable at IDIAP. What accounts for this relationship? Is it that a small country agricultural research organization (IDIAP) is discovering “truths” about agricultural development at about the same time as a major actor (IDB), and therefore making similar linguistic adjustments? Is it that the IDB is forcing its models (including their concomitant language) on developing countries like Panama, using their financial leverage? Are some actors cleverly reorganizing their development language in order to capture as much external funding as possible? Are changes in development policy, in the latter case, mostly about reorganizing language? The remainder of this chapter examines the rhetorical strategies of various actors, including IDB, the Republic of Panama, IDB President, IDIAP researchers, and farmers and other end users.

*IDB.* To address these questions, let us consider the case of the *Agricultural Services Modernization Program* in Panama. The Modernization Program is a comprehensive project directed at improving the profitability and productivity of Panama’s agricultural sector. Its principal objective is to:



“ . . . facilitate the adaptation of Panamanian farmers to a more competitive economic system by modernizing the national services for the generation and transfer of technology, plant and animal health, market information, and the [sic] land titling” (Inter-American Development Bank 1996).

This includes significant institutional upgrading for MIDA (the executing agency) and IDIAP. Specific aims of the program include:

(i) increase the output of agricultural products for export and competitive domestic consumption; (ii) reduce losses from pests and diseases and gain greater access to international markets; (iii) improve the efficiency and reliability of market information; and (iv) expand land titling coverage (Inter-American Development Bank 1996).

Project implementation activities began in 1996, but the first draft of the project proposal was produced as early as 1994, submitted to the IDB loan committee in 1996, and approved in March of that year. The total amount of the project is US\$48 million, \$33.6 million of which is financed by IDB over a five year disbursement period. The borrower of this latter amount is the Republic of Panama. The remaining \$14.4 million derives from local counterpart funding. The program is divided into four subprograms, (i) technology generation and transfer (far and away the largest subprogram, funded at \$23.5 million), (ii) plant and animal health, (iii) market information; and (iv) land titling.

As an entry point to examine the rhetoric surrounding this project, let us begin with the primary document of the first subprogram, entitled “Agricultural Services Modernization Program: Subprogram of Technology Generation and Transfer” (BID 1995).<sup>3</sup> First, a comment on how this project proposal was constructed (and where it came from) is necessary. Government officials in charge of Panama’s agricultural sectoral expressed an interest to IDB in a project to modernize the organizations that make up the institutional matrix of the sector. To formally express this interest the Panamanian team developed an initial proposal, which was submitted to IDB for consideration. The IDB calls this the identification stage of their project cycle.<sup>4</sup> The Panamanian team was led by the Minister of Agricultural Development (MIDA), and was otherwise composed of the Directress of Economic and Social Planning in the Ministry of Planning and Economic Policy (MIPPE), the Director General of IDIAP and a consultant from MIDA. In actuality, the collection of data and drafting of the document was most likely carried out by a team of planners and economists from MIDA, IDIAP and MIPPE. After submission of this initial proposal, the IDB expressed an interest and sent a team of technicians on a mission to Panama. It is actually this team, not the Panamanian officials, that drafts the full proposal that goes to the

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<sup>3</sup>Recall that “IDB” and “BID” are one and the same. BID is the Spanish acronym for the Inter-American Development Bank. BID will appear in parenthetical references that refer to documents originally in Spanish.

<sup>4</sup>The IDB identifies six stages in its project cycle: (1) programming – this is carried out every two years when IDB sends a mission to each country to identify development priorities and needs; (2) identification – in which the borrowing government presents a request to the IDB to consider financing a specific project; (3) preparation – carried out by the borrowing country to clarify the scope of the project; (4) analysis – carried out by the IDB to assess the technical and economic feasibility of the project from the IDB’s point of view; (5) negotiation and approval – carried out between the borrower and the IDB to establish the terms of the loan; (6) execution and supervision – in which the project is carried out and IDB monitors the progress.

IDB.<sup>5</sup>

From the standpoint of rhetorical analysis, one of the first questions we come up against is authorship. Who is the author of “Agricultural Services Modernization Program: Subprogram of Technology Generation and Transfer?” Given the process of proposal development at IDB, and having witnessed some of IDIAP’s participation in developing the Modernization Program, it is reasonable to conclude that the Modernization Program was produced by a team of professionals from MIDA, IDIAP and MIPPE. Yet, authorship on the final document is attributed to a corporate author, IDB, not the individuals who drafted it. This has an impact as a rhetorical device, since the reader is now faced not with fallible, subjective, individual authors, but rather IDB. If the reader wants to challenge the document, then she needs to take into account not only the substance of the claims, but the status, values, goals and interests of the IDB, a corporate, collective body.

The status of the author is not a trivial issue (Latour 1987). Consider the standing of a document of the same title authored by a small Panamanian NGO. The reader might wonder whether a small NGO would have the necessary expertise to make an “authoritative” statement on such a topic. The political interests of the NGO would also become an issue. Likewise, consider the standing of a document with the same title authored by Rafael Ortiz. The reader, perhaps even before engaging the text, would immediately want to know: Who is Ortiz? What is his institutional affiliation? Is he with the Bank? An academic? What are his qualifications? With what *authority* does he write about this topic? The reader takes into account not only the substance of the claims, but the reputation of the author *and* the author’s

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<sup>5</sup>Indeed, the process described here is standard practice at IDB for proposal development.

institution. If the reader is able to answer the above questions, it conditions the manner in which she engages the document – with more skepticism or trust, for example. Without this knowledge, the document is more of a “black box” (Latour 1987), in the sense that the reader has less knowledge about the processes and conditions of production that led to the final document. The social relations of production are obscured. Thus, authorship matters, as the reader must take into account not only the substance of the claims being made, but also her views of the reputation, skill, objectivity, experience and goals of the author and the author’s institution. Some of the information the reader learns may be contradictory. For example, the reader may know that the IDB has considerable economic expertise, but may also be aware that the IDB is a bank, and a solid, profitable one at that (Inter-American Development Bank 2000). Making the author a corporate one (i.e., removing information about authors, their institutional affiliations, their qualifications) can be understood as the first rhetorical tactic here, because it can make dissent on the part of the reader more difficult.

The case that IDB is trying to make in this document is basically the following. First, the nature of the text suggests that the project is in stage four – the analysis stage – of IDB’s project cycle (see footnote #4). In this stage IDB technicians assess the technical and economic feasibility of the project from the Bank’s point of view. Thus, the logic that IDB needs to follow in order to make its case for the project is: (a) review the agroecological and socioeconomic context, the current policy direction of the sector, the existing capacities and resources of the institutions involved, and then (b) ask what are the challenges the agricultural sector faces, and what are the limitations, gaps and deficiencies in the sector that warrant being addressed through an IDB-funded project, and finally, (c) how will this

particular project plan address those deficiencies? The argument is something of a balancing act. On the one hand, IDB has to show that the main institutions of the sector (MIDA and IDIAP) have the experience, personnel, competence and overall capacity to take on and to carry out the project. On the other hand the document has to show that there are important deficiencies that require a major project, and that can be effectively addressed through this project.

At the outset of the text we immediately encounter the next rhetorical tactic. The author says in the opening statement of the first page:

As a consequence of the macroeconomic policy and of the participation of Panama in GATT, its agriculture will confront greater competition due to the gradual lowering of tariff protection, the access competing countries have to new production technologies, transformation and marketing, and a growing environmental regulatory framework (BID 1995: 1).

This is a strategy that the IDB uses successfully throughout the document. Panama's agriculture sector will face increasing competition, but it will not be because of the particular development model that the IDB is promoting; rather, it will be due to the macroeconomic policy path that Panamanian officials themselves have chosen. This strategy is more evident in the next paragraph:

The national authorities have proposed to carry out "The Program of

Modernization of Agricultural Services,” which includes the Subprogram A: Generation and Transfer of Technology. Said modernization program proposes to “. . . contribute to the creation of the conditions that will permit the Panamanian agricultural sector to strengthen its capacity to contribute to general economic growth, increasing production and productivity of the commodities and production systems of small and medium-size producers, and contributing to the preservation of renewable natural resources of the rural sector.” The above will be achieved as the legal, institutional and technological restrictions that limit agricultural development are removed (BID 1995: 1).

This contributes to the legitimation of IDB’s case because it says that Panamanian authorities have conducted their own analysis, identified their country’s needs, drawn their own conclusions, and developed a program to address their needs. To great effect, IDB inserts in quotations Panama’s own wording in the above passage to state the proposition of the program, then ends with an assertion in its own wording. Enrolling the Panamanian authorities deflects critical attention away from IDB’s own interests in promoting the project. Through this rhetorical strategy IDB enrolls Panama as an ally in the project – an ally that the Bank is simply helping to accomplish its own goals. It creates an alliance that strengthens the document. The reader who wishes to dissent will have to confront this IDB-Panama association. The argument that IDB is imposing its development model on a dependent southern nation is weakened when Panamanian officials are brought in to show

that it is indeed they who are pursuing the project and financing. Politically, it also suggests a sensitivity on the part of the Bank to criticisms stemming from the debt crisis of the 1980s, in which the development banks were criticized for encouraging Latin American governments to finance growth by assuming increasing amounts of external debt.<sup>6</sup> The maneuver of enrolling the Panamanian authorities from the start averts that criticism.

Having brought the Panamanian government in to legitimate its involvement, IDB now needs a credible narrative of the agroecological and socioeconomic context. To build this credibility IDB increases the number of associations in the narrative, i.e., it calls on more actors to help support its case. In the process, IDB solidifies its associations with the government of Panama by enrolling MIDA, MIPPE and IDIAP, and it enlists a new actor in the cause – IICA (the Instituto Interamericano de Cooperación para la Agricultura, a leading policy research agency in the region). What actors other than the local ministries and research institutions could speak with greater authority on the local/regional agroecological and socioeconomic context? Enlisting these actors in an affirmative manner helps to strengthen and legitimate IDB's case, while it also turns the statements in the documents cited more into facts. For example, when IDB wants to show that poverty is primarily a rural problem, and then suggest the importance of agriculture in generating employment and producing export value (1995: 5), it cites the IICA study (1992) to strengthen this claim. Likewise, in its diagnostic of the national socioeconomic situation in Panama IDB calls on MIPPE's (1994) documentation of poverty (50% of the population), extreme concentration of income, high levels of unemployment, low competitiveness, excessive protectionism and

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<sup>6</sup>The IDB was profitable in its ordinary capital operations every year during Latin America's "lost decade."

inadequate infrastructure (BID 1995: 4). This diagnostic is immediately followed by prescriptive measures which are strategically attributed to the central government:

Based on this type of diagnostic of the present situation, the central government has proposed various strategies to induce change. First, the internationalization of the markets for goods and services as a measure to create new investment and employment opportunities. Second, generation and transfer of technology [specifically, irrigation and agroindustry] to improve the competitiveness of the domestic producers (BID 1995: 4).

Once the context of the problem has been convincingly established, the narrative moves on to the next step in the logic of the argument – showing the current limitations and deficiencies in the sector. To identify the elements that limit the development and contribution of the agricultural sector to the economy, it is much more effective to draw on MIDA's own analysis of these factors. Thus, the IDB states:

According to the MIDA document, the potential for development and for the contribution of the sector to the national economy. . . is limited by: [among others] a) a lack of adaptation of the sectoral policy to the macroeconomic policy; b) institutional inefficiency; c) the lack of adequate technology; d) low competitiveness in production; e) high costs of manual labor and agricultural inputs; f) imperfections and high levels of market protection; g)



low level of public and private investment in port infrastructure, commercialization, etc. (BID 1995: 6, citing Ministerio de Desarrollo Agropecuario, 1994 #692)

In this way, the reader traces the language of limitations and deficiencies to MIDA rather than IDB, which helps to avoid the impression that IDB is overstating the deficiencies of the sector in order to show a greater urgency for the financing. IDB's message in the subtext here is, "We are not imposing our view on Panamanian agricultural officials. They are telling us what their own limitations are."

Finally, how does IDB make the case that this particular project will effectively address the deficiencies identified the diagnostic process? Its main strategy in the Subprogram of Technology Generation and Transfer is to bring the propositions of the subprogram closely in line with the objectives outlined by IDIAP in 1994. IDB states the specific objectives of the subprogram to strengthen IDIAP in the following terms:

Increase the supply of agrotechnological innovations, which have been biologically, economically, environmentally and socially validated . . . .

Promote the participation of the private sector in the process of generation of technologies . . . . Transfer the resulting technologies to Extension so that they might be diffused en masse to the producers (BID 1995: 75).

In its 1994 annual report, IDIAP (1995a: 3) had established the following objectives (among

others) for a modernized system of generation and transfer of agricultural technologies:

(a) Increase the supply of agrotechnological innovations . . . .; (b) Increase economic and productive efficiency . . . .; (c) Promote the adoption of innovation . . . .; (d) Ensure the participation of the sector (producers, providers, agribusiness, public and private entities), in the process of agrotechnology generation . . . .; (e) Promote the agroindustrialization of the sector . . . .

The IDB statement of objectives parallels closely what IDIAP cites above as the orientation that the government has defined for its agricultural research policy (BID 1995: 9). Indeed, one was almost certainly drawn from the other, though it is difficult to discern which was the original source. Thus, one of the ways in which IDB attempts to make the case for the Modernization Program is to use the language already in circulation in official government documents. The objectives that IDB favors are objectives already identified as desirable by IDIAP. In the policy language, the organizations appear to have very similar goals.

*Republic of Panama.* This raises an additional point. What becomes apparent in the above analysis is that the IDB cites documents from the Panamanian government – where language in accord with IDB’s perspective was already available – already circulating in agricultural sector networks. Similar language was used by both IDB and the Panamanian government organizations to state objectives, limitations, problems and prescriptions. As noted earlier, the major actors had begun implementing a neoliberal development model in

the early to mid 1980s. Yet, it is the government's 1991 statement in the "Program of Development and Modernization of the Economy of Panama" that displays the full embrace of the neoliberal language. A brief excerpt is sufficient to witness the flavor of this document:

The government of Panama has made the decision to transform the productive structure of the country and modernize its economic system. Experience indicates that a self-sustaining process of economic and social development is based in various principles, salient among which is the creation of a market economy. . . . Competition between firms and a free system of prices are the best mechanism for an optimal allocation of resources. . . . To achieve a full market economy, the following must be done:

- Eliminate all interventions in the pricing system;
- Expand competition through the introduction of imports, with a reasonable tariff;
- Liberate the restrictions that limit access to markets;
- Create a flexible labor market;
- Reduce State intervention (MIPPE 1991: 2-3).

An important issue in this kind of rhetoric is the audience. The MIPPE document above is essentially an expanded letter to the President of the World Bank. The objective of the

rhetoric is to normalize relations with the international finance community. As such, the document presents the strong case, i.e., the idealized version of neoliberal policy reform. Sweeping, unsubstantiated statements are made based on the presumed expectations of the audience:

The Private Sector is more efficient than the Public Sector in productive activities. This is explained by the lack of bureaucracy, the flexibility to act and a better mechanism for decision making and allocating resources. Therefore, the expansion of private activity increases the efficiency of the whole economic system (MIPPE 1991: 3).

In many contexts, such assertions would need at least some substantiation. Yet, once it is understood that the primary intended audience for this document is the international finance community, and the World Bank in particular, it becomes obvious that no supporting evidence is necessary. MIPPE does not need to convince the reader of these particular assertions. The authors understand that they are in friendly territory, and that these will not be points of contestation. To identify the points of contestation – those issues that are most sensitive – one need only search in the document for the places where the layers of supporting evidence become thicker. For example, the MIPPE document is designed to convince the international finance community that Panama is serious about structural reform, that important measures have been taken, and that they are having the desired impact. Part of the document is a letter from the Second Vice President of Panama and the Minister of

Finance and Treasury to Lewis Preston, then President of the World Bank. The letter summarizes the main points of the document. In the letter, the evidence becomes more layered around the most sensitive points – those of importance to the relationship between Panama and the international finance community:

We have achieved considerable progress in all three interrelated areas [reestablishing democratic institutions, resuscitating the economy and restructuring the economy]. These positive developments have restored Panama's position within the international community. We have complied with the [International Monetary] Fund-Monitored Program since September 1990. The public sector deficit was reduced from 11.5 percent of the GDP in 1989 to 2.9 percent in 1990. We have initiated the implementation of a sound public investment program addressing critical infrastructure needs. We lifted the deposit restrictions which had been introduced to avoid deposit withdrawals . . . . Deposits in the banking system have increased by US\$3.5 billion in 1990. Strengthened public confidence contributed to real GDP growth of 3.4 percent in 1990. . . . Since April 1990, we have made all payments on maturing debts owed to the IFIs [International Finance Institutions] . . . . In November 1990, an agreement was reached with the Paris Club for the rescheduling of official debt service payments in arrears . . . (MIPPE 1991: annex II)

The most sensitive issues are identifiable by the amount of effort the authors expend in supporting the claim. Compare, for example, the differential effort the authors invested in defending, “We have achieved considerable progress in all three interrelated areas [reestablishing democratic institutions, resuscitating the economy and restructuring the economy]<sup>7</sup>,” versus “The Private Sector is more efficient than the Public Sector in productive activities. . . .” Clearly, supporting evidence becomes thicker around the claims the author feels will be the most scrutinized by the reader, or perhaps most vulnerable to dissent. An additional tactic used above to make the claims more incontrovertible is to bring in allies for support – independent authorities that could verify their claims.<sup>8</sup> Thus, the authors call on the IMF, international finance institutions and the Paris Club, in case Mr. Preston is not fully convinced and chooses to verify Panama’s claims. What MIPPE needed to show here was that positive steps have been taken, and that they have led to the desired outcomes. MIPPE’s objective is to reestablish Panama’s credibility in the international finance community.

Similar language appears in various key government documents in addition to those mentioned above, for example, MIDA’s 1992 proposal to develop the national plan for exports (MIDA 1992), MIDA’s 1994 to 1999 “orienting framework” for agricultural policy (Ministerio de Desarrollo Agropecuario 1994), IDIAP’s orienting framework for the generation and transfer of technology (IDIAP 1994a), various of IDIAP’s annual reports and

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<sup>7</sup>Interestingly, the authors mention progress in “reestablishing democratic institutions,” yet are not compelled to support this particular claim with any detectable evidence whatsoever in the seven page letter to Mr. Preston. Rather, the effort is invested in supporting the other two claims regarding the economy. This is revealing of the authors’ comprehension of their audience.

<sup>8</sup>The parallel here to Latour’s rhetorical analysis of scientific articles is his argument that “when controversies flare up, the literature becomes technical” (1987). Here where issues become sensitive, the supporting evidence becomes thicker and the number of associations is increased.

MIPPE's 1994 public policy statement (MIPPE 1994). The question is: What is the nature of the circulation of this language? What explains its appearance in policy networks at a particular point in time?

*The IDB President Speaks, 1992.* Let us consider an example as a step towards a partial explanation. Returning to the Modernization Program example, imagine the scenario leading to the drafting of the proposal and its eventual fruition. It is the early 1990s. Officials of the Panamanian agricultural sector are contemplating a proposal to infuse significant investment into the sector. The two leading candidates for the source of such financing – i.e., at the level of negotiating loans with governments for projects that are national in scope – are the World Bank and IDB. The IDB in particular directs the largest portion of its lending towards agricultural projects. The challenge is to draft an initial proposal that will attract the attention of one of the major lenders. Strategically, the next step is to network with key actors/decision makers at the lending institutions – where those contacts are available – in order to learn what kinds of project are being sought, what is currently in favor and what is possible. Yet, to review precise proposal language, one would also need to go to the documents of the lenders to investigate the development language being used, the model being promoted, and the vision the major lenders have of the kinds of projects they would like to see advanced. In short, investigate what the actors you need to convince are saying!

An example of a document that the Panamanian officials and technicians would want to consult is *Reflections on Economic Development: Toward a New Latin American Consensus*, published by the IDB and authored by Enrique Iglesias, IDB President (Iglesias

1992). Of particular interest is a chapter entitled “Foundation for an Economic Agenda for the 1990s.” As the chapter title suggests, Iglesias outlines a number of objectives to serve as an underpinning for the “. . . design of the region’s economic and social policies for the 1990s” (Iglesias 1992: 144). Appropriate to our analysis here is Iglesias’ objective concerning technology, which he states as: “Promote the incorporation of the most advanced technology into the productive processes in order to enhance the regions’s international competitiveness” (Iglesias 1992: 144). Here we see a familiar theme, in which technology’s primary role is defined as enhancing competitiveness in an international economy. Later, the author expands this to say that:

Our countries’ potential for producing competitively and penetrating world markets depends on their capacity to keep up with international technological trends and incorporate the new knowledge into the production of tradable goods and services. This, in turn, depends not only on the existence of programs designed specifically to promote scientific and technological development, but also on the organization of enterprise, on its relationship with the various productive sectors, on financial and marketing services . . .

(Iglesias 1992: 151)

As we have seen repeatedly in documents from IDIAP, MIDA and MIPPE, Panamanian officials have tailored the role of science and technology in agriculture precisely along these lines. Note also that this language was circulating in development networks at about the time



that Panamanian officials were beginning to develop the proposal for the Modernization Program to IDB. One quite plausible explanation of how this circulation of language takes place is that local authorities draw on statements such as this one by Iglesias, they appropriate the language, “translate” it to accommodate their circumstances, then recirculate the language in project proposals. A less subtle, cynical interpretation would be that local officials appropriate the language of the major actors in order to feed back to them what they want to hear in order to increase the likelihood of a successful proposal. Yet, this is an overly simplistic reading. The language of the neoliberal model is simultaneously circulating in networks that extend all over the globe, and so there are many different possible sources. Government officials, planners and researchers are connected into multiple overlapping networks where various versions of this language are circulating. The causal arrow cannot be so simply drawn from IDB to Panama. Moreover, Iglesias is not the IDB, although it is not unreasonable to view him as a spokesperson for the Bank. Still, interestingly, page ii of Iglesias’s book warns that “The views and opinions expressed in this publication are those of the author and do not necessarily reflect the official position of the Inter-American Development Bank.” Here, the Bank is clarifying that the views of Iglesias, in this particular venue, cannot be taken as those of the IDB. Iglesias is indeed separate from “the Bank,” the Board of Directors and the loan committees that make decisions on specific projects. Yet, how unreasonable is it to assume that his views are not too distant from those of the top decision makers in the IDB?

One final comment regarding President Iglesias is in order. His role vis-à-vis development language is a unique one because of his position. His position gives him a bully

pulpit. Iglesias, more so than many of the actors in the networks discussed above, has the ability to publish his ideas on development and distribute them widely to key decision makers throughout the western hemisphere. To what extent does he enjoy preferential access to the IDB printing press as president? This suggests a linkage between authorship and authority. His words will be taken by many as authoritative, and they are made possible in part by his position of authority. They will be influential in setting the development agenda in Latin America.

*IDIAP Researchers.* Let us now move to a different point in the network to consider how the language of the neoliberal model is interpreted, translated and recirculated by IDIAP researchers. One of the key documents written by IDIAP researchers is the project document. Particularly in terms of rhetoric, the project document is key because it is here that the researcher frames the project in terms of the larger objectives of the institution, provides justification for expending resources on the project, states specific project objectives, identifies specific beneficiaries, and states the expected results. The project document is a quintessential exercise in rhetorical tactics.

In 1995, IDIAP went through a process – as part of its larger process of institutional change – of rethinking and developing all new research project proposals. The aim of these efforts was to recast research projects from a more holistic, integrated management perspective, to structure proposals based on a uniform format to increase comparability and consistency across projects, and to bring all research projects in line with sector policy. For example, in a research project on watermelon for export, the project opens with the following justification:

The national plan for modernizing the Panamanian economy considers . . . entering into external markets, through the processes of agricultural diversification, with emphasis on production for export. In this sense, the agrotechnological innovations that are promoted must respond to the necessities of external markets, without ignoring the sustainability of production systems (IDIAP 1995d: 2).

The proposal goes on to argue that watermelon is one of the commodities with high potential for export, due to the opening of markets in the US. This opening of markets, the author argues, has caused the acreage devoted to watermelon to nearly double, and the production to more than double. In short, the specific research project in watermelon is framed within IDIAP's objectives, the objectives of the sector, and in turn, those of the national economic modernization plan. The logic of the case being made here is from broad (Panamanian economy) to narrow (watermelon's contribution). The translation of the language in this case seems fairly straightforward. Cleverly, the researcher establishes the importance of IDIAP in removing the barriers to increasing exports in this subsector, while simultaneously ensuring the role of research by identifying "lack of information . . . about the technologies for integrated management of watermelon . . ." as a primary problem in the subsector (IDIAP 1995d: 11).

A project in pineapple research adopts a similar strategy, in which the author strategically locates research as a critical link in getting the commodity chain to function

effectively:

. . . the prices obtained in recent years by countries that sell fresh pineapple to the US have been good and have been improving in recent months. This offers an alternative to our producer[s] and stimulates interest in export activities. Yet, the necessary adjustments must be made in order to enter into said market, which includes technological changes that must emerge from research and be carried immediately to the farmer. . . (IDIAP 1995c)

Again, the author is making the case for the project by inserting research as a critical link in this subsector – critical if the national goals (e.g., competing in international markets) are to be met.

A more recent project on highland onions takes no chances in locating its project within the relevant framework adopted by the sector. In stating the project objectives, the author combines (nearly verbatim) the 2001 mission statement (see Table 3 above) with IDIAP's 1995 statement of what characteristics their technologies should have (also cited in (BID 1995: 9)), thereby linking together a number of documents to derive:

The project will permit the strengthening of the national technological base to contribute to food security, competitiveness and the sustainability of agribusiness, in benefit of the Panamanian society through technologies that are technically solid, economically feasible, socially desirable and

environmentally safe and stable (IDIAP 2001c).

A final project example is worth mentioning for its strategic linking of both new places and actors. This research project on cantaloupe connects beneficiaries (melon producers) in various parts of the country, with input vendors, with an association of agroexporters, and finally with buyers in the principal markets in Miami and New York. In addition, the author creates important associations that help to ensure the viability of the project:

The strategic alliances that have been arranged with the input vendor firms and with the Grupo de Agroexportadores de Panamá (GANTRAP, [25 exporters, 16 of which export melon]) guarantee the feedback, collaboration, follow up and evaluation of the identified and prioritized activities in order to contribute to capacity building and adoption of sustainable agrotechnologies (IDIAP 2001b).

*Farmers and End Users.* Finally, farmers and other end users also take up, interpret, translate and recirculate the language of the new model. For example, a member of the Board of Directors of APACH (Association of Rice Producers of Chiriquí) argued that the private sector, APACH for example, should have a closer relationship with IDIAP. APACH would be willing, according to this board member, to provide support in terms of inputs and plots, as long as IDIAP “carried out research in what is needed”. He portrayed APACH and IDIAP as close allies. He related an instance in which there was discussion that the central

government planned to privatize IDIAP. Representatives from APACH met with administrators of MIDA to express their objection:

For us IDIAP is exceedingly important. If you want to reduce the bureaucracy, eliminate the BAD [Agricultural Development Bank]. We can find financing elsewhere, but we cannot move forward without the technology.

Similarly, a highland potato farmer, who produced for the markets in David and Panama City, portrayed his interactions with IDIAP as closely collaborative:

I work in a very tight relationship with IDIAP. We compare plots; I am always trying new products that come out of IDIAP and the commercial houses. We compare and discuss what is going well, what is not . . . IDIAP has had a tremendous impact here with technology. The one thing I will say is that IDIAP needs to be more integrated with the producer.

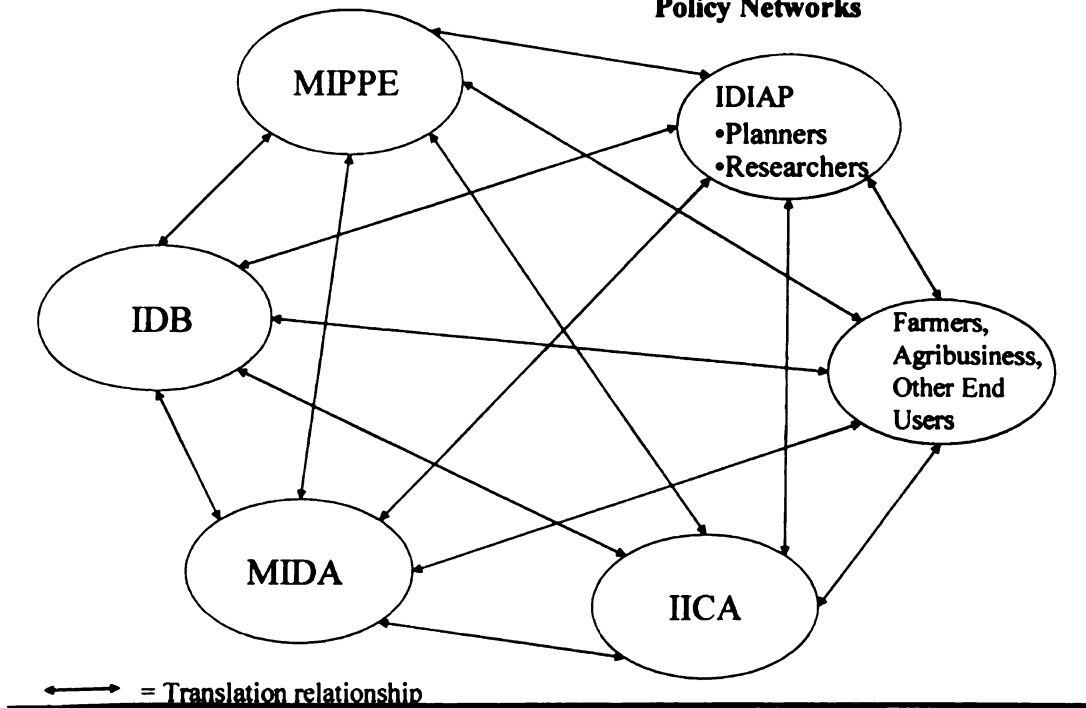
This is the view of a farmer who was well educated, comfortable discussing the latest technologies, and so comfortable in the IDIAP research station where the interview took place that he sat down at the director's desk to make a phone calls to his workers in order to plan the work day. His view of IDIAP's role was as a direct link to producers. Indeed, he envisioned a triangle connecting IDIAP, the producer and the commercial houses,

eliminating the role of Extension.

*Summary and Conclusions.* What has been shown in this chapter is a circulation process, in which development language is appropriated by actors in policy networks and refashioned to help each actor “make the case” in order to advance their interests. The language can be appropriated from any source in the policy network. For example, the following circulation of language is one possible scenario: (1) the IDB president publishes his views on the development agenda for the next decade, (2) Panamanian officials (e.g., Ministers of MIDA, MIPPE and Director General of IDIAP pick it up as leading edge development language, knowing they will need to cast their plans in this language in order to convince the major actors, (3) IDIAP leaders cast the goals, objectives and activities of the institution in similar language, (4) IDIAP researchers pick up the signals and represent their research projects in the image of the emerging model in order to show their relevance. Yet, this circulation of language does not necessarily occur in a linear fashion. It may be quite difficult to determine a starting and ending point. Rather, it might be more aptly described as a recirculation or translation process, as suggested in Figure 2 below.

Latour (1993) uses the notion of translation as synonymous with network. Thus, translations link in a continuous chain the biophysical entities, power relations, strategies and language. Translations are sets of practices that create “mixtures between entirely new types

**Figure 2: Language Circulates Along Policy Networks**



of beings, hybrids of nature and culture” (Latour 1993: 10). (We will say more about things and power relations in the next chapter). Likewise, networks are not “things” – they are relationships or sets of practices. The translation relationships depicted above suggest associations in which actors appropriate language, adapt it to their circumstances, then recirculate it in such a way as to situate their own actions strategically, oftentimes making their own project or institution a critical link, or what Latour refers to as an “obligatory passage point.” This is not to suggest that (re)presentation of one’s activities is disingenuous, but rather to say that it is strategic. Casting one’s actions in various lights depending on the circumstances is a common, often necessary, strategy.

We have also seen rhetorical tactics used to create the appearance of objectivity in the formation of policy in order to legitimate the process. For example, IDB was careful to



create associations with local actors in order to legitimate its involvement, appear as an objective outsider, and avert criticisms that they were acting in self interest (i.e., to overstate the need in order to win another client). Rhetorical strategies may also be used to rationalize a particular policy. For example, actors who were speaking for the State (e.g., MIPPE) argued for their policy based on the need for the agriculture sector to be competitive. By claiming national interest as the objective of policy, the state attempts to situate itself as beyond the specific interests of any group or class that may be benefitting from the policy.

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### *Narrative Commentary*

From the discursive perspective language is primary. Until about the 1960s it was generally held that there existed a neutral language that could describe the world; that by appealing to the search for truth it was possible to perfect a modern discourse that was universal (i.e., that it would hold in all cases regardless of place and time). For the West this modern discourse was rationalism, and in its most formal expression, science. Thus, in the postwar period, armed with the economic and political strength from having successfully engaged in the war, the conviction of Western righteousness and the certainty of Western reason, the US set out with a mixture of good intentions and economic and political self interest to bring the rest of the world along the development path toward the American model. As Peet (1999: 125) phrases it “. . . for the modernist, reason made possible science, which enabled development on behalf of humanity.”

Paramount among the Western discourses was the language of economics. Following

Western thinking, since economics was the most rational of the social sciences it could be used to create universal explanations of and prescriptions for developing the third world. Neoclassical economics could essentially guide world development. Yet, beginning in the 1960s some scholars began to question this Western notion of development. For Derrida and others, the notion of a neutral, positive social science was problematic because the relationship between object and subject (or reality and mind) was not so direct. Derrida (1982) argued that the object-subject relationship is linguistically mediated and historically specific. In other words, a science of society or markets that presumes a society which exists independently of our interpretation of it, is fundamentally flawed. Or, at least it is flawed if we go on believing that the resulting scientific claims are somehow neutral. That relationship between object and subject – i.e., the moment of interpretation between object and subject – came to be reinterpreted by poststructuralists as the moment in which the construction of reality was imbued with a fully Western interpretation.

Some began to make the connection between universal truth claims (Western knowledge) and the universalization of power and control exerted by the West around the world. This insight led scholars to begin to attack the central tenets of the West: reason, truth, science, democracy and development. And some postmodern thought became characterized by its loss of faith in the Western metanarrative (Derrida 1982, Lyotard 1984). Reason and development became critically reinterpreted as a mode of social control that acted through disciplinary institutions, but also more subtly and imperceptibly through automated and eventually internalized mechanisms of power (e.g., Foucault 1978). Perhaps in a critique of the Marxist focus on modes of production, Baudrillard argued that what was

important to study was not production relations, but the production of signs, symbols and codes in social life (Baudrillard 1983).

Foucault was interested in the creation of formalized systems of knowledge, or epistemes, in which it was decided what counted as real knowledge. He argued that modern discourses were based on appeals to some independent truth. Yet, he argued that truth could not be separated from society and power, and that truth, power and knowledge were inextricable (Foucault 1972). Moreover, this critique of modern discourse extended beyond the social sciences to the natural and physical sciences in the work of science studies scholars. Certainly, all the work in this area cannot be considered discourse analysis or poststructuralist. Yet, it is the case that much of it did the same kind of problematizing of the natural sciences that had been done in the social sciences. In a study of elite scientists Latour and Woolgar (1979) showed that rather than discovering facts about nature, rather than revealing nature as it “really” is, scientists are engaged in a game of *literary tactics* which are designed to convince readers that their version of reality is the correct one. They do this by following the production of facts from the hypothesis, to the production of images through various inscription devices (signs and symbols), eventually to the final product—the scientific paper. Some philosophers of science took on similar problems. For example, Rouse (1987) argued that the object (e.g., nature) is always constructed in our attempts to explain it with language. Therefore, language (or other symbolic representational tactics used by scientists) becomes a mediator between object and subject. Rouse argued that while science would like to view nature in its “pure objectivity” (i.e., as it really is), there is no way of escaping the object/subject relationship – not even through following the scientific method

as Descartes suggested. Thus the claim to universality is impossible because of the many possible ways of “seeing” or “visioning” the object (Haraway 1995, Harding 1991, Rouse 1987).

What does this tell us about the narrative discussed in this chapter? Does this mean that we should focus our attention on the analysis of the discourses of those social and natural scientists (and the policymakers and bureaucrats who use their work) who are making claims to knowledge? In science and technology studies, discourse analysis has been underway for two decades or more, with some important results (see Ashmore et al. 1995 for a review). As Latour (1993: 5) argues, “. . . rhetoric, textual strategies, writing, staging, semiotics – all of these are really at stake, but in a new form that has a simultaneous impact on the nature of things and on the social context, while it is not reducible to one or the other.” In other words, discourse analysis by itself is not sufficient because the rhetoric does not remain in texts. Rather it is picked up by policymakers and given force through policy, leading people to engage in interactions and power relations (impacting the social) and to impacts in the material world as those policies are carried out.

A strength of the Latourian approach to rhetoric is that rather than trying to answer what an author should say in principle, as do philosophers, this approach attempts to show the practical answers: What are the discursive practices that authors (scientists, policy makers, researchers) actually use? What strategies do they use to convince others? It keeps the analysis grounded in action, and can tell us about discursive practices. Yet, a weakness of the approach is that while we learn about rhetorical tactics, the connection from these practices to how material and social relationships are transformed is weaker. In other words,



this is what the researcher said her project would do, but what did the researcher actually do to transform nature?

Moreover, the documents used in this chapter are, to some extent, black boxes. They are for the most part finished products. To accomplish a more thorough ethnography of policy making, one would need access to the discussions, arguments, debates and battles that took place during the production of the documents. What should be included in them, what should be excluded, and what language should be used? With this kind of data, one could show the process of language become more social as it is sedimented in documents. In other words, spoken language is softer than documents. Documents become more social because the number of associations, alliances and voices increases as a claim moves from language to policy document. I will address this issue further in the next chapter where I visit some of the debates – about research policy, IDIAP's clientele, the objectives of research, etc. – that were on going at the time of the fieldwork, as IDIAP was in the midst of a process of institutional change. The next chapter attempts to address the partiality of each of the three previous accounts. The question then becomes: What kinds of approaches might move us towards a better integration of the three perspectives discussed thus far?

## **Chapter 5     Negotiating Society, Language and Things: The Case for a Modest Actor-Network Theory**

The previous three chapters attempted to present a distillation of material determinist, social realist and discursive approaches, while simultaneously seeking to make empirical sense of the shaping of agricultural research policy in Panama. They each represent a particular “ordering” of a pool of empirical data that is necessarily messy and complex (Law 1994). Building a narrative from multifaceted realities is essentially a process of imposing an order upon them. The argument that I have been developing to this point is that the previous three approaches present analytic strengths and weaknesses, yet each is also necessarily a partial view that reflects the standpoint, values and theoretical commitments of the observer. The objective of this chapter is to move towards an approach integrative of the three perspectives.

To do so I draw on the resources of actor network theory (ANT), not as a path to the *real* narrative – for none exists – but as a means to address some of the drawbacks of the previous approaches through ANT’s ability to avoid (in particular) the macro/micro, structure/agent and nature/society dualisms that sociologists have wrestled with for decades. By integrative I do not mean that we will arrive at the *final* approach that will dissolve conclusively sociology’s dualisms, allowing us to tell the complete, holistic narrative. Nor do I mean that an integrative approach will or should displace previous explanatory attempts. By integrative I simply mean an approach that is able to bring together things, society and language into single accounts, and by doing so results in a narrative that is novel and in

some ways more complete than other accounts. The premise of the chapter, therefore, is that there are stronger and weaker accounts. This further presupposes that there must be a means and criteria by which to judge accounts.

*Structure and Strategy of the Chapter.* This chapter begins with a brief overview of the central premises of ANT. The overview is not intended to be full review of the ANT literature, which has been done elsewhere (Law and Hassard 1999). Rather, it is intended to familiarize the reader with the basic tenets of ANT so as to make the remainder of the chapter intelligible. The chapter then proceeds with four vignettes. Vignettes are used in part because it is neither reasonable nor desirable in one chapter to go back to reinterpret all of the empirical data of the previous three chapters from an ANT perspective. While this approach is certainly possible, it is unlikely that a lengthy rewriting of the material already presented would, after a point, be of much interest. The vignettes are brief sketches of the current processes of agricultural research policy and institutional change at IDIAP. While they again attempt to make sense of the empirical substance of the case study – and they bring the story up to date – their main purpose is to illustrate the ways in which ANT can improve upon the previous approaches. Each vignette is followed by a reflection which discusses the main points that the vignette illustrates vis-à-vis actor network theory. The fourth vignette/reflection is followed by a final narrative commentary on the chapter, as was done with the other chapters. The narrative commentary at the end essentially asks: Why is ANT modest and why should this narrative be believed over any others? If it is simply another “ordering” imposed on reality, why should it be more credible? The response to this question briefly proposes some criteria for deciding what makes narratives stronger or



weaker.

The overarching theme in this chapter that pulls together the material, social and discursive elements is *negotiation*. The basic argument that is advanced is that development can be better understood as an outcome of negotiations among heterogeneous actors, as they attempt to extend networks – which include people, things and language – to further their interests in some way. Having said this, I also contend that ANT needs to be modest in its explanatory claims. One reason this is the case is because ANT is empirically driven, and as such is modest in scope, recognizing that it cannot see or tell about everything at once (Busch and Juska 1997). Another reason for ANT's modesty is that it recognizes that the analyst is fundamentally a part of the process of ordering stories and of sensemaking. As such, “. . . we're also, and necessarily, caught up in its uncertainty, its incompleteness, its plurality, a sense of fragmentation” (Law 1994: 2). Law goes on to argue that to pretend that an ANT narrative is complete, or to conceal the processes of its production, is to actually weaken it. Perhaps ironically, I argue that ANT's modesty can be seen as one of its strengths.

### *Actor Network Theory: Basic Premises*

Emerging out of the social studies of science in the late 1980s (e.g., Latour 1987), actor network theory has challenged a number of basic assumptions of both the social realist approach (e.g., critical political economy) as well as those parts of poststructuralism that deal with language and language alone. Let us turn to an overview of the basic premises of an actor network approach.

*Symmetry.* Perhaps the central methodological and theoretical premise in ANT is that of symmetry. Working in the eclectic field of science and technology studies in the 1970s, Bloor (1976) argued that “true” scientific knowledge deserved sociological explanation in the same terms as “false” scientific knowledge because both were social products. Neither true nor false knowledge should be privileged in an analysis, he argued. Rather, their truth or falsity should be explained as an outcome of the labor processes and the social context of scientific knowledge production. This basic principle – to approach all entities we study in the same way, in the same terms – has been extended to wide range of phenomena, most importantly to those we often associate with longstanding dualisms in sociology: micro/macro, structure/agency, and nature/society, to name a few. Symmetry is essentially a relational concept, which leads us to see entities as taking their form and characteristics not because of a given order, but as a result of their relationships with other entities.<sup>1</sup> It is not that there are no divisions, but rather that observable divisions are “. . . understood as *effects or outcomes*” (Law 1994). Thus, symmetry is a methodological notion in that it directs us to apply our methods equally to all entities; it is a theoretical notion because doing so significantly challenges the ontological distinctions given in prevailing theoretical approaches. The application of symmetry in ANT has led to two additional key features: the inclusion of non-human actors in social analysis, and the deconstruction of corporate actors.

*The inclusion of non-human actors.* This is where actor network theory parts with

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<sup>1</sup>This insight – the relationality of entities – has its roots in semiotics. Law argues that ANT is a “. . . ruthless application of *semiotics*” (Law, 1994: 3). It leads us to take the notion that entities are produced in relations and apply it to everything we study. This is effective in that it pushes us to challenge the distinctions that seem given in the world. Yet, Law seems to go too far in his apparent suggestion that any entity can simply be created at will through interaction. Here, the notion of interpretive flexibility (e.g., Bijker, 1995) is useful in understanding the limits of the construction of reality.



both those poststructuralists that deal solely with language as well as those political economists that only deal with social categories. Conventional sociology usually only considers humans and their organizations. Things are often either assumed as part of a background (e.g., Wallerstein 1979) or in some cases considered to be so fluid as to frustrate attempts to even label them due to their ethereal state (e.g., Collins and Yearly 1992). In contrast, ANT takes nonhumans as actors that are full citizens of our everyday networks. They are not passive. For example, crop pests commonly resist human attempts to eradicate their populations. Non-humans also alter our behavior when we interact with them. For example, people usually slow their cars when approaching a speed bump. This in itself involves an association of human decision, tubes, fluid, cylinders, brake shoes, etc. Further, humans cannot do whatever they like with things. Rather, the relationships between humans and other entities is under constant renegotiation (e.g., Latour 1995). For example, as Busch and Juska (1997) note, when Anglo farmers attempted to grow their wheat varieties in the North Plains of the US (after successfully eliminating or displacing the Native American populations), their varieties were useless. The arid conditions of the region would not allow it. Nature had to be negotiated with first. It was only after new wheat varieties were developed that the prairie could be settled. This both changed the prairie ecosystem as well as the human organization that was possible in the prairie. In short, in order to understand development processes nonhumans must be included in order to produce a more comprehensive narrative.

*Deconstruction of Corporate Actors.* Another key feature of ANT is that it allows the deconstruction of corporate actors. Consider the IDB in the previous chapter. If the lone

dissenter were to attempt to challenge IDB as the faceless, corporate monolith it would be quite difficult. Yet, as we saw in that chapter, IDB can do nothing for itself. In order to act, IDB needs spokespersons to speak for it. It also needs letterhead, computers, networks and the iadb.org website and e-mail addresses to create legitimacy. Without this association of humans and nonhumans, IDB cannot exist. This observation does two things. It suggests that instead of taking the IDB as a black box, we should look at the associations of specific actors and things that allow the IDB to act. In turn, this suggests that we might blur the distinction between macro actors and micro actors. As Busch and Juska (1997) argue, to deconstruct corporate actors is not to deny the power of institutions. It is, rather, to push analysts to look at how the specific people and things that make up corporate actors are able to create longer networks, in order to act a distance.

*Action at a Distance.* Action at a distance is another important aspect of ANT, and perhaps the feature with the most explanatory aspirations. Various scholars writing from an actor network approach have suggested that “development” or western expansion might best be understood as the creation of longer networks allowing actors to control people and things at greater distances. For example, Law (1987) shows that new technologies (e.g., maps, navigational technologies and ships) allowed European monarchs to better control their sea captains to ensure the return of wealth to Europe. Elsewhere (1986), he argues that Portuguese expansion was made possible in part because of the association of documents, devices and people, which were combined and mobilized in such a way that made it possible for a small number of people in Lisbon to influence events half-way around the world – what he calls long distance control. Sousa and Busch (1998) describe how, in the 1960s and

1970s, the Brazilian state was able to act at a distance to create a demand for soybean oil and rapidly develop the soybean subsector in that country. In short, understanding development processes as action at a distance asks that we not look for the power that inheres in certain actors, nor that we ask how dominant corporate actors determine economic outcomes; but rather that we consider actors' locations in networks, their specific actions, who they are speaking for, and how they succeed or fail in acting at greater distances.

*Distributive Justice.* Another feature of ANT is its ability to identify distributive justice issues in ways that are glossed over by other perspectives such as critical political economy. For example, Busch and Jaska (1997) argue that while critical political economy can identify the distribution of social goods such as income, status, power, wealth and prestige, it tells us little about the specifics of how or why they are distributed in particular ways. Moreover, critical political economy would identify corporate actors (states, transnational corporations, etc.) as dominating the political economic system and therefore determining distributive outcomes. In contrast, ANT looks to the specific networks into which actors are inserted in order to understand particular distributive outcomes. The concept of enrollment – in which some actors enroll others in order to advance their own interests – has become critical in ANT studies in order to understand distributive outcomes. Rather than looking to abstract “forces” outside of networks (e.g., the logic of global capital in Bonanno et al. 1994) for explanation, ANT looks to the networks that are available to actors in specific instances. This leads to a more grounded, empirically driven kind of explanation of distributive justice.

*Reflexivity.* Finally, reflexivity has become a prevalent feature of ANT (e.g., Law

1994). A reflexive account is one which has the ability to recognize the analyst in the narrative, making decisions, choosing to talk about some data over others, imposing order over complexity, and generally problematizing the object/subject dualism. It is a self-referring account, which recognizes that it is constitutive of the very situation it is describing. Reflexivity is neither unique to ANT studies, nor is it new to social theory.<sup>2</sup> The debate in science studies is about how seriously to take reflexivity and to what extent is it useful, desirable or “progressive.” While some see reflexivity as a logical and healthy extension of the notion of symmetry to the subject/object divide (e.g., Woolgar 1992), others see it as a pointless path leading to the infinite regress of relativism (e.g., Collins and Yearly 1992). Certainly, sociologists cannot be all-seeing gods, yet in the attempt to avoid omnipresence it hardly seems useful to permanently undermine one’s own narrative. Indeed, in the extreme relativist position, where each new attempt at ordering is seen as simply another story (i.e., with no way to judge between stronger and weaker accounts), social science efforts seem quite futile. In any case, it seems clear that while reflexivity to some extent is always possible and necessary, absolute reflexivity is never possible (Rouse 1987). With these features of ANT in mind, let us turn now to the vignettes.

### *The Vignettes*

The general empirical questions this study has been pursuing are: How has

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<sup>2</sup>For example, Radnitzky (1970) captures the basic tension around reflexivity in his comparison of the logical empiricist and hermeneutic traditions in metascience. In short, he argues that approaches stemming from logical empiricism generally ignore process in the production of knowledge (i.e., they erase the narrators), whereas approaches stemming from the hermeneutic tradition are more able to cope with the additional ambiguities of reflexivity.

agricultural research policy (as a subset of development policy) been formulated in Panama? What is the character of the relationships between the various “major” and “local” actors in the process of formulating research policy? And how is IDIAP responding to a globalizing agrifood system (i.e., a constantly changing set of demands)? A key component of IDIAP’s response to this latter question – from 1994 on – has been to enter into a comprehensive process of institutional change. The first vignette<sup>3</sup> brings us up to date on that process.

### ***Vignette One: Institutional Change at IDIAP***

In the early 1990s some of IDIAP’s planners and decision makers became increasingly concerned with the implications that global economic changes would have for the institution. Specifically, they were concerned about two major issues: the implications of the opening of agricultural markets through the lowering of barriers to trade, and the potential impact of government austerity programs on IDIAP. It was clear that the central government was aggressively pursuing a new economic development policy, in large part as a result of the negotiation of new reform programs with the World Bank and the IMF. These programs were designed to pay back external debts and normalize relations with the international finance community (MIPPE 1991). Moreover, the Balleares administration (1994 – 1999) made it immediately obvious that it intended to continue to intensify this policy path, including further lowering of trade barriers, the entrance of Panama into the

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<sup>3</sup>The term vignette is the diminutive form of the Old French term *vigne*. In addition to its meaning as a brief literary sketch, it is also used to refer to the practice of using vine tendrils for decorative or ornamental purposes. The vine metaphor seems doubly appropriate here, in particular for the image of an interlocking lattice whose beginning and end are often difficult to discern.



WTO, and the modernization of state institutions (MIPPE 1994).

The comments of one of IDIAP's leading planners reflect the thinking among the leadership ranks at that time:

These global changes have been producing cases of privatization, cases of complete shut downs of institutions like this one; they have provoked cases of restructuring, or reengineering . . . changes provoked by presidential decree, executive decree . . . layoffs and other things. . . . So, we began to worry about this, and say, 'with all that is happening, it could happen to IDIAP as well . . . and so we need to be at least sustainable. We cannot wait until what has happened to other institutions happens to us. From here the change initiative emerged . . .<sup>4</sup>

At the same time, as a component of its development policy, the government began negotiating the \$48 million modernization program for the agricultural sector with IDB in about 1993 (BID 1996). This program included a subprogram for modernizing the agricultural research and extension system (with \$7.8 million earmarked specifically for IDIAP). Among the major objectives of this subprogram were to encourage a research and extension system,

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<sup>4</sup>Indeed, IDIAP's concerns were not unfounded. In a number of countries in the region, such as Bolivia, Honduras and Peru, agricultural research has nearly disappeared from the public sector agenda.

. . . with the capacity to respond to the demand for technical innovations that . . . will contribute to the raising of productivity, competitiveness, and sustainability of the commodities and production systems of strategic interest to the nation, with minimal deterioration of the natural resource base required for production (BID 1995: 2).

Moreover, the IDB project encouraged closer collaboration with the private sector, which would become “. . . co-responsible in determining not only 'what to research,' but it would also offer increasing participation and moral, political, and financial support in the process of generation and transfer of technology. . . . (BID 1995: 1).

By attaching these objectives to financing, IDB would advance its goal of reducing the role of the state in region and enhancing the role of the private sector. The central government of Panama would advance its political interests by demonstrating to the international finance community its resolve to modernize the state and to enhance the role of the private sector. The political leaders would also benefit from enhanced legitimacy in the international finance community, and also in their local networks by showing their ability to land a fairly sizeable (for Panama) IDB project. Moreover, the state would benefit by receiving funds to upgrade the institutions of the agricultural sector. The negotiation of Panama's participation in this IDB project – negotiated by the Minister of Agricultural Development and other top government officials – created considerable pressure on IDIAP's leadership to proactively position the institution firmly within the IDB project on their own terms. All institutions in the sector would now come under intense scrutiny. If IDIAP did

not have an aggressive plan for its own transformation, plans for restructuring, reorganizing, or downsizing would come directly from the Ministry or IDB. The IDB project, after all, was the major project in the agricultural sector, and would certainly be important in shaping the future of agricultural development efforts. IDIAP would either change with this project proactively, or perhaps face a more drastic kind of reform. It needed a plan that would withstand the scrutiny of MIDA and IDB officials and place it clearly within the framework of the IDB Modernization Program and the new development policy being adopted by the central government. Yet, in the early 1990s IDIAP did not have such a plan in place.

*Enter ISNAR.* During the same period that the IDB Modernization Program was being negotiated (1993-95), IDIAP's leadership became aware of an ISNAR (International Service for National Agricultural Research)<sup>5</sup> project in Latin America on strengthening the administration of agricultural research. After reviewing materials produced in the first phase of the ISNAR project on strategic planning (1992-94), with well developed management tools and instruments, the Director General and Director of Planning realized that linking IDIAP to the ISNAR project would not only be beneficial to the institution on the merits of improved planning, monitoring, and evaluation (PM&E) – the key components of the project – but that it would also be a wise move strategically. IDIAP could avoid being modernized

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<sup>5</sup>ISNAR is an international, nonprofit agency that assists developing country governments in strengthening their national agricultural research systems. Established in 1979 by the Consultative Group on International Agricultural Research (CGIAR), ISNAR is one of the international centers of the CGIAR system. The agency, based in The Hague, receives its support and mandate from a variety of donors, development agencies, and research organizations from both developed and developing countries. For example, its donors in 1996 were Australia, Canada, People's Republic of China, Denmark, European Union, France, Germany, India, The Inter-American Development Bank, Iran, Italy, Japan, The Netherlands, Norway, The Philippines, Spain, Sweden, Switzerland, United Kingdom, United States, and The World Bank. It pursues its objectives by "promoting appropriate agricultural research policies, sustainable research institutions, and improved research management" (ISNAR, 1996). Ultimately, its activities are intended to benefit both producers and consumers in developing countries by contributing to a secure food supply while preserving the natural resource base.

from above by proposing a strategic plan for its own transformation. They saw the ISNAR project as the mechanism to embed IDIAP firmly within the IDB Modernization Program, which would virtually ensure its survival. As part of the CGIAR<sup>6</sup> system, ISNAR is well known and established in the international agricultural research community. That its core donor list includes the World Bank, the IDB and the major nations in the world that contribute to development efforts (see footnote #5) gives it an *official* seal in the world agricultural development community. These linkages helped produce legitimacy for the IDIAP/ISNAR association. Moreover, the ISNAR project in Latin America itself was, at least until about 1997, financed by IDB to the order of 40% of total costs. IDB would be in favor of the IDIAP/ISNAR association because it was funding both the Modernization Program in Panama and the ISNAR project. ISNAR's involvement with IDIAP added not only legitimacy, but could be seen as an integral part of the larger effort to modernize the institutions of the agriculture sector. This overlapping of associations tied together the organizations into an increasingly dense and interlinked network. Moreover, this increased the resources that could be brought to bear on the project, distributed responsibility for project success across the network and enhanced the perception of legitimacy among the various actors. It might also be argued that actors became more willing to commit resources to a project when they saw others making similar commitments to the same – or closely related – project. Finally, ISNAR would benefit from its association with Panama as a pilot

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<sup>6</sup>The Consultative Group on International Agricultural Research (CGIAR) was created in 1971. It defines itself as “an association of public and private members supporting a system of 16 international agricultural Centers that work in more than 100 countries to mobilize cutting-edge science to reduce hunger and poverty, improve human nutrition and health, and protect the environment” (CGIAR, 2001).

country because it was interested in extending the relevance of its own project throughout the region.

The ISNAR project could serve as a mechanism of legitimization that would secure IDIAP's place in IDB's modernization project, and therefore also secure its image in the eyes of government leaders as a public institution that was proactively adjusting to the new liberalized environment. Thus, in 1994 IDIAP's upper management decided to initiate a process of institutional change based on (and building on) the core management concepts developed through the ISNAR project. IDIAP entered into an agreement with ISNAR, and soon became a key participant and a pilot country for this regional project to improve the administration of agricultural research. The major thrust of the project was to develop, through a process of rationalization of management tools at all phases of the management cycle, improved planning, monitoring and evaluation systems for agricultural research. Key aspects of this process were its participatory character, the rigor of its management tools and methods, and its strategic focus, all of which were intended to help managers proactively and effectively adjust the organization to its changing environment.<sup>7</sup> One reading of IDIAP's process of institutional change is simply as an organizational survival strategy in a period of reduction of state institutions. Yet, IDIAP's current research policy is an outcome of a more complex process, involving negotiations with MIDA, the central government, IDB and other international organizations.

### *Reflection on Vignette One*

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<sup>7</sup>See vignette three for more details on the process of institutional change.

An actor-network approach helps us make sense of this vignette. Development, from this standpoint, is understood as: (a) extending networks by enrolling actors to advance one's interests; (b) creating stronger associations among multiple and dispersed actors that can withstand scrutiny from competitors and critics; and (c) fostering processes that create legitimacy, trust, shared responsibility, greater resources and credibility in the networks.

For example, in this vignette, IDIAP managers advance the interests of the institution by enrolling ISNAR on IDIAP's behalf. Enrolling ISNAR helps to increase financial resources (related to the project), and enlists rationalized management tools in order to send the message to the Minister of Agriculture and IDB that IDIAP is proactively modernizing itself. The enrollment of ISNAR, which includes visits and involvement of a range of experts from throughout the region, also increases IDIAP's legitimacy in Panama's agriculture sector, as well as the legitimacy of Panama's agriculture sector in the eyes of IDB officials. Certainly, it becomes more difficult to criticize IDIAP once they have enrolled ISNAR on their behalf, since the managers are now linked to another project also funded by the IDB. Additionally, an important outcome of stabilizing IDIAP as a viable organization is a measure of job security for IDIAP's mid-level managers.

ISNAR (and the specific actors at ISNAR involved in this project) also advances its interests by enrolling Panama in its project as a pilot country. This increases the legitimacy and credibility of the project in the region because it allows the ISNAR project leaders to say, in effect, "here is another country that has reviewed our project content and outputs and has decided that it is so worthwhile that it will commit to institutionalizing a system of PM&E in its agricultural research organization." The fact that actors like the managers at IDIAP

pick up the materials of the project and reaffirm them in a positive way – by agreeing to be a pilot country – further stabilizes the ISNAR project as a network to be reckoned with. Again, IDB benefits from the IDIAP/ISNAR association because it was funding both the Modernization Program in Panama and the ISNAR project. The IDIAP/ISNAR association enhances legitimacy, and contributes to the larger effort of modernizing the institutions of the agriculture sector.

The above qualities – e.g., legitimacy, credibility, stability – are produced, but they are not produced from thin air. Nor are they produced anew in each interaction or association. They draw from preexisting relationships, on layers of such relationships over time, and therefore on history. Legitimacy, for example, is an outcome as more “credible” actors buy into a project. Likewise, credibility is not something that inheres in an actor. It is an effect that occurs, as an outcome of an actor’s relationships, for example, when an actor is involved in a recently successful project. Then, when this actor engages in a new project, credibility already exists as a perception among actors who share a history of relations. Thus, the history of relations between actors becomes important.

As such, what is possible in extending networks is limited to some extent by those layers of preexisting relationships and the practices and meanings attached to them. Some writers refer to these limits as social structure. A critical political economy approach might emphasize how small countries who have not developed these relationships are closed out of international development finance circles. Giddens, (1984) refers to them as structuration processes, i.e., structure as the active layering of social relations over time. An actor-network approach, being focused first on action, would tend to see them as associations that both

provide opportunities for extending networks as well as obstacles to extending networks. For ANT there are no structures outside of networks – structure is seen as a relational concept. As an opportunity, for example, more organizations will “buy-in” to a project as the number of other credible actors invest in and *become invested in* the project. Investment, risk, trust, responsibility, credibility and legitimacy are thus distributed throughout the networks among more actors. As an obstacle, some associations can prevent actors from accomplishing their goals, from being heard, or from extending their own networks. Consider, for example, the lone critic who wants to challenge the IDB Modernization Program, which is a formidable association between the IDB, the Government of Panama, MIDA, MIPPE and IDIAP. What impact could a lone dissenter have on this association, which calls the voices of economic science to its defense? The need for organizing counter associations becomes immediately apparent.

In short, by examining the strategies of specific actors to extend their networks and create stronger associations, ANT enables us to show the specific ways in which development takes place. While more abstract approaches (e.g., political economy) can identify distributive outcomes of political economic systems, they are less able to tell us about the processes and strategies of specific actors, nor do they say much about how particular outcomes are produced. Later in this chapter we will again pick up the story of the further processes and outcomes of IDIAP’s process of institutional change. First, however, let us take one step back to examine briefly how the ISNAR project to improve the administration of agricultural research in Latin America came to be. This vignette will tell us something more about micro- and macro-actors, and moreover, it makes a stronger case



to demonstrate the rewards of delving into the details of practice.

***Vignette Two: Negotiating the ISNAR Project in Latin America<sup>8</sup>***

In 1990, ISNAR, along with the other CGIAR centers, was invited by the IDB to submit proposals for projects on agricultural research and development. The funds for these projects were designated for regional technical cooperation; they were to be for research or training that would benefit the entire region. Douglas Horton (a Program Director at ISNAR) and a colleague identified a need in Latin America for the strengthening of managerial capacity in agricultural research organizations, and they decided to develop a proposal. Taking into account recent advances in development thinking and practice, they framed a proposal based on participatory action research (PAR), an action-learning model. In this model, participants build capacity to identify and solve their own problems. This was developed as an improvement on the conventional transfer (or blueprint) model in which blueprint solutions were simply transferred to organizations, without a comprehensive, participatory and local diagnosis of problems (Horton 1999). The objective of ISNAR's proposal was strengthening agricultural research organizations through improved systems of planning, monitoring and evaluation (PM&E). Horton's review of the literature had identified weak or nonexistent systems of PM&E as a major deficiency in agricultural research organizations in the region. Years of development efforts had focused on fostering technical capacity, while managerial capacity had been relatively ignored.

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<sup>8</sup>This vignette draws extensively on Douglas Horton's account of his experiences as the manager at ISNAR who initially developed and launched this capacity-building project (Horton, 1999).

The proposal, submitted in 1990, had four major activity phases over a period of six years. The request was for \$1.6 million for the first three activities: (1) PM&E needs and assessment planning, (2) testing of new management practices, and (3) evaluation and drawing of general lessons. These were to be implemented over a three year period. The fourth activity phase, dissemination of lessons, principles, guidelines and practical tools, was conceived as a major component of the project, and would take an additional three years.

After it was submitted, Horton and his colleague heard nothing for several months, until they received a phone call in December of that year. It was the Bank officer responsible for the funding that went to the CGIAR centers. The officer, referred to by Horton as Mr. A, said that the bank was interested in supporting the PM&E proposal, with certain necessary changes:

- The budget would have to be reduced to under US \$700,000.
- The project would have to be implemented within an eighteen-month period.
- The project would have to focus on regional workshops and training, not emphasize research.
- Testing of the new PM&E methods in national research organizations could not be included, since the funding was for regional activities.
- The project should be “self-standing,” because future funding for an additional phase was unlikely (Horton 1999: 161).

Horton writes that he was shocked upon receiving this news. The time line and budget for the project were severely undermined, and the basic PAR approach, which emphasized action learning and research as an integral part of project implementation, was essentially gutted. His first response was to propose elaborating the program logic to Mr. A, keeping the project approach intact. If the bank still did not accept the project for what it was, ISNAR should look for funding elsewhere.

Greg, ISNAR's project development officer at the time and Horton's colleague, thought this would not be a good idea, arguing that project funding is more a question of detective work and negotiation than of elegantly constructed proposals. His logic was the following:<sup>9</sup>

Think of it as a maze with a bag of money somewhere. Our job is to figure out where the money is and how to get it. This donor probably has a specific amount of money allocated for support to ISNAR. Like other funding agencies, Donor X<sup>10</sup> needs to disburse its funds on a defined schedule. So it doesn't matter if our project "requires" three years; if the donor's funding horizon is for eighteen months or two years, we have to accommodate ourselves to that schedule.

We know that a large part of Donor X's grant funds go to support

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<sup>9</sup>Horton notes that these exchanges are paraphrased to convey the spirit and substance of the interactions, and are not quotations from recorded discussions. "Greg" is the name that Horton uses in the paper cited above.

<sup>10</sup>For the purposes of his publication, Horton refers to the IDB as "Donor X." Independent sources (e.g., Tollini, 1994) confirm that Donor X is the IDB.

agricultural research, and there is growing opposition to this within the organization. Many people think these funds could be better used for education or health. Luckily, Mr. A supports agricultural research. He's our ally, and we need to work with him.

Don't worry about the details now; worry about getting the grant. Once we have the funds, we'll see how to make the best use of them. But remember: core funding is going down. If we don't get this grant, you're likely to be sitting in your office next year with no funds to get to the field (Horton 1999: 161).

After these conversations Greg negotiated a series of changes in the proposal by telephone, which Mr. A said would "ensure its approval." The "project," highly valued by Horton for the work and intellectual investment that went into it, was from the standpoint of the bank, a relatively small part of a much larger "agreement" being negotiated with several CGIAR centers. The agreement then went to a grants committee and later to the bank's board of directors, where it was approved in 1991.

But Horton was not yet ready to fully concede on the content of the agreement. He had an opportunity to meet with Mr. A at the bank to work out some outstanding issues before implementation began. As he notes, his "secret agenda" was to convince Mr. A of the need to revert back to the original conception of the project, which included "thorough needs assessment and action research" (Horton 1999: 162). Mr. A, after listening to Horton's arguments, responded:

Believe me, I'm all for research, and I'm the greatest supporter of the CGIAR here. But people are getting tired of supporting research; they want to see results. We have already supported the CGIAR for fifteen years. How much more research is needed?

And as for "needs assessment," people in the region know what they need, and ISNAR should know it, too. If you don't, you'd better keep quiet. Otherwise, people will wonder what you've been doing for the last ten years (quoted in Horton 1999: 162).

Frustrated, Horton reflected back on his discussions with Mr. A and Greg and realized that both had suggested a way out of the dilemma:

Don't worry about implementation details now. Put first things first: get the agreement signed. Later, when you have the funding, you can deal with the details in the work plan. All you need to do is play by the [administrative] rules and deliver on the main objectives. The rest is up to you (Horton 1999: 162).

He realized afterwards that of less concern to the bank were the technical aspects of the proposal. What mattered at this point – the key issues to be negotiated – were the broad objectives of the project and the budget allocations. The bottom line was that at the end of the eighteen month period, he would have to deliver on the agreed upon objectives. When

the overall agreement with the CGIAR centers was approved in October 1991, Horton's original twelve-page proposal

. . . had been reduced to a four-line statement of purpose and a twelve-line description of activities: over a period of eighteen months, the project would analyze the status of PM&E in four organizations; prepare practical guidelines for improving PM&E; improve knowledge on this topic among research leaders, through regional workshops; and disseminate information on PM&E to middle-level managers, through subregional training events (Horton 1999: 163).

What had begun as a request for \$1.6 million over six years became, in the final approved agreement, a budget of \$690,000 over 18 months. The lesson that Horton draws out of this initial experience is that "Project design is much more than a technical process; it is essentially one of negotiation." Further, consider that this was only the very early stage of proposal writing and project design. Other preparations for the project, much less implementation, had hardly even begun! Appropriately, a second lesson Horton points to is that "In capacity-building projects, design activities cannot end when implementation begins" (Horton 1999: 163). Other lessons he draws as he takes us from the implementation of the project through to evaluation, include the importance of collaboration on a basis of equality with participants, and how such projects are unavoidably intertwined with organizational politics. One could summarize these lessons to conclude that such projects involve

negotiation as a central component from beginning to end. Project design, planning, who participates, implementation and evaluation are all points of negotiation through the life of a project, and they necessarily include a range of actors such as donors, designers, planners, implementors, participants and evaluators. Moreover, in a project based on participatory principles, participation is ostensibly taken seriously, and could potentially change the course of the project. Indeed, my own participant observation in certain moments of this project (subregional and national workshops in Panama and a synthesis/evaluation workshop in Ecuador), suggests that the participation of middle and upper level managers in the region was taken seriously, and has shaped the project in important ways. This kind of participation requires room for maneuver for additional layers of negotiations.

### *Reflection on Vignette Two*

This glimpse into the early phase of this project illustrates the myriad negotiations that take place in development projects. Despite its brevity, it raises at least two key points relevant to our discussion of ANT, regarding: 1) deconstructing corporate actors, and 2) “soft” language versus “hard” documents.

*Deconstructing corporate actors.* Thus far in this study I have generally used “major actors” to refer to the large development banks and agencies and “actors” to refer to individuals and organizations. This has been a shorthand solution, though the distinction is problematic. Terms such as “major actors” and those from the other extreme such as “small farmer,” imply something about the potential agency of the actor. The implication is often that a “major actor” has a broader range of actions available and when actions are taken, they

impact others, especially “smaller” actors. Likewise, it is often assumed that smaller actors are recipients of those impacts, and their own actions are frequently portrayed as having mostly local impacts. Yet, to accept categories such as “major actor” as a given, and as a term that defines a *kind* of actor is to privilege those actors. For example, in the social realist narrative of chapter three, the assertion of the “macro-ness” and “micro-ness” of actors is assumed as obvious. The IDB and World Bank are macro actors handing down policy directives to local and dependent Panamanian institutions in an effort to destabilize one development model and implement another. Their power and size are assumed to be something stable and given.

To assume the power of a “major” actor is to move closer to reifying that power rather than explaining it. To pick up and use the distinction between macro and micro actors in a narrative covers over important assumptions, leaving the reader with the impression that macro-ness and micro-ness are things that inhere in certain actors. It does not tell us about what makes a major actor major, or how they got that way, or what makes some actors appear smaller than others. What is it, for example, about the IDB that makes it appear more powerful than IDIAP or an individual researcher?

Law's (1994) work suggests that we look first to one of the basic principles of ANT – that of symmetry. Based on the notion of symmetry, the first move of an actor-network theorist is to rephrase the question to ask: What happens if we treat macro and micro actors in the same way? As Law phrases it:

That some phenomena, actors, institutions or organizations, end up being



larger than others is something that we might take on trust . . . . The question, rather, is what we should *make* of this distinction. The principle of symmetry suggests that we might treat size as a product or an effect, rather than something given in the nature of things. . . . I believe this is a crucial move. For the alternative is to distinguish . . . between the large and the small and to assume that these are different in kind. It is to prevent us from asking how it is that the macro-social got to be macro-social. And it is to demote the micro-social: to allow that while it might be interesting, it is ultimately of subsidiary importance [*emphasis in original*] (Law 1994: 11).

What does a deconstructed IDB look like? If we were to strip away the “IDB” label, and if we were to go to the physical office space of the IDB at 1300 New York Avenue in Washington, D.C., we would not find “the IDB.” Instead, we would find the people, things and production processes that create the IDB. We would find Baum’s (1982) “man behind the curtain,” which consists of all the people, things and production processes that create the image and actions that comprise the IDB.<sup>11</sup> We would find Mr. A, who negotiated the agreement with Greg at ISNAR, which defined the ISNAR project in Latin America. We would notice that Mr. A is not the abstract, monolithic actor **IDB**. He is not different *in kind*

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<sup>11</sup>For example, some of the important things that help to create an IDB that people believe are the building, IDB letterhead, website, @iadb.org e-mail addresses, computers, computer networks, documents, and of course the people and language.

than other actors we encounter.<sup>12</sup> My argument is that if we followed Mr. A in his work for any length of time, we would also notice that what makes the outcomes of his work different is not his macro-ness, but that he is able to act at a distance because his location at the dense node of relationships that is the IDB inserts him into long networks (Latour 1987).

He was able to get Horton, in The Hague, to reduce his project proposal in size (\$1.6 million to \$690,000), scope and duration. Mr. A at the bank was able to convincingly say to Horton that if you insist on these changes, you will have to resubmit and wait until the subsequent round of funding decisions next year. He was able to steer Horton's action in a particular direction. This seemingly innocent negotiation had an impact in offices of Director Generals of research organizations all over Latin America, as Horton described the project, reduced in size, scope and duration. That negotiated agreement further shaped the actions of planners, managers, researchers in Latin America as they participated in the project. This ability to get other actors to do what you want is what is often taken as macro-ness. ANT suggests that we should just take it as an indication of an actor's location in a network. Being located at the node known as IDB, Mr. A was also linked to members on the board where the CGIAR agreement was reviewed. Therefore, he was able to credibly tell Greg at ISNAR that if they insisted on the original form of the proposal, it would not get funded. At that moment he was speaking for the IDB. Indeed, he was speaking for the board members, which enhances their influence because it increases the distances and the number of places where they can "act" simultaneously.

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<sup>12</sup>The same applies to Horton, who does not appear as ISNAR, but rather an actor who is strategically weighing the downsides of compromising on his proposal versus the possibility of not being able to get to the field for a year.

In short, the advantage of the symmetrical approach in ANT is that it pushes the analyst to explain the “macro-ness” of an actor rather than assume it as a given. It pushes the analyst to deconstruct corporate actors. Put another way, *there are no macro or micro actors, only actors*. Some actors have many people and things they can get to speak and act for them; this allows some to act at a greater distance than others. This is how some actors get to be perceived as macro actors, but essentially they are never larger than the networks in which they are inserted.

*Soft Language Versus Hard Documents.* Language also remains important in an ANT narrative. Once a document, like the project agreement in this vignette, reaches its final form, the negotiations that took place during its production disappear. Consider the layers of discussion, followed by draft text, followed by final document, that went into the ISNAR project. The first round of discussions took place between Horton and his colleague with whom he developed the proposal. They then *crystallized* all of the fluid language and gave it a more structured form in their twelve page proposal. The project proposal was then floated to a number of other actors, including Greg and Mr. A, and a subsequent round of discussions took place. The bank responded with a list of significant changes. Further, more heated, discussions ensued. Its label slid from “project” to part of an “agreement.” What was a structured proposal in a hard document, was suddenly becoming more fluid again. It was losing the hardness of its document form and reverting (being reverted) to its previous state of fluid language. Horton concluded with Greg that having a reduced, modified project to work with was better than the possibility of having no project. In a telephone call, Greg negotiated final changes in the proposal ensuring its approval, according to Mr. A. Finally,

what had begun as a twelve page project proposal was crystallized in sixteen lines of the final agreement. What was soft language again became hard document.

Following ANT theorists (e.g., Latour 1987, Law 1994) and others in science studies (Knorr-Cetina 1981) the hard document is best understood as an outcome of previous negotiations. The negotiations that led to the final document are hidden in the final product. Once it is in this form – a black box – it becomes more difficult to reopen it to see all the processes of its production. Yet, in the case of Horton's project we recall that this finality does not mean that the *actions* of the project itself will conform to the language of the final agreement, to wit:

Don't worry about implementation details now. Put first things first: get the agreement signed. Later, when you have the funding, you can deal with the details in the work plan. All you need to do is play by the [administrative] rules and deliver on the main objectives. The rest is up to you (Horton 1999: 162).

Note here how trust and history become an issue in closing the negotiations on the final project document. Trust is quite important here in funding Horton's project based on relatively few details. Mr. A and the committee at the bank take it on trust that Horton will come through on the final objectives. His history with the CGIAR<sup>13</sup> and the bank then come

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<sup>13</sup>Prior to his current post at ISNAR Horton led the social sciences department at the International Potato Center (CIP), also a CGIAR center, for fifteen years.

into consideration, as they weigh the likelihood that the final products will be delivered. For closure, the final layers of legitimacy are placed on the agreement: cover letters from the top officials on IDB and ISNAR letterhead, perhaps a foreword from a ranking officer stating the need for the agreement, and committee members signing off – these are the final touches that create the official story.

***Vignette Three. The Combined IDIAP/ISNAR Project of Institutional Change***

With the agreement signed, implementation of the project (the first stage, 1992-1994) began in 1992. Word of the project, and its outputs, circulated quickly in the Latin American agricultural research community. This vignette focuses on the manifestation of this project in Panama, beginning in 1994 when the ISNAR project was entering its second stage (1995-1997). In particular, it focuses on the changing relationships between IDIAP and its constituents.

The logic of the project was the following. In the early 1990s, Latin America was in a process of redefining the role of the State in the context of neoliberal reforms being promoted by representatives of the IDB and World Bank. Those aspects of the reforms that dealt with the public sector were framed under the logic of modernization. As such, in IDB documents for example, Latin American public sectors were portrayed as overly bureaucratic, bloated, inefficient, ineffective and corrupt. Their actions in the economy were almost invariably portrayed as distorting markets that ostensibly would otherwise be in equilibrium. In contrast, the private sector was seen as the solution to economic and social problems. Private sector organizations acted on market principles, were efficient, effective

and honest. To be modern came to mean, for many leaders of public sector organizations, to adopt organizational models from the industrialized world whether or not they served the best interests of the nation or fit with their realities.<sup>14</sup> In this political context of pressure from the development financiers to reduce the state, the resources for public agricultural research were becoming increasingly scarce. Thus, the argument follows, national agricultural research systems need improved systems of PM&E in order to efficiently and effectively use the resources they have. Moreover, leaders and managers of agricultural research organizations need the skills to define their own problems and proactively change their organizations to adjust to their rapidly shifting environment.

Based on this rationale, in 1994 IDIAP and ISNAR launched a combined project: IDIAP began a process of institutional change (with the ISNAR project of improving PM&E systems at the center), and ISNAR expanded its regional project of improving PM&E systems in agricultural research organizations in Latin America (with Panama now committed as a pilot country). The general objective of the ISNAR project was to “. . . contribute to the improvement of PM&E in national systems of agricultural research in Latin America and the Caribbean” (Cheaz et al. 1996: 2). The specific objectives included: (1) analyzing existing PM&E experiences in the region; (2) preparing publications and practical guides for PM&E; (3) improving knowledge among the leaders of agricultural research organizations about the importance of improving PM&E; and (4) diffusing new practices to improve PM&E processes. The methods to accomplish these objectives included

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<sup>14</sup>For a penetrating critique of the neoliberal undermining of Latin America's public sector see Souza Silva (1996).

literature review, case studies, workshops and capacity building (Cheaz et al. 1996). The overarching approach to the work drew on the key elements of participation, institutional collaboration and experiential learning.

The technical content of the project was drawn out of the management and experiential/action learning literatures and adapted to local situations. While this content is interesting and important, it has been amply covered in the voluminous output of the project (see e.g., Bojanic et al. 1995, Bolívar et al. 1997, Borges-Andrade et al. 1995, Cheaz et al. 1996, Cheaz and Souza Silva 1999, Díaz et al. 1997, Gálvez et al. 1995, Granger et al. 1995, Souza Silva 1997, Tollini and Siri 1994). Therefore, I focus here on a set of issues that has received less attention in the project. The central questions is: What are the distributive implications of this process of change in a broader sense?

### *Distributive Outcomes and Selective Enrollment*

Just as technological innovations produce distributive consequences, institutional innovations can also produce these consequences. While the rationale for the project focused mainly on management tools, IDIAP's interpretation and implementation of the change process went well beyond the practices of managers doing PM&E. It attempted to set in motion a change process that involved a major portion of IDIAP personnel. For example, in the discussions on how to make IDIAP sensitive and proactive vis-à-vis its changing environment, researchers were pressed to think about their projects in new ways. Their research was now supposed to be demand driven, and they would be more critically evaluated based on how well their projects responded to an actual, defined client need. One

of the strategies to accomplish this was to increase the participation of their clientele through *consultas* (needs assessment meetings) with producers and producer associations.

*Enrollment.* It is apparent that with the new focus on demand-responsive research, participation of certain client groups in the shaping of the research agenda has increased. Indeed, researchers are now expected to cultivate client for specific research projects. The ideal model is to link the projects directly to clients who will support the research financially or in-kind. One mechanism currently being used to do this is *consultas*, which are intended to make research more responsive to the demands of producers. Based on my fieldwork, including numerous site visits in addition to the interviews, my conclusion regarding *consultas* is that they are a misnomer – there is very little if any consulting going on.

Rather, *consultas* can best be understood as a processes of strategic enrollment. The enrollment occurs in two ways. In the first instance, the researchers enroll the extension agents, producers and spokespersons of producers to participate in the meetings. What this accomplishes is essentially a lengthening of networks for the researcher, who is aligning supporters around the country to speak for him and his research project. After the *consulta* the spokespersons for producers return to their association's meetings to report on the *consulta*, and to assure his colleagues that he has convinced IDIAP researchers to include their concerns high on the agenda. They then discuss the ways in which they might be able to support the research. In this scenario, the researcher has successfully enrolled the producer association on behalf of his research project, thereby increasing his own stature within IDIAP. His stature is increased because his project is being demanded, it is needed and necessary. He has strengthened the association between a number of actors thereby



extending the network of his project. The producers and their association are now his allies.

In the second instance, producers and spokespersons for producers enroll the researcher. Their objective is to create a network in which the researcher is a necessary link. The network they want to stabilize stretches from the researcher to, for example, a new crop variety, to the field, to a transporter, to a processor or exporter, and on to a final market. The *consultas* are not for the researchers to listen to producer demands. Both the producer and the researcher could most likely produce the entire script of the *consulta* before it ever occurs! In most cases, each already knows what the other will say. A good researcher is already well aware of the production issues growers are facing. A good producer will know what researchers will be interested in pursuing, and which problems are researchable. There may be some negotiation of the specific problem, the timing of research results and, most importantly, producer support. I would argue, however, that the main purpose of the *consultas* is for producers, spokespersons and researchers to, literally, *network* (or create longer networks). This is not difficult for the producers who attend the *consultas* because a) they are already interested in IDIAP's technologies; b) they are likely to use what is produced by IDIAP; c) they tend to have views similar to the researchers regarding technologies and markets, and there is less social distance between them, and therefore there is an easier exchange process between them.

*Dilemmas.* This raises a number of questions about the social, economic and ethical implications of IDIAP's work. In the current context of modernization of the agricultural sector and the shift toward a demand-responsive research model, IDIAP is under considerable pressure to demonstrate its *raison d'être* as a public institution. In order to

survive financially and politically, they are creating close alliances with the constituencies that are able to provide this financial and political backing. Of course, these are precisely the actors who are more organized, articulate, linked into markets, and who are usually quite clear about their research demands. The implication is that IDIAP will have to shift its attention away from those clients that are less organized less connected to markets, since they do not represent a powerful constituency.<sup>15</sup> A review of IDIAP's 1995 portfolio of research projects in agriculture (excluding the animal sciences) confirms that very few of these projects attempt to deal directly with the groups least connected to markets.

In the interviews most researchers and managers recognized the potential for demand-responsive research to further isolate the traditional beneficiary groups. However, there is very little clarity or agreement on how to deal with this issue. Some felt that the law upon which IDIAP was established in 1975 should simply be changed to reflect the new reality and to relieve the institution of any express obligation to this group. Others felt it prudent to pursue the demand driven research model, while simultaneously strengthening programs for subsistence farmers, though this usually comes up against the problem of limited resources. Still others treat the issue as an inevitable reality of a market economy, as did one planner:

Now farmers have to be competitive. . . . They are on their own to adopt the technology, and if not they'll have to pack their bags, sell the land, and head

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<sup>15</sup>The parallel here with US researchers at the turn of the century should be noted. As Rosenberg (1976) points out, US scientists in the early 1900s had little choice but to align themselves with influential farmers. Agricultural scientists were struggling to establish their legitimacy in the university so they could effectively compete for funds, and influential farmers were able to provide the crucial support at legislative appropriations hearings to fund the kind of research they wanted.

for the city. This frees us up a bit from any culpability that we are not serving that type of farmer.

One researcher made it quite clear that the rice growers that are the primary constituency of his research group are not “farmers.” They do not live on the land where the rice is grown. They live in nearby Panama City, and are generally businessmen with other commercial activities such as department stores and car dealerships. Rice production is but one of their economic enterprises. They usually hire technicians to take care of the maintenance that their crops need, such as monitoring for pests and applying chemicals. Another researcher, discussing the new institutional mission, noted that small and medium size farmers no longer appear in the mission statement. This is because, he noted,

. . . if that is our mission [i.e., serving small and medium size farmers] then our entire enterprise is in jeopardy because they are not really going to be able to pay for the technology that we are going to generate.

Nevertheless, the notion that farmers and producer organizations will become major financial supporters of research is still mostly an ideal in Panama. The two most powerful producer associations, the Association of Rice Producers of Chiriquí and the National Association of Cattlemen, do provide some in-kind support for research, but their contributions are still somewhat limited. They do, however, offer political support where possible. The presumption of the current model is that those who do not fall into these

beneficiary groups – the majority of rural Panama – will eventually benefit from increased economic activity in rural areas. If they are not able to grow all of the food they need to support their families, they would be able to purchase it with income derived from labor opportunities generated in a growing rural agricultural economy. The risk appears to be that if this trickle-down to poorer members of rural society does not occur, that agriculture in Panama may become increasingly dualistic in its structure, with a relatively small percentage of farmers controlling much of the income generated in sector, and a majority remaining or becoming marginalized. IDIAP's current move toward a demand-responsive research model could exacerbate this dualistic structure. Yet, it is undeniable that in the current context of modernization of state institutions, IDIAP needs the financial and political backing of the influential farmer and agribusiness organizations.

These concerns lead to several conclusions. First, the process of institutional change at IDIAP seems to be achieving its goal of helping the institution do what it does better through improved methods of PM&E. Yet, what appears to be lacking are mechanisms that would allow IDIAP to respond to a broad range of constituents. IDIAP's current mission claims broad societal benefit (IDIAP 1997). Yet, the link between research focused on a relatively narrow group and broad social benefit is not obvious. Participatory mechanisms to bring in the concerns of not only producers and agribusiness concerns, but a broad range of potential constituencies (e.g., NGO's, indigenous organizations, environmentalist groups, any consumer groups organized around food availability, quality, safety issues, and rural development groups) might help IDIAP clarify the link between its research agenda and broad societal benefit.

### *Reflection on Vignette Three*

In this vignette, the lens of ANT and the concept of strategic enrollment in particular, allow us to bring distributive justice and power issues clearly into view. In contrast to IDIAP's notion of *consultas* as increasing the participation of clients, this vignette suggests that they are better understood as a mechanism through which actors – both researchers and producers – extend their networks by enrolling each other in order to advance their own interests. *Consultas* may be an effective public relations tool for IDIAP, but they are essentially an institutional mechanism to bring together actors in the network who would have come together for the purpose of mutual benefit in any case. The producers with capital and interest in new technologies and with little social distance between themselves and the researchers enroll the researchers as a critical link in their commodity network, i.e., knowledge and technology. The researchers enroll the same group of producers in order to create a demand for their projects, thereby increasing their visibility and relevance nationally. The researchers are essentially selling their work, creating a constituency for their work, and therefore creating financial and political allies (Latour 1988).

As such, a series of stronger associations is created between the researchers and a select few growers. In some ways, this is effective for IDIAP because it targets directly those clients who are interested in specific technologies. Moreover, it is used to enhance the legitimacy of the institution. However, from an ANT perspective it is clear that stronger associations between researchers and this group of growers can be used to thwart the creation of associations between researchers and other types of growers or potential client groups. In short, the close linkages between researchers and these growers are used to shut others out.

Clearly, the capitalized growers benefit by having the public researchers work on their problems, and the researchers benefit by having stronger allies for their projects. The power of the growers derives from their ability to support the researchers politically and to a smaller extent financially. The power of the researchers derives from their ability to deliver profit-enhancing technologies to this specific group of growers.

In effect, the resources of the state are being distributed unevenly, in part because other groups do not have the political, economic and organizational power to “break in” to the network. This uneven distribution is then justified through an ideology which holds that the smaller, unorganized, less market-oriented growers are resistant, unmotivated, and backwards. This is why – according to the justification – they do not adopt the technologies that IDIAP produces. It is due to their own shortcomings. In short, what is portrayed by IDIAP as increased client participation – the *consultas* – is seen through the ANT lens as a process of uneven distribution of public resources. This is one way in which ANT highlights differential power relations.

***Vignette Four. Material/Social/Linguistic Hybrids: A Brief Story of the Processing Tomato in Panama***

In 1975, the tomato processing industry in Panama, one of the important productive industries of the country, was nearly devastated by a bacterium. The Nestlé plant in Panama’s southern peninsula, which makes tomato juices, salsas, pastes and ketchup, was near the point of having to close its doors. The closing of this plant would have meant the loss of a profitable crop for hundreds of producers and hundreds more laborers who worked

in the production and processing of the crop. Nestlé contracted, purchased, processed and distributed the vast majority of the processing tomato production in Panama. Researchers at IDIAP, which had just recently been created, imported genetic material from the US and the international research centers in an attempt to develop a variety that would be resistant to the bacteria, *Pseudomonas solanacearum*. With genetic material from North Carolina, researchers were able to develop a variety, De Leon–IDIAP, 1-12, with high resistance to the bacteria. With this resistant variety, an important agricultural industry was saved from disaster (IDIAP 1995e).

According to one plant breeder/biotechnologist, there had been interest in the processing tomato in Panama from the 1940s, and since the late 1960s, there have been research efforts in the sector to improve the tomato. Over the years, the research efforts were directed towards “. . . achieving more stable lines that would guarantee yields with more certainty, so that the tomato company [Nestlé] could program and plan.” From the mid-1970s on there has been close collaboration between Nestlé and IDIAP on working to maintain the quality and improve processing of tomato varieties. Currently, the tomato processing industry is still viable in Panama. Almost all of the production in the country is produced by some 500 small growers on plots whose average size is .8 hectares. This small grower group represents about 80% of the processing tomato producers. In the 1993-1994 season growers planted about 717 hectares of processing tomatoes for a total production of 48 million pounds, and a yield of about 67,000 pounds per hectare (IDIAP 1995e: 3). As has been the case historically, the industry remains dominated by Nestlé. The company “assigns space” before planting and establishes prices, negotiated beforehand with the grower (IDIAP

1995e: 3). In other words, the production arrangements are by contract. Nestlé then buys 92% of the production. They process it into juices, salsas, pastes and ketchup and then supply the domestic market as well as export to other Central American countries, where no other such processing plants exist (IDIAP 1995e). The plant has the capacity to handle 1 million pounds per day, and is presently only at about 50% capacity.

Currently, the two primary problems in processing tomato production are pathogens. The principal problem in the subsector is the marchitez bacteriana (*Ralstonia solanacearum*), followed by the gémini virus. Both impact yield and fruit quality. The incidence of the gémini virus is “generalized” and it is closely linked to the infestation level of its primary vector, the White Fly (IDIAP 1995e: 5). Losses in Panama's processing tomato industry due to infection by gémini virus during the period 1991-1994 were estimated to be 6000 tons (IDIAP 1995b: 11, citing Nestlé data).

The strategy of IDIAP researchers to control the virus includes both conventional methods and biotechnology for genetic improvements in tomato. Using biotechnological techniques, researchers are introducing germplasm that shows resistance or tolerance to the virus (IDIAP 1995b: 11). Conventional breeding efforts are also underway to obtain tolerant varieties that also have other desirable characteristics, such as high yield and fruit quality. The advantage of biotechnological techniques, according to one researcher is to reduce the time it takes to produce a new line from six or seven years to two or three.

The objective of genetic improvement is to “. . . permit the growers to produce this commodity sustainably and competitively, within the global policy of liberalizing markets” (IDIAP 2001a). According to IDIAP, the new processing tomato varieties must satisfy the



need of the growers, consumers and the processing companies (IDIAP 2001a). Moreover, the genetic improvement efforts must be on going, as IDIAP notes, “The continuous planting of varieties under conditions of pressure from pathogens, makes necessary the renewal of those varieties . . .” (IDIAP 2001a).

In addition to the pressure from pathogens, the tomato growers want to be able to compete, and therefore, according to a researcher, are exerting pressure on IDIAP to find technological solutions for the diseases. This, argues a planner, is IDIAP’s appropriate role; indeed these are the kinds of activities in which IDIAP has long been successfully involved. Yet, notes the planner, “the public does not know why the processing tomato sector exists today. Through the efforts of IDIAP researchers it was possible to develop a variety that saved an industry. What IDIAP needs to create is a *reputation* that reflects the positive impact it has in society.”

Bacteria, viruses, new seeds, tomatoes, laborers, growers, Nestlé, researchers – these are some of the actors that make up the processing tomato subsector in Panama. The actors include things as well as people. The researchers’ activities include not only negotiations with other people in the subsector, but negotiations with things as well. In reviewing the processing tomato case in Panama, we find that people and things come together in an interesting story. Processing tomato varieties were under pressure from pathogens, which were attacking the tomatoes. The gémini virus had an ally in the White Fly, which carried the virus through the fields helping it to find new hosts. This, in combination with the effects of the bacteria, resulted in the tomato plants producing a lesser quantity and quality of fruit. In turn, this put pressure on the growers, who had to sell the crop, pay laborers and other

costs of production, and still make a reasonable profit. Moreover, the managers of Nestlé were unhappy because the tomatoes were not cooperating with their business plan. But the characteristic that Nestlé found objectionable about the tomatoes was not their color, their size or their juice content. It was their stability – a criterion that is as much social as it is natural. Stability is a hybrid criterion, simultaneously genetic, social and economic. The tomatoes were not reliable, which made it difficult for Nestlé to program and execute even the most basic business plan. Thus, Nestlé and the growers resolved to renegotiate their agreements with these errant tomato varieties. Were they to let minuscule things like bacteria and viruses bring down an entire industry?

To begin to bring pressure against these things that were causing them trouble, the growers and Nestlé began with the conventional kind of pressure that human actors put on each other – the kind we usually think about in social relations.<sup>16</sup> They brought their demands and pressure to bear on the researchers at IDIAP with experience in plant breeding and plant pathogens. The researchers quickly realized they needed to respond, lest the growers and Nestlé go to others in the network (e.g., regional legislators or officials at MIDA) with news that IDIAP researchers are doing nothing for the important processing tomato industry. In short order, the researchers identified their foe in the pathogens. To combat the bacteria, researchers brought in an ally – new germplasm imported from the US – that showed resistance to the bacteria, *Pseudomonas solanacearum*. With the help of the germplasm researchers developed a new variety, De Leon, which was highly resistant to the bacteria. De Leon did its part, holding off the pressure from the pathogens. This, at least for

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<sup>16</sup>In fact, it did involve telephones, letters, cars, gasoline and office buildings.

the time being, satisfied the needs of the growers and Nestlé. Thus, to close the circle, the initial pressure from pathogens on the old tomato varieties, was transferred through the network. After the old varieties felt the pressure, their quantity and quality of production dropped off. This transferred pressure onto the growers, who struggled to remain profitable, then on to Nestlé who needed a reliable and uniform input for its processing plant. In turn, they pressured the researchers, who enrolled some new allies, including germplasm and laboratory tools, to develop De Leon. De Leon transferred the pressure back onto the pathogens, who could now not be as successful as they were previously. Successfully resisting the initial pressure from the pathogens required a complex network of people and things.

What were the outcomes of this process? Two important and intertwined outcomes can be readily identified: genetic stability and social stability. Genetic stability is an outcome because more stable lines guarantee that the new varieties will produce a more consistent yield (if the proper agronomic conditions are met). Social stability is also an outcome in this case because with more stable lines, Nestlé can plan with more certainty, resulting in more stable relations with the growers, and in turn, the growers can more accurately plan on their labor needs, allowing workers more stable employment. This is not to suggest that a system which is socially more stable is necessarily socially just. Commodity systems can be stable, while simultaneously being unfair to workers and hard on the environment.

Additionally, what is the outcome – the effect – for IDIAP in this process? It is not more profitable growers or more robust tomato varieties per se, though these may be desirable. The IDIAP planner quoted above clarified this for us. It is reputation! He

basically argued that what IDIAP needs to produce in order to ensure its survival is a reputation for having a positive impact in society. With a reputation of saving industries, a lot of other things (like money and in-kind support) are more likely to be taken care of by IDIAP's supporters.

### *Reflection on Vignette Four*

*Non-human Actors and Hybrids.* This vignette illustrates the importance of including non-human actors in “social” analysis. Following both Law (1994) and Latour (1993), it is increasingly clear that the notion in conventional sociology of purely social networks is untenable. Discussing the idea of social order, Law critiques both the notion of *social* and that of *order*. Regarding the former, he argues that what we usually call *social* is actually a materially heterogeneous network, made up of “. . . talk, bodies, texts, machines, [and] architectures” (Law 1994: 2). These are all intimately part of and reshape the social. If networks were comprised of only language and relationships between human actors, they would not stretch very far at all. A purely linguistic network would have very little chance of having any impact, because language alone is not capable of enrolling actors and creating and sustaining longer networks. As to the latter – the notion of order – Law argues that there is no *order* in the first place because orders are never complete and final, but rather are usually precarious and vulnerable smaller accomplishments, which can be overturned. Certainly, there is no single *order*, but a collection of plural processes of ordering in which different actors struggle to advance disparate interests, with multiple interpretations. This *ordering* is best understood as ongoing action – as a verb rather than a noun. Thus, the

concept of *the social order* is replaced “... by a concern with the plural processes of sociotechnical ordering” (Law 1994: 2).

Given this, should we consider De Leon, the resistant variety in the above vignette, to be technical or social; is it nature or society? Following Latour (1993) De Leon is a quintessential hybrid – part real, part constructed and part narration. It is a quasi-object that is not reducible to any of these three dimensions. Surely, De Leon is a social construction. It was an outcome of researchers' labor in a specific social and historical context. The researchers chose this problem to work on not in the abstract, but as a result of pressure from growers and the major processor, who were all functioning in a particular set of market conditions. Without this interest group pressure, De Leon would not have come into existence. Moreover, in a different context, for example, without adequate networks to obtain the required inputs to accompany De Leon, it could just as easily be defined as a failure. Yet, to conceive of De Leon as merely a social construction would be tantamount to ignoring the objects mobilized to construct it. Microscopes, petri dishes, nutrient solutions and computers were all a necessary part of creating De Leon. Moreover, in the field, De Leon grows. It draws on sunlight, nutrients and moisture in the soil to grow and eventually bear tomatoes, which in turn deliver important vitamins to the people who consume them. These are real processes of nutrition and life. Although somewhat flexible, De Leon has a reality of its own. It also has an existence in language. Research reports of the early field trials were written up, describing it as promising. It was later written up in IDIAP annual reports as an example of IDIAP's benefit to society. This humble new variety became, in the IDIAP narrative, the savior of the processing tomato industry. In this vignette it is playing

the role of a Latourian hybrid. Yet, recognizing De Leon as a hero in IDIAP annual reports or as a quasi object in this study does not mean that it can be infinitely flexible at the whim of whomever is writing the words. It does not mean that we can deny its real and social aspects. One of the key ANT arguments is simply that we presume neither the sociality nor the materiality of hybrids prior to the study. The principle of symmetry suggests that the division between society and nature is something that should emerge as an outcome of analysis.

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### *Narrative Commentary*

Each new telling of a particular narrative either explicitly or implicitly makes a claim to knowledge about the way the world is. Yet, if an ANT narrative is simply another ordering imposed on the empirical data, why should it be more credible? All three of the previous chapters are also interpretations, and this chapter is another possible rendering of this story. Why should it be believed? Those at the constructivist extreme – critical deconstructionists – essentially argue that accounts are all relative and deciding which are stronger is simply an imposition of power. In this view no narrative can be stronger than any other. Further attempts lead the infinite regress of relativism. If we subscribe to this view, it makes ordering narratives rather pointless; indeed it makes social science pointless if the narrative can be made no stronger. How do we make judgements as to which claims are stronger? Below are a few criteria by which we can judge the strength of various accounts.

*Is the account symmetrical?* Symmetrical accounts are stronger than asymmetrical

ones because they are more logically consistent. For example, in the second vignette, we came up against the problem of treating some actors differently than others. Specifically, we saw how easy it could be to fall into the habit of assuming some actors, institutions or organizations to be larger and more powerful than others. I had treated the IDB, for instance, as a “macro- actor,” while implying that institutions in Panama were less than macro-actors. This is the case with much of conventional sociological analysis. Yet, from an ANT perspective, these actors emerge from the same context. Thus, it is more logically consistent to treat them in the same way in order to show how the “macroness” or “microness” of actors is an effect of actions in the network rather than something that inheres in actors. The alternative is to treat actors as different in kind. This privileges certain actors and diminishes others by not subjecting them to the same kind of analysis. The result is a distorted account.

*Are non-human actors included?* Accounts that include non-human as well as human actors are stronger because they are a more comprehensive rendering of the world. To ignore things is not only to ignore a huge part of lived experience from the point of view of humans, but it is also to ignore most of the entities that allow the world to function as it does. As Latour phrases it, to leave out things is to ignore the “missing masses” (1992). Consider the work that was delegated to the tomato variety, De Leon, in the final vignette. It was expected to resist the attacks of bacteria, allowing the tomato plant to produce greater quantity and quality, eventually reducing the pressure on growers, the processor and the researchers. It may have spared workers from exposure to increasing amounts of agrichemicals by doing some of the work the chemicals would have done. In short, the world is much more coherent when understood as materially heterogeneous networks of people, things, and language, in

contrast to the notion of social order, which actually conceals much of what is going on.

*Is the account reflexive?: On Reflexivity and Modesty.* Accounts that are reflexive are stronger because they make transparent the processes of ordering the narratives. Critics of knowledge claims need to be willing to examine the bases of their own findings. This was pointed out more than two decades ago by Latour and Woolgar (1979) who were troubled by a tendency in science studies to produce critiques of science which were themselves ostensibly “scientific,” yet unwilling to question the bases of their own claims. In response, they developed a discourse which consciously kept the issue of reflexivity in the foreground. They argued that multiple perspectives of reality can exist simultaneously, with no reason to privilege any one perspective. They cast their own laboratory study as one of the possible versions of reality, although they also attempted to persuade the reader that it was the most accurate version.

Similarly, the present chapter makes a new truth claim, yet I stop short of arguing that as a result we have arrived at the *real* account of agricultural development in Panama (or the real account of development narratives). The argument is simply that ANT can bring us to a stronger, more comprehensive account. The material determinist account is seriously flawed by downplaying or leaving out altogether the politics and power relations between actors that ultimately shape development outcomes. The social realist account is flawed in that it tends to leave out the missing masses (or places them in the background), while reifying the *social* in the form of structure and external forces. Similarly, discourse analysis by itself tends to the downplay or deny the reality of materially heterogeneous sociotechnical networks. An integrative account, through the lens of ANT, can lead to a more



comprehensive account, showing how things, society and language interact.

*Why a modest sociology?* This leads to the final point, which is that ANT is strongest when its claims are modest. Modest accounts do not presume that ordering is complete or certain, nor do they conceal the processes of production (Law 1994). Indeed, they recognize that they are necessarily incomplete, and they are relatively aware of the context of their own production. Moreover, being empirically driven ANT's claims tend to be limited to the networks under study. Since in this perspective there is nothing outside of human/non-human relationships, the claims tend not to extend beyond the networks, recognizing that the narrator cannot see or describe everything at once. This transparency of perspective and process results in stronger accounts.

## Chapter 6    Theoretical Perspectives and Participatory Models

### *What is This a Case Of?*

It seems that this is an appropriate point – and a necessary part of concluding – to reflect on the question: What is this study a case of? Perhaps not surprisingly, in doing so we come up against yet another dualism – that of nominalism versus realism. Fortunately, Ragin (1992) and Walton (1992) provide us with some tools to think through this problem.

Ragin (1992) suggests a fourfold table that yields four possible formulations to help us answer: What is a case?

**Table 1: Understanding “What is a Case?”**

Understanding of Cases	Case conceptions	
	Specific	General
As empirical units	1. Cases are found	2. Cases are objects
As theoretical constructs (from Ragin 1992: 9)	3. Case are made	4. Cases are conventions

In the first dichotomy, cases are conceived as either empirically real or as theoretical constructs. In the second dichotomy, these conceptions are either specific or general. Thus, in the first quadrant, cases are seen as empirically real, but specific. Researchers who approach a case from this perspective see identifying the specific boundaries of the case as part of the research process. The empirical case is “found” and defined through the research

process, though the implication is that it was already “there.” In the second quadrant, cases are also seen as empirically real and bounded, but researchers put less effort into defining specific boundaries. Rather, units of research that already exist in literatures (e.g., the general cases of organizations or families) are used. In the third quadrant, cases are “made” over the course of research. In this view, cases are seen as “. . . specific theoretical constructs which coalesce in the course of the research. Neither empirical nor given, they are gradually imposed on empirical evidence as they take shape in the course of the research” (Ragin 1992: 10). Walton (1992: 121) adds that “. . . cases are ‘made’ by invoking theories, whether implicitly or explicitly, for justification or illumination, in advance of the research process or as its result.” What is important in this approach to a case is the interaction between evidence and ideas, and the search and demonstration of the theoretical significance of the case. Finally, in the fourth quadrant, cases are seen as general theoretical constructs that affect the ways of doing social science. It recognizes that the naming of a theoretical case may be problematic and may be the result of the way cases have been named in previous literature.

The point here is not to draw absolute lines and try to force the present study into one of the above quadrants. Indeed, as the Ragin volume points out, in practice researchers commonly cross these lines, draw on different perspectives and change the definition of their case in the course of a project. This is how we avoid the nominalist/realist divide. In other words, it makes little sense to hold on to the strong nominalist claim that cases are merely the consequence of theoretical questions, not having any real empirical existence. Nor does it make sense to hold on to the strong realist claim that cases are simply “out there” waiting

to be discovered and empirically verified. Having said that, this project fits most closely with the third and fourth quadrants above. It certainly is a theoretical construct that has been imposed on the empirical evidence and taken shape over the course of the research project (i.e., “cases are made”). It exhibits an interaction between ideas and evidence as well. Moreover, it fits to some extent within the fourth quadrant, as it does make some metascientific claims and is therefore shaped by the existing language, practice, categories and conventions of social science. As such, this study can be thought of as two cases – one of secondary and the other of primary importance.

*Of Secondary Importance.* On one level, this is an empirical case of the shaping of agricultural research and development policies in Panama over the past several decades. As Walton (1992) notes, cases imply both particularity and generality. In regards to particularity, the implication is that the empirical evidence is drawn from a particular social setting or social activity, and so the case is telling us something about that particular instance. Much of the empirical evidence in this case is drawn from the experiences of agricultural development in Panama. The claim to generality here comes from the presumption that agricultural/development policy is also shaped in much the same way in other Latin American countries, and indeed most of the developing world. It is fair to say that the World Bank and the regional development banks act in similar ways toward different countries in the developing world. In fact, they attempt to implement similar policies throughout the developing world. It follows, for example, that the arguments in this study about the imposition of development models (chapter three) and the strategic use of rhetoric (chapter four) would also hold in other developing countries that negotiate policies with the major

development financiers. In short, the claim in the empirical case study is that it can tell us about something more than merely development processes in Panama. Indeed, it can be used to think about the processes of shaping development policy throughout the developing world generally. The empirical case is illustrative of negotiation processes that take place in the hashing out of development policies.

*Of Primary Importance.* However, of primary importance is the theoretical argument. If we frame the theoretical argument in terms of case study language, then this is a case study of four development narratives. Each case is a distinct narrative, a different approach by social scientists to the telling of development stories. As such, the activity of doing social science, of ordering stories, of imposing order on a body of empirical evidence, becomes the object of case study analysis. The main objective of this study has been, then, to examine each of these cases, to identify areas where each has strengths and weaknesses and to see which of them does a better job of telling the story. This is the basis for the primary claims of this study; it is its primary purpose. The remainder of this chapter summarizes the empirical and theoretical conclusions, and then discusses the implications of the study. Let us turn first to a summary of the conclusions.

### *Empirical Conclusions*

The initial questions that informed this study were about how public agricultural research organizations – IDIAP in particular – are responding to a rapidly changing global context. How are agricultural research organizations formulating policy in a context of a globalizing agrifood system, a constantly changing set of demands, the liberalization of trade

policy, direct competition from farmers around the world, increased political pressure to integrate the environment and sustainability into the research agenda, the trend toward privatization of research and information and static or declining budgets from the state? Then, I wanted to know what this policy response meant for the actors involved. How did farmers, end users, researchers, administrators, state bureaucrats and other spokespersons perceive the new policy direction, and how were they impacted? In short, what are the distributive effects of this institutional change? Who benefits and who loses as a result of IDIAP's response to the changing context?

Moreover, I sought a better understanding of the relationship between the models promoted by the major development actors and the models adopted at the national level. With what strategies are the major actors able to globalize the models they see as the most appropriate for world development? How is the model for research policy reinterpreted and recast by the various actors involved? What is the relationship between the policy rhetoric and the practices of the actors? How do some actors convince others that their particular organization of language represents the real version of how development takes place? In order to pursue these questions, I examined the actors, the language, the policy documents, the negotiations and actions that have shaped agricultural research policy in Panama from the 1950s to the present. The conclusions can be summarized as follows.

*Policy in a Changing Context.* The shifts in research emphasis at IDIAP are fairly clear. Less attention is now directed toward the traditional constituency of small farmers who are less connected to market outlets, and more attention is directed towards those that are larger, more capitalized, and more closely linked to markets. Indeed, any reference to

small or subsistence farmers was removed from IDIAP's mission statement during the period of my fieldwork (1997). Additionally, more research focus is now directed toward non-traditional crops that show some potential for export, such as pineapple, cantaloupe, watermelon, onions and potatoes. Sugar cane, cacao and coffee are not given priority because of their generally depressed prices in international markets. These shifts are not surprising, and are a fairly straightforward application of the development policy of export-led agricultural growth, which is being applied throughout the region. IDIAP is attempting to shift its research model from a supply model (in which research problems and resulting technologies are defined internally) to a demand responsive model (in which research problems are demand-driven and targeted toward specific client groups). Accordingly, researchers are being resocialized to think in more entrepreneurial terms regarding the formulation of research problems. Ideally, they now should line up financial and political supporters for a particular research trajectory to demonstrate that the research will potentially be self sufficient financially. Specific demands from specific clients should be demonstrated before a research project is embarked upon. Moreover, the researcher needs to show in the project proposal that the project fits closely within IDIAP's overall research policy framework. One of the outcomes of this is that research increasingly begins with the demands and standards of end markets – both domestic and international – in mind. Market standards for size, color and quality, particularly of fruits and vegetables, are increasingly early considerations in research programs.

Much of this makes good sense in the current context. However, not surprisingly, this strategy will also have differential distributive impacts. Farmers and producers who do

not meet the profile of the producer who is prepared to compete in domestic and international markets are largely left out of the new policy focus. IDIAP has little vision and few programs to address the needs of those who are financially or technologically on the margins.

Regarding IDIAP's process of institutional change, the conclusions are mixed. On the one hand, the process of institutional change is quite effective in helping the institution do more effectively what it had been doing previously, due to significantly improved methods of planning, monitoring and evaluation. Yet, the concept is overly "internalist" in practice. For all the thought and effort in improving the methods of the organization's work, IDIAP still lacks a basic mechanism to address the fundamental "why" questions. Why this particular research trajectory and not another? If the answer is simply, "because we are responding to market signals," which it largely seems to be, then it seems quite inadequate. Research and technologies for the minority of producers who have the capital and privileged links to market outlets does not obviously translate into the broad social benefit that IDIAP claims in its mission statement. One benefit is that the organization is more participatory internally, and some stronger, albeit highly selective, participatory links have been created externally. It seems logical that to achieve its mission of broad societal benefit, IDIAP needs some mechanism to incorporate the views of not only capitalized producers and agribusiness concerns, but a broad range of potential constituencies, such as indigenous organizations, environmentalist groups, critical NGO's, rural development groups, and any consumer groups organized around food availability, quality and safety issues. Such mechanisms are conspicuously absent at IDIAP. There is little evidence of mechanisms to democratize research and technology policy in a larger societal sense. Indeed, broadening the



constituency base may also broaden the support base for IDIAP. I will further address the issue of participation in the later discussion of the study's contributions.

*Development Models and Agricultural Research.* Chapter three examined the relationship between the models promoted by the major development actors and the models implemented at the national level. The analysis showed that in Panama over the last several decades there has been a strong relationship between the development models promoted by the major actors and Panama's own agricultural research model. Indeed, the country's institutional arrangements for agricultural development have been heavily influenced by external actors for the past five decades – a fact that counters the more internally driven induced innovations argument (Ruttan and Hayami 1990). The US essentially transferred the land grant model to Panama beginning in the 1950s, installing personnel from US universities in leadership positions of key organizations in Panama's agricultural sector. US influence continued in the 1970s and 1980s through USAID support for institutionalizing the Green Revolution model in Panama. Then, from the mid-1980s on the World Bank and IDB, with US support, began to implement the neoliberal model, while systematically undermining the statist import substitution model. Ironically, USAID and the Bank had previously supported the supply-driven, import substitution (Green Revolution) model of agricultural development, but withdrew support for that model when their own views on development changed. Thus, the evidence shows a process of implementation and destabilization by the major actors. They have historically implemented new models through policy directives, while destabilizing the old models. Those institutions associated with the previous paradigm are restructured to serve the new model, or they are cut back, privatized

or eliminated, while institutions to support the new model are created. Because of the differential economic and political power of the major actors over Panama, the country had little choice but to continuously reorganize its institutions and language in the interest of continued access to international financing. One consequence of this reorganizing and remaking the image of the institution is that these activities consume a great amount of energy and resources. Moreover, they may divert the institution's attention from core problems. IDIAP, like many other developing country organizations, is vulnerable to external pressure to continually reinvent itself.

*Rhetoric and Development.* Chapter four examined the strategic use of rhetoric in development networks. The question of this chapter is, basically: How do some actors convince others that their particular organization of language represents the real version of how development takes place? To pursue this question I analyzed the use of language and rhetorical strategies of the IDB and IDIAP. First, I demonstrate a close correlation between the shift in language at IDB and the shift at IDIAP. During the same years that the IDB language reflects an interest in support for low income groups and small projects, IDIAP defined its primary clientele as small producers, marginalized farm workers and marginalized campesinos. Likewise, during the years that IDB language shifted in emphasis toward microenterprise, modernization of the state, and the private sector, IDIAP defined its clientele more in terms of private sector interests (see chapter four, figure one). Specifically, the three key linguistic transitions evident in IDIAP's documents are: (1) the shift in language defining its clientele (from small, marginalized producers and campesinos to producers, industrial suppliers and agribusiness); (2) the shift from a narrow to a broad

definition of objectives for IDIAP (from benefits for specific producer groups to broad societal benefit, in order to claim greater relevance of the institution); and (3) the shift from the language of supplying technologies to responding to client (market) demand for technologies. These shifts correspond temporally with a similar linguistic shift at IDB from support for low income groups and small projects to support for microenterprise, the private sector and modernization of the state.

These shifts are then examined more closely and explained as rhetorical strategies. What the chapter shows is a circulation process, in which actors in policy networks appropriate development language and refashion it to “make their case” and ultimately advance their own interests. The translation relationships (synonymous with networks) suggest associations in which actors appropriate language, adapt it to their circumstances, then recirculate it in such a way as to situate their own projects strategically, oftentimes making their own work, project or institution a critical link. Actors strategically cast their actions in various lights depending on the circumstances, i.e., depending on who they need to convince. As an example, we saw the IDB carefully craft associations with local actors in order to legitimate its own involvement, appear as an objective outsider, and avert criticisms that it was acting in self interest to win another client.

Of course, the empirical conclusions above are based on the fieldwork and documentary analysis that I was able to do within certain limitations. The conclusions here are not intended to provide a full overview of all the debates in Panama on these issues. Due to time and resource limitations, I was not able to carry out interviews with local NGOs or media outlets, for example. Another way to go about this study would have been to attempt

to distance myself from the public sector agricultural organizations in order to a broader overview. This strategy also has its limitations, however. While it may have made possible a survey of a broader range of views, it most certainly would have limited my access to IDIAP, MIDA and ISNAR documents that were a rich source of “inside” data.

### *Theoretical Conclusions*

Through the course of literature review, fieldwork and analysis of a range of other documentation related to agricultural research and development policy in Panama, the idea emerged that contemporary models of explaining development processes can be categorized into three major theoretical approaches: material determinist, social realist and discursive. In effect, these approaches became the cases of primary interest. It is not that these exist in a clearly defined sense, nor that they are empirically real, even though they might be understood as social activities. Rather, I have imposed these categories as a way to talk about the perspectives or lenses through which analysts view, describe and attempt to explain the world.

The questions that I pursued with the three narratives were: how does each of these perspectives tell the story about agricultural research policy in Panama, and more generally, how does each explain development and change, especially in agrifood systems? And, what are the strengths and weaknesses of these explanations? Chapters two, three and four are distillations of material determinist, social realist and discursive narratives respectively. These chapters present a standard narrative from each perspective while also making sense of part of the empirical story. In each chapter, the standard narrative is followed by a

narrative commentary, which reflects on the strengths and weaknesses of each approach. The argument of these chapters is that while each perspective has its particular analytic strengths, each is also partial and thereby weakened in some ways. The question is then posed: Is there a way to tell the story that is more complete, that avoids some of the problems demonstrated in the first three perspectives, and that is able to integrate the social, material and discursive? Actor network theory is advanced as an approach that can be integrative of the previous three. Let us briefly review the arguments vis-à-vis the three narratives, plus the proposed alternative, actor network theory.

*Material Determinist Narrative.* The material determinist narrative looks primarily to the material world (e.g., the environment, infrastructure, technologies) as primary determinants of development. It is often presumed that modifications in the material world (e.g., new technologies, improved infrastructure) are what is needed to spur social and economic progress. In chapter two it is argued that the typical narrative of Panamanian development in this perspective begins with a material inventory of the country – geography, climate, agriculture, infrastructure – a listing of the physical, technical, human and financial resources of the country. It then proceeds to say: given this inventory, here is how the country has organized for development, under these policies and with these technologies. Then a significant gap is shown between existing policy in the country and the normative development policy framework, as judged by the major actors who are promoting the dominant paradigm. Policy prescriptions follow accordingly.

It is argued that a number of factors explain the success of this narrative. First, rhetorical strategies are used that create the appearance of objectivity by obscuring the

processes of producing policy documents. This is an attempt to increase credibility by portraying the author as disinterested. Yet, it also obscures politics, conflicts and struggles, and the fact that the impacts of the policy prescriptions will be distributed unevenly, benefitting some segments of society, while hurting others. Second, a mechanistic metaphor is used to explain the market. Essentially, society is seen as derivative of a “naturally” functioning market. Thus, the role of policy is simply to provide the proper elements for the market to run. In this way, prescriptions such as new technologies are presented as neutral, and as a result power and conflict between interest groups is glossed over. Technology choices are not seen as social and political, but as rational, objective inputs into the market mechanism.

*The Social Realist Narrative.* The general picture that emerged in the analysis of chapter three is one of the monolithic actors foisting new policy directives on Panama, which complies because of its weaker power position in development networks and its dependence on international financing. The evidence shows a process of implementation and destabilization by the major actors. They have historically implemented new models through policy directives, while destabilizing the old models. Those institutions associated with the previous paradigm were restructured to serve the new model, or they were cut back or eliminated, while institutions to support the new model were created. The outcome for Panama is a process of continually tuning its development model (which often meant reorganization and restructuring) to stay in line with the dictates of the financiers, in order to ensure the continual flow of funding channeled through the state. In this narrative, there are “actors” and “authors,” though they are typically corporate actors. The actions and

decisions of individuals rarely come into view. The outcomes for Panama are seen as a result of the power structure – of its position in the international political economy. Those with the power are able to impose their views and shape the development of those with less power who are dependent on the resources of the powerful. The narrative in this chapter can thus be seen as a conventional macrosocial argument from a sociological perspective, emphasizing differential power.

In their efforts to emphasize power inequalities, the social realists (often neomarxist in orientation) were critiquing the neoclassicals who had minimized the importance of global inequalities. In doing so, however, they were equally objectivist in their understanding of social structure and power, as the material determinists were objectivist in their depictions of the biophysical world and market forces. Moreover, both social realist and material determinist approaches employed an objectivist rhetoric. Authors in the social realist perspective do not generally speak of *ordering*, but of a social *order*. For them social order is purified of biophysical elements. They tend to maintain a clear dichotomy between human action in the foreground and nature in the background. Likewise, they tend not to be transparent about the processes of producing their narrative. In terms of legitimacy, it seems that what has largely happened is that authors in both of these perspectives – social realist and material determinist – have found legitimation from within their own circles. This has led to the current situation in which the two perspectives have little need to interact, and generally find each other's narratives of little use.

*The Discursive Approach.* The discursive approach in chapter four shows a circulation – or translation – process, in which development language is appropriated by

actors in policy networks and refashioned to help each actor “make the case” in order to advance their interests. The translations link in a continuous chain the biophysical entities (e.g., policy documents), power relations, strategies and language. The translation relationships depicted in chapter four suggest associations in which actors appropriate language, adapt it to their circumstances, then recirculate it in such a way as to situate their own actions strategically, oftentimes making their own work, project or institution a critical link, or what Latour (1987) calls an “obligatory passage point.” The argument is not that (re)presentation of one’s activities is disingenuous, but rather that it is strategic. Casting one’s actions in various lights depending on the circumstances is a common, often necessary, strategy. Finally, we saw rhetorical strategies used by actors in order to create the appearance of objectivity and legitimacy, to avert criticisms of self-interested action on the part of the major actors, and to rationalize policies.

Yet, to say that outcomes of development practice are essentially a result of rhetorical maneuvers is to minimize the role of the material world in social relations. Obviously, development processes are never purely material, social or discursive. Discourse and rhetorical strategies are indeed at stake, but analysis of these alone is insufficient because the rhetoric does not remain in texts. Rather it is picked up by policymakers and given force through policy, leading people to engage in interactions and power relations (impacting the social) and to impacts in the material world as those policies are carried out. A strength of the Latourian approach to rhetoric is that rather than trying to answer what an author should say in principle, as do philosophers, this approach attempts to show the practical answers: What are the discursive strategies that authors (scientists, policy makers, researchers) actually



use to convince others? In this sense, it keeps the analysis grounded in action, yet a weakness of the approach is that while we learn about rhetorical tactics, the linkages between these practices and material and social relationships are less clear. Thus, actor network theory is proposed as an alternative able to address the weaknesses of the three previous approaches.

*The Actor Network Approach.* The actor network approach in chapter five attempts an analysis integrative of the previous three – not as path to the final, complete narrative, but as a means to address some of the drawbacks of the previous approaches through ANT's ability to avoid the macro-micro and nature-society dualisms that sociologists have wrestled with for decades. The section of chapter five in which an actor network perspective is applied to the case study is divided into four vignettes. The first of these portrays development as action in various novel ways: (1) Extending networks by enrolling actors to advance one's interests. For example, IDIAP managers advance the interests of the institution, and simultaneously their own interest in job security, by enrolling ISNAR on IDIAP's behalf; (2) Creating stronger associations among multiple and dispersed actors that can withstand scrutiny from competitors and critics. For instance, enrolling ISNAR increases IDIAP's legitimacy in Panama's agriculture sector, as well as the legitimacy of Panama's agriculture sector in the eyes of IDB officials, since the managers are now linked to another IDB-funded project. This makes it increasingly difficult to criticize IDIAP; (3) Fostering processes that create legitimacy, trust, shared responsibility, greater resources and credibility in the networks. The increase in associations between organizations increases legitimacy and responsibility, as it distributes these as well as risks through networks. In short, by

examining the strategies of specific actors to extend their networks and create stronger associations, ANT enables us to show the specificity of development processes. While more abstract approaches (e.g., political economy) can identify distributive outcomes of political economic systems, they are less able to detail the actions of specific actors, nor do they say much about how particular outcomes are produced.

The second vignette shows the value of ANT in deconstructing corporate actors. ANT suggests that we apply the notion of symmetry – treating actors in the same way, with the same methods – to all actors. Doing so allows us to see that “macro” and “micro” actors are not different in kind. Rather, what produces different effects is not the macro-ness or micro-ness of actors, but that they are able to act at a distance because their location in associations and nodes of associations (networks) inserts them into longer or shorter networks (Latour 1987). Insertion into a longer network allows an actor to act at further distances, and vice versa. The advantage of the symmetrical approach in ANT is that it pushes the analyst to explain the “macro-ness” of an actor rather than assume it as a given – i.e., to deconstruct corporate actors. In short, this vignette argues that there are no macro or micro actors, only actors. Some actors have many people and things they can get to speak and act for them; this allows some to act at a greater distance than others. This is how some actors get to be perceived as macro actors, but essentially they are never larger than the networks in which they are inserted.

The third vignette uses the ANT concept of strategic enrollment, allowing us to bring distributive justice and power issues clearly into view. In contrast to IDIAP's notion of *consultas* as increasing the participation of clients, this vignette argues that they are better

understood as a mechanism through which actors – both researchers and producers – extend their networks by enrolling each other in order to advance their own interests. It shows how a series of stronger associations is created between the researchers and a select few growers. From an ANT perspective it is clear that stronger associations between researchers and selected growers can be used to thwart the creation of associations between researchers and other types of growers or potential client groups. In short, the close linkages between researchers and these growers are used to shut others out. In effect, the resources of the state are distributed unevenly, in part because other groups do not have the political, economic and organizational power to “break in” to the network. This uneven distribution is then justified through an ideology which holds that the smaller, unorganized, less market-oriented growers are resistant, unmotivated, and backwards. The tools of ANT allow us to highlight these differential power relations.

Finally, the fourth vignette illustrates the importance of including non-human actors in “social” analysis. The vignette follows the story of a new tomato variety, De Leon. Using an ANT approach, it treats De Leon as simultaneously social, real and narrated. It is social because it emerged out of pressures from interest groups, which shaped its final material form and function. It is real because of its material dimension – it converts energy into growth and eventually provides nutrients for people. It is narrated because, depending on who is telling the story, De Leon is cast in different ways, for example, as “promising” by researchers, and as a “savior of the industry” by those attempting to bolster the image of IDIAP. The key theoretical argument here is that we presume neither the sociality nor the materiality of hybrids prior to the study. The principle of symmetry suggests that the division

between society and nature is something that should emerge as an outcome of analysis.

*Contributions of the Study: Redefining Development Narratives*

There is surprisingly little interaction between the development studies literature and the science studies literature, from which ANT emerged. A basic contribution of this study is to begin to apply an ANT approach to understand development processes. I argue that applying the basic premises of ANT – symmetry, the inclusion of non-human actors, deconstruction of corporate actors, action at a distance, distributive justice, and reflexivity<sup>17</sup> – to areas conventionally thought to be development studies will greatly expand the lexicon and conceptual vigor in the latter field. Moreover, another theoretical and methodological contribution of ANT is its emphasis on conceptualizing *development as action*. Its first concern, therefore, is to identify key actors (human or nonhuman), and to study what strategies they use to advance their interests, what tools they use to carry out their strategies, and what the outcomes are. The objective is to understand where the actor is situated in networks, and what this tells us regarding the actor's opportunities or limitations in extending their networks.

This is not to suggest that sociologists study “development projects,” as conventionally understood. Rather, I am advocating a focus on action, but on development action broadly conceived, including all the strategies pursued by actors from the remote village to state organizations, to corporate offices, to boardrooms of the major development financiers. “Development,” although there are ambiguities with its definition and an implied

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<sup>17</sup>See chapter five for a review of these concepts.

value judgements (because of its basis on a western norm), is what millions in the South engage in and pursue in their everyday lives. It is reflected in the discourse of the daily press and other media; it is expressed in the names of innumerable state agencies (e.g., the Ministerio de *Desarrollo* Agropecuario), and so it reflects how states frame and address their problems; it is inevitably a part of the language of international relations; and as a result of all these, it is embedded in the language of everyday life. Whether or not academics find the term problematic, it is deeply embedded in the experience of millions in the South – *desarrollo*, *développement*, *desenvolvimento*, and so on, around the world. Therefore, it frames the actions of millions of actors in the South as well as their northern collaborators. While some may call for development studies to focus on explaining “third world formations,” I would argue that once the layers of abstractions are peeled away, and once one arrives at the empirical nuts and bolts of development as action, the empirical data is essentially the kind of negotiated detail I have tried to analyze in the previous chapters. While studying third world formations will reveal certain global processes, it is likely to remain at a level still somewhat distant from on the ground action. In short, from an ANT perspective, development is best understood as an extension of networks, a process of creating associations of human and non-human actors that make the strongest case, the strongest network.

#### *Contributions: Participation and the Policy Process*

A reader might comment that this is all fine, and might even accept the argument that development studies would benefit from cross fertilization with science and technology

studies. Yet, what difference does it make for the people involved, or for development policy? Let us assume that the argument I have made above is a reasonable one – that indeed development in action is a co-construction of material, social and discursive processes. What does this rather theoretical claim imply for agricultural research policy and development policy?

First, policy documents are based on knowledge claims about how social development occurs. Policy recommendations usually flow out of some analysis and diagnosis of problems. The recommendations are based on knowledge claims about the way the world is. I suggest that if the analyst defines the problems from material determinist perspective, it will lead to one set of policy recommendations; if the analyst interprets problems from social realist perspective, it will lead to another set of recommendations, and so on. Moreover, each perspective suggests different views on who should participate in the policy process and to what extent. Thus, each theoretical perspective implies a different participatory model.

Consider the example of agricultural research policy. Not surprisingly, how one envisages the processes, outcomes, and legitimacy of development claims will profoundly influence the vision one will embrace regarding the research policy process. Indeed, the new characterizations of scientific research produced by science studies scholars have had the effect of legitimizing the literature on participation. If science is only about discovering facts that are immutable and incontrovertible, then the facts “speak for themselves” and there is little purpose in participation and debate involving a broad public. Moreover, since scientific experts are granted full authority it is assumed that even decisions about priority-setting and

funding in research are assumed to be best handled by the experts. (In our Panamanian case study, we can see that this applies in particular to economic scientists and agricultural technologists). However, if science at its core involves fundamentally social choices that will transform the way people live their daily lives, and if, as science studies have shown, scientific knowledge is not a uniquely rational way of knowing the world, but one, albeit very powerful view among many, then the questions posed by the literature on participation become legitimated. In the new characterizations of science, the facts are not immutable; they are susceptible to reinterpretation and change over time. They are not incontrovertible; they are the outcomes of controversies, some of which never become fully settled. They do not “speak for themselves”; they are carefully constructed through interaction and compromise, then vigorously represented and defended in papers, conference presentations and policy documents. Once the privileged shell which long protected science has been removed, once the distinction between science and society is shown to be untenable, the questions raised in the participation literature become quite relevant.

*Participation and Alternative Roles for Laypersons.* The arguments that alternative roles for lay participation are necessary, meaningful, and possible are gaining strength in the literature. It is worth briefly reviewing some of the recent literature that deals with the democratization of science and technology, and then I look at examples of the practical implementation of new roles for lay participation. Sclove (1995) fuses the concepts of participatory democracy (Barber 1984, 1992, Pateman 1970, Putnam et al. 1993) with ideas about decision making in science and technology (Fiorino 1990, Laird 1993, Nelkin 1992, Petersen 1984) to develop a forceful argument for the democratization of science and

technology policy. Sarewitz (1996) asks how we can redefine progress in science and technology to be more closely tied to social goals. Science, he argues, must be made more responsible to show direct social benefit, and the only way to accomplish this is to broaden the range of values that are represented in science policy debates. This broadening of the debate appears more urgent in light of Beck's (1994) observations, that a) in a risk society, the threats of technological development are less predictable, if even comprehensible, b) that the current technological decisions, e.g., genetic engineering, are taking place in "subpolitical" or extraparliamentary arenas, not the traditional political arenas of industrial society, and c) intensifying the traditional scientific expertise on problems may not resolve them and may even exacerbate them, a point which Nelkin (1992) also argues.

Along similar lines, Feenberg (1995) argues for a "subversive rationalization." This is the notion that rationalization in society is sensitive to, and shaped by, the "human and natural contexts of technical action." It requires an understanding of technology not as determined, but as democratically controlled. Feenberg sees subversive rationalization as potentially a kind of resistance whereby ordinary people refuse to accept the logic of technological and economic determinism and demand that technological advances be shaped by a democratic, decentralized decision making process that links technological development explicitly with broadly defined values in society.

Feenberg argues that democracy has not been extended beyond the political sphere to include technology because we have accepted the idea of efficiency as a major criterion for technological development. Winner (1995) agrees that technology is currently undemocratic, but he argues that the reasons for this are traced to the early modern thinkers,



e.g., Locke, Hobbes, and Smith, who saw technological change as progress that should be brought about by individuals seeking advantage in the private sphere. Thus, debating issues of technological development in the public sphere was not encouraged, and hence we developed no moral community in which to carry out these debates.

The growing body of literature concerned with the politics of science and technology demonstrates that a) new roles for lay participation in science and technology decisions have a strong foundation based on a political critique of the existing technological order, and b) new roles for participation are necessary in order that knowledgeable laypersons begin to challenge technological determinism from the ground up by taking control of the technologies that impact their immediate lives. Let us turn now to the other dimensions of the question of this section – how alternative roles are made possible and meaningful in a practical sense.

There have been some attempts at creating alternative roles that offer publics/laypersons meaningful opportunities to participate in science and technology decision making. For example, for more than a decade the Danish Board of Technology (DBT) has been running consensus conferences that have provided a forum in which ordinary citizens are involved in technology assessment (Danish Board of Technology 1992). The consensus conference was developed and institutionalized in the mid-1980s by the DBT as a “democratic conference” in which ordinary citizens with diverse backgrounds are involved in the assessment of technology, and where the relationship between social priorities and technology choices is made explicit. The conference consists of a three-day dialogue between a panel of citizens and another of “experts.” The citizen panel formulates a series

of questions focused on a particular concern, and members of the expert panel respond, articulating their views on the technical aspects, potential benefits, and implications of the technology. The results of these dialogues between citizens and a panel of experts are widely disseminated in the media, and are often acted on by legislative bodies. The DBT has held conferences on industrial and agricultural biotechnology (1987), irradiation of food products (1989), and genetically manipulated animals (1992). It appears that this model is now being more widely adopted in Europe.

An example in the US is the efforts by the Loka Institute. Loka is an NGO interested in making science and technology more responsive to democratically decided citizen concerns, and with an interest in research on the possibilities of democratically directing science and technology (Sclove 1995). In 1997 Loka, along with a number of other collaborating institutions, organized a pilot citizens' panel based on the consensus conference model. This particular panel dealt with issues arising from changes in telecommunications technologies and policy. One potential problem with the consensus conference approach is the assumption that the lay panel represents a cross section of ordinary citizens. Volunteers are self-selected in that they are interested or motivated enough to participate. Yet, those who self-select may hold strong, and perhaps negative, opinions on the technology under review. While difficulties in implementing these approaches are certain to emerge, both the work of Loka and the DBT warrant further exploration.

In addition, Fiorino (1990) reviews a number of other mechanisms that allow lay participation in environmental risk decisions. He evaluates the mechanisms based on democratic process criteria, which include whether direct participation is allowed by

amateurs, whether authority is shared, whether there is discussion, and whether there is some basis for equality. While results were mixed based on these criteria, citizen review panels and initiatives tended to lead to more democratic processes than did public hearings and public surveys. Middendorf and Busch used similar democratic process criteria to review mechanisms for participation in the agricultural research process (Middendorf and Busch 1997).

Finally, implementing and experimenting with alternative forms of participation expands our understanding of science and technology decisions. First, it challenges the common assumption in science policy of a positive, linear relationship between scientific advance and social progress (Sarewitz 1996). Judging from the conference reports of the recent Loka conference, the panel demonstrated that lay citizens are capable of meaningful participation in complex technical and public policy issues (Loka Institute 1997). These approaches also highlight the fact that science and technology policy making is an inherently political process. Any dialogue that is constructive will necessarily bring together actors with divergent goals and values that often contradict each other. In the debates over biotechnology, for example, some might argue for values such as profitability or freedom from excessive regulation, while others might argue for safety, environmental soundness, or equity. There is no one decision rule with which to rank these competing values in a simple hierarchy. Rather, decisions must be accomplished through a process of debate, negotiation and compromise in which all stakeholders have a voice (Busch and Middendorf 1997).

The point to emphasize here, relating the argument back to the earlier question in this chapter, is that the model for lay participation flows from the theoretical perspective one

assumes. If one departs from a material determinist position, then the participation model will tend to include a more restricted community of peers in which scientific and economic expertise is granted more authority. If one accepts a more constructivist theoretical stance (e.g., ANT), then the model will likely include a broader community of peers, with scientific expertise less centered and authoritative. The middle ground leads to a mixed policy community where a range of values are represented and decisions must be made through compromise and negotiation. We will return to this discussion in the final section. First, let us examine more closely the relevance of this point to the formulation of agricultural research policy.

#### *Relevance to the Formulation of Agricultural Research Policy*

Clearly, these arguments are relevant to the formulation of agricultural research policy and the practice of agricultural research. Indeed, there is a substantial literature on these questions. One component of this literature focuses on the role of scientific knowledge in agricultural development. In these writings, the research agenda is seen as an outcome of struggles between interest groups, generally dominated by agribusiness concerns (e.g., Friedland and Kappel 1979, Hightower and Agribusiness Accountability Project. Task Force on the Land Grant College Complex. 1978, Kloppenburg 1988), and also as a process of negotiations and compromises including interest groups as well as a range of other actors, such as scientists and science administrators (Busch and Lacy 1983, Busch et al. 1991). Others (e.g., Deo and Swanson 1991, Souza Silva 1994) focus on the dimensions of international inequality that result from the political economy of agricultural research.

In recent years a number of these scholars have called for a more participatory public agricultural research establishment (e.g., Browne et al. 1992, Busch and Lacy 1983, Busch et al. 1991, Busch and Middendorf 1997, Kloppenburg 1991). Yet, the *process* of enhancing and institutionalizing participation in the agricultural research enterprise in the US context has been explored only by a few writers (e.g., Lacy 1996, Middendorf and Busch 1997, Stevenson and Klemme 1992). One aspect of this literature is that it has not tended to ground the arguments for participation in the theoretical concerns raised in this study. Rather, with the exception of Kloppenburg (1991), the arguments for enhanced participation tend to be advanced on populist grounds, on ethical grounds, on the grounds of democratic process, or toward improving in some way the management of the existing research establishment. These are valid grounds for advancing this argument; my observation here is that there appears to also be a need to make the argument for participation based on more theoretical concerns.

Another group of writings that advances arguments for involving farmers and other users in research has been focused on agriculture in developing countries. These include farming systems research, (Shaner et al. 1982), farmer participatory research (also see critique by Bentley 1994, Eyzaguirre and Iwanaga 1995), farmer first approaches (Chambers 1983, Chambers et al. 1989), and studies of indigenous knowledges (Brokensha et al. 1980, Richards 1985) and local knowledges (Flora 1992, Kloppenburg 1991).

Farming systems research (FSR) emerged in a context in which development thinking was shifting away from growth toward basic needs, and away from overemphasizing economic variables towards incorporating socio-cultural variables. These changes were

accompanied by attempts to also move away from a reductionist approach, which tended to compartmentalize knowledge, towards a more holistic approach. At the same time, development researchers and practitioners were increasingly realizing that the agricultural reality faced by many in LDCs was very complex and often accompanied by uncertainties. FSR emerged as a paradigm that could accommodate complexity and uncertainty, in which the farm could be seen as an interaction of subsystems (human, plant, animal, etc.). FSR was from the beginning seen as a strategy for improving farming systems. To some extent it was hoped to be a response to the failures many perceived of the Green Revolution. Thus, intervention and development of appropriate technologies was also a goal of FSR work, although there was an attempt to introduce technologies that would conform to the goals, needs and socio-economic circumstances of the targeted farm system. The main critiques of FSR have been its implicit technological determinism as a development strategy and that it ignores the “macro-economic and social structures” that impose limitations on local action strategies (Oasa and Swanson 1986). Marcotte and Swanson (1987) elaborate the latter critique, arguing that the “. . . disarticulation between the realities of the political economy . . .” and the farming system in question is a result of FSR’s theoretical heritage in functionalist analysis, which tends to see societies as closed, interdependent systems. Biggelaar (1991) argues that at the practical implementation level FSR continues to be a top down approach relying in most cases on exogenously developed innovations.

Studies of indigenous knowledge and farmer participatory research have also gone a long way in demonstrating the ingenuity, resourcefulness, and ecosystem knowledge of farmers (e.g., Brokensha, Warren and Warner 1980; Chambers 1983; Richards 1985).

Moreover, they have discredited the notion that developing country farmers do not experiment or innovate in their farming systems. Richards (1985) critiques the development approach that relied on technology transfer from the outside, arguing instead that the capabilities for change exist among smallholders. As Chambers, Pacey, and Thrupp (1989) point out, it is not so much the label that is attached to the various farmer first approaches (e.g., farmer participatory research, farming systems research, participatory action research, indigenous/local knowledge, etc.). What is important is that these approaches together are about reversals. Instead of the knowledge of the agricultural scientist being central, it is the knowledge of the farmer. Instead of the research priorities of the experiment station driving research, it is the everyday problems facing the farmer. Instead of the experiment station field being the center of innovation, it is the farmer's field, and so on. The thrust of all these approaches is populist, and focused on local needs and local innovation.

Yet, while local knowledge is very important, the unique power of science cannot be completely dismissed, as Richards (1985) recognizes. Richards, later followed by Biggelaar (1991), argues for a synthesis of local knowledge with the "universal" knowledge of scientific experimentation to address those problems that farmers themselves have not been able to solve. Still others, such as Flora (1992) and Bentley (1994), argue that while we need to recognize and understand local knowledge, we also need to be careful not to mythologize or romanticize it.

Finally, the farmer first approaches seem to be vulnerable to the same criticism that was leveled at FSR – namely, that there is little consideration of a larger political economy. For example, in Richards' work (1985), we do not really know what the agribusiness sector

is doing, or in what ways rural areas have been penetrated by capitalist relations. What tends to emerge in this literature is a “development project view of the world,” in which there are poor villages and development organizations. The presumption is that of a somewhat isolated rural village, populated by farmers who are very knowledgeable, yet somehow unidimensional in that they tend to be defined by their rurality, and their full interest is devoted to agricultural problems.

### *Pulling it Back Together: Theoretical Perspectives and Participatory Models*

The basic argument of this chapter is that there is a relationship between the theoretical perspective from which one approaches development issues and the model of participation implied. Thus, from a material determinist perspective, those knowledge claims that derive from a more positivist tradition will be privileged, and the participatory model will be more restrictive. From a social realist perspective, if nature and technologies, for example, are determined solely by reference to the social categories (e.g., interest groups) then it becomes more difficult to judge between competing knowledge claims other than by reference to the social realm. If nature does not enter into the decision making, then evidence that bioscientists might produce in a controversy would have no unique standing relative to any other claim. Claims would be judged based on looking at whose interests were represented, negotiations between the parties, and ultimately decided based on which interest group was powerful enough to impose its view. As a model of participation it may lead to a kind of epistemological anarchism (Feyerabend 1975). Yet, as the basis for a coherent model of public participation in science and technology, it seems untenable. The discursive



approach comes up against similar problems, as the emphasis is on discourse while at times denying the reality of material realms.

In the actor network perspective, the dualism between Nature and Society is rejected, and determinative power is granted to neither pole. Thus, we can look neither to nature nor to society for a full explanation of scientific knowledge claims. The constructivist approach of ANT, in which knowledge claims are seen as constructions of various actors vying to advance their interests, is more amenable to a model of participation in which an expanded community of peers interacts to define problems, carry out research and integrate local knowledge in the process. To say that neither Nature nor Society are determinative by themselves is not to argue that they have no role at all. There is a place both for natural science (because we must eventually bring in the world to inform controversies), and for constructivism (because of the interpretive flexibility of the world). This also fits well with Funtowicz and Ravetz's (1992) post-normal science which considers both the positivist paradigm and the constructivist paradigm inadequate by themselves but nonetheless necessary to deal with the new kinds of risks created by industrial society. Thus, both Callon and Latour and Funtowicz and Ravetz are in search of a middle philosophical (and, for Funtowicz and Ravetz, *practical*) route between realism and deconstruction. The two basic principles for a model of public participation along this line of thinking can be adequately drawn from the Funtowicz and Ravetz's (1992) analysis: a) scientific expertise works in cooperation with an extended community of peers, including a full range of stakeholders regardless of their formal qualifications, and b) an extended pool of facts is considered legitimate input, including the data marshaled by the laypersons.

This seems to be a fruitful starting point to more fully connect metatheoretical issues with a prospective model for participation. This chapter has attempted to show a linkage between theoretical perspectives on development and their concomitant models of participation. Clearly, it is necessary to go beyond populist arguments for participation. Further research is needed, however, in order to develop more practical models for public participation in science and technology decisions. Mechanisms for bringing together experts and laypersons are also necessary. Moreover, how will the claims of the extended peer community gain legitimacy along side of those of the technical experts? What outcomes are expected and how are they to be enforced? These are all likely to be some of the most difficult yet crucial issues to engage researchers in this area.

## APPENDICES

## APPENDIX A

### QUESTIONNAIRES: SPANISH VERSION

**1) Cuestionario: Alta y Media Gerencia** (por ej., Director General, Subdirector, Directores Nacionales)

#### ***I. Sobre el IDIAP en general:***

1. ¿Cuáles son los programas de investigación más importantes en el IDIAP? En otras palabras, dónde se coloca mayor énfasis en cuanto a esfuerzos y especialización? Por cultivo? Por tecnología? Por región?
2. ¿Cuáles son los mayores desafíos que enfrenta el IDIAP?
3. ¿Como describe su trabajo diario, lo que hace en su trabajo cotidiano?
4. Actualmente, ¿que es el proceso de priorización de proyectos de investigación, o sea como se decide cuales proyectos serán prioritarios?
5. Se ha hablado de varios tipos de vínculos con otros entes tanto publicas como privados para fortalecer los recurso para la investigación. ¿Qué posibilidades ve usted para vincular el IDIAP a otros entes con el objetivo de aumentar sus recursos?
6. ¿Quiénes son los apoyadores más importantes para la institución, ya sea en el contexto nacional o internacional?
7. Cuando usted habla con funcionarios de otras instituciones, ¿como vende la idea de investigación agrícola?
8. ¿Qué cambios ve usted en el papel que jugará el IDIAP en el futuro?

#### ***II. Sobre el proceso de cambio institucional en particular:***

9. ¿Porqué comienza el IDIAP una iniciativa de cambio en 1994?

10. ¿Implícito en una iniciativa de cambio es el cambio de un modelo para otro. Cuáles son los elementos del viejo modelo que se quieren dejar, y cuáles son elementos del nuevo modelo que se quieren crear?
11. ¿Cuál es la relación entre el proceso de cambio institucional en el IDIAP y el programa de modernización de los servicios agropecuarios financiado por el gobierno y el BID?
12. ¿Desde la iniciativa de cambio en 1994, cuáles han sido los mayores logros en el proceso de cambio institucional?
13. ¿Cuáles son los factores más importantes que han *contribuido* a esos logros?
14. ¿Cuales son los factores mas importantes que han *impedido* el alcance de los objetivos que se habían puesto?

### **III. Closing**

15. ¿Hay algunos asuntos relacionados a este tema que no hemos discutido? Si?, cuáles son?
16. ¿Nuestro objetivo es aprender de un rango bastante amplio de perspectivas sobre el proceso de cambio institucional. Tomando esto en cuenta, con quién más puedo entrevistarme que tenga orientación o filosofía que sea significativamente diferente a la suya?

Fin

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## **2) Cuestionario: Directores de Centros**

### **I. Sobre el IDIAP en general:**

1. ¿Cuáles son los mayores desafíos que enfrenta el IDIAP?
2. ¿Cuáles son las fortalezas y debilidades más importantes del IDIAP?
3. ¿Cuáles son las principales actividades de su centro? P.ej., sus áreas de énfasis, especialidades, etc.
4. De que manera esta vinculado este centro con otras organizaciones en la región?
5. ¿Quiénes son los beneficiarios principales de la tecnología que se genera en este centro? En que sentido beneficia la población en general?

6. El mecanismo que intenta ampliar la participación de clientela o usuarios en el proceso de formulación de la agenda de investigación es la consulta. ¿Me puede explicar un poco mas sobre la consulta, p.e., las ideas en que se basa, como se hace, etc.?
7. ¿Sería posible ver algunas propuestas e informes de trabajo, tantos recientes como anteriores?

**II. Sobre el proceso de cambio institucional en particular:**

8. ¿Desde la iniciativa de cambio en 1994, cuáles han sido los mayores logros en el proceso de cambio institucional?
9. ¿Cuáles son los factores más importantes que han *contribuido* a esos logros?
10. ¿Cuáles son los factores que han *impedido* lograr objetivos del proceso de cambio?
11. ¿Cuál es el papel que ha jugado usted en el proceso de cambio?
12. ¿Cómo describe sus actividades cotidianas?, o sea ¿qué es lo que hace en su trabajo diario?
13. ¿Hay algo que le preocupa sobre el proceso de cambio?
14. ¿Desde que empezó el proceso de cambio, ha cambiado de alguna manera su trabajo diario, o el enfoque de su trabajo? ¿Ha cambiado la manera de definir su trabajo?
15. ¿Qué cambios ve usted en el papel que jugará el IDIAP en el futuro?

**III. Cierre**

16. ¿Hay algunos asuntos relacionados a este tema que no hemos discutido? Si?, cuáles son?
17. ¿Nuestro objetivo es aprender de un rango bastante amplio de perspectivas sobre el proceso de cambio institucional. Tomando esto en cuenta, con quién más puedo entrevistarme en las otras regiones que tenga orientación o filosofía que sea significativamente diferente a la suya? Seria posible hablar con algunos productores que no estén muy involucrado en este proceso?

Fin

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### **3) Cuestionario: Investigadores**

#### **I. Sobre el IDIAP en general:**

1. ¿Cuáles son los mayores desafíos que enfrenta el IDIAP?
2. ¿Cuáles son las fortalezas y debilidades más importantes del IDIAP?
3. ¿Cuáles son sus principales actividades como investigador? ¿Como describe sus actividades cotidianas?, o sea, ¿qué es lo que hace en su trabajo diario?
4. ¿Cuáles son las metas principales de su investigación?
5. ¿Porqué escogió este problema para investigar?
6. Actualmente, ¿qué es el proceso de priorización de proyectos de investigación?, o sea, ¿cómo se decide cuales proyectos serán prioritarios? ¿Decide el investigador cual tecnología se va a desarrollar?
7. ¿Cuáles son las implicaciones y consecuencias probables de su investigación?
8. ¿Quién es la clientela y usuarios principales de su investigación?
9. ¿Existe algún mecanismo institucional que intenta ampliar la participación de clientela o usuarios en el proceso de formulación de la agenda de investigación? ¿Tiene datos sobre la interacción con clientela y usuarios, por ej., el numero de consultas y reuniones con productores, quienes participaron, etc.?
10. ¿Sería posible ver algunas propuestas e informes de trabajo, tantos recientes como algunos de antes de 1994?

#### **II. Sobre el proceso de cambio institucional en particular:**

11. ¿Porqué comienza el IDIAP una iniciativa de cambio en 1994?
12. ¿Desde la iniciativa de cambio en 1994, cuáles han sido los mayores logros en el proceso de cambio institucional?
13. ¿Cuáles son los factores más importantes que han *contribuido* a esos logros?
14. ¿Cuáles han sido los factores que han *impedido* lograr objetivos del proceso de cambio?
15. ¿Cuál es el papel que ha jugado usted en el proceso de cambio?

16. ¿Hay algo que le preocupa sobre el cambio institucional?
17. ¿Desde que empezó el proceso de cambio, ha cambiado de alguna manera su trabajo diario, o el enfoque de su trabajo? Si? En que sentido?
18. ¿Ha tenido algún impacto el proceso de cambio sobre el proceso de la formulación de la agenda de investigación? Si? Puede ampliar?
19. ¿Qué cambios ve usted en el papel que jugará el IDIAP en el futuro?

### ***III. Closing***

20. ¿Hay algunos asuntos relacionados a este tema que no hemos discutido? Si?, cuáles son?
21. ¿Nuestro objetivo es aprender de un rango bastante amplio de perspectivas sobre el proceso de cambio institucional. Tomando esto en cuenta, con quién más puedo entrevistarme que tenga orientación o filosofía que sea significativamente diferente a la suya? Seria posible hablar con algún productor que no este muy involucrado en este proceso?

Fin

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### **4) Cuestionario: Productores**

1. Cuales son sus principales actividades agrícolas?
2. Cuanta tierra trabaja?
3. Participa usted en algún mercado?
4. Cuales son sus principales insumos? Como y donde los obtiene?
5. Siembra variedades criollas o modernas?
6. Cuales son los mayores problemas que enfrenta en sus actividades agrícolas?
7. Cuales han sido los mayores cambios tecnológicos en su finca en los últimos cinco a veinte años?



8. En que manera trabaja usted con representantes del sector agropecuario? P.e., extensionistas del MIDA, investigadores de IDIAP, etc.?

Fin

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**5) Cuestionario: Extensionistas**

1. Cuales son sus principales actividades como extensionista?
2. Quien es su clientela principal? Grandes, medianos, pequenos?
3. Cual es el objetivo principal de su trabajo?
4. Cuales son las practicas o técnicas que usa para lograr ese objetivo? Como convence a los productores de lo valioso de la tecnología, p.e., lote demostrativos?
5. Cuales son los principales problemas o limitantes que enfrenta en el desempeño de su trabajo?
6. Adoptan los productores la tecnología generada por el IDIAP? Adoptan toda la tecnología que se les lleva? Hay tecnología que no han adoptado? Si/no. Porque?
7. De que manera esta integrado su trabajo con el de IDIAP y otras organizaciones?

Fin

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## APPENDIX B

### QUESTIONNAIRES: ENGLISH VERSION

Name and title of respondent:	Address:	Telephone:
Interviewer:		Date of Interview:

**I. Agricultural Research Institution: Decision Makers** (e.g., Director General, Subdirector, top managers such as the head of planning)

***About IDIAP in general:***

1. What are the primary goals of IDIAP?
2. Which is (are) the most important research program(s) of IDIAP? In other words, where does the organization place major emphasis in terms of efforts and expertise?
3. Why was it decided that this (these) program(s) would be given priority?
4. What changes among those in process in the *global* and *national* contexts concern you the most with respect to IDIAP, and why?
5. What are the greatest challenges that IDIAP currently faces?
6. What are IDIAP's most important strengths and weaknesses?
7. Who are the most important actors, in the national or international context, for IDIAP? (E.g., supporters, linkages, donors, clients, etc.)
8. Who are the primary end users, clients, and beneficiaries of IDIAP?

9. What do you see as the future of IDIAP?

***About the SPME project in particular:***

10. How did you learn about ISNAR's SPME project?
11. What convinced you that IDIAP should participate in the SPME project?
12. In what ways do you hope to benefit from your participation in the SPME project?
13. What role do you play in the process of PME in your institution?
14. What is the relationship, as you see it, between the SPME project and the overall process of institutional change at IDIAP?
15. What are the arrangements regarding IDIAP's and ISNAR's participation in the project in terms of finances and other resources dedicated to the project?
16. What impact has the SPME project had on IDIAP thus far?
17. What are the most important factors that have *contributed* to the successful implementation of a system of PME?
18. What are the most important factors that have *impeded* the successful implementation of a system of PME?

***Closing***

19. Are there any other related issues that we haven't discussed? If so, what are they?
20. Would it be possible to look at (and possibly photocopy) IDIAP documents (both recent and archival) that deal with the institute's mission, research priorities, specific research programs and projects and budgets?
21. Our goal is to gain insights into the full range of perspectives on the SPME project. With that in mind, could you suggest other persons whom I might interview whose orientation or philosophy is significantly different from your own?
22. Would you mind talking with me again at a later point if I need to clarify points of this interview, or if additional questions arise?

23. Do you have any questions for me?

## **II. IDIAP Research Managers and Researchers**

### ***About their program of research:***

1. Could you describe to me your research program?
2. What are the primary goals of your research program?
3. How was it decided that you would focus your efforts on this particular program of research?
4. Who are the primary end users, clients, and beneficiaries of this research program?
5. How do they become aware of the research results?
6. Who are the major supporters of the research program?
7. What are the greatest challenges you currently face in implementing the research program?
8. What are the implications or likely consequences of your program of research?

### ***About the SPME project in particular:***

9. How did you learn about ISNAR's SPME project?
10. What role do you play in the process of PME in your institution?
11. In what ways will IDIAP benefit from its participation in the SPME project?
12. What is the relationship, as you see it, between the SPME project and the overall process of institutional change at IDIAP?
13. What impact has the SPME project had on IDIAP thus far?
14. What impact has the SPME project had on your program of research thus far?
15. What are the most important factors that have *contributed* to the successful implementation of a system of PME?

16. What are the most important factors that have *impeded* the successful implementation of a system of PME?

### ***Closing***

17. Are there any other related issues that we haven't discussed? If so, what are they?
18. *Optional:* Would it be possible to look at (and possibly photocopy) documents related to your program of research, for example the original proposal for the research, progress reports, journal articles that have resulted from your work?
19. Our goal is to gain insights into the full range of perspectives on the SPME project. With that in mind, could you suggest other persons whom I might interview whose orientation or philosophy is significantly different from your own?
20. Would you mind talking with me again at a later point if I need to clarify points of this interview, or if additional questions arise?
21. Do you have any questions for me?

### **III. Primary end users, clients, and beneficiaries of IDIAP research (e.g., farmers, others?)**

#### ***About their primary activities:***

1. Please describe your major agricultural activities. E.g., What are your primary crops/livestock? What varieties/breeds do you grow/raise?
2. Why did you choose to grow these particular crops/raise these particular livestock?
3. How much land do you farm?
4. Who is involved in working on the farm?
5. What are your primary inputs? How and where do you obtain them?
6. About what portion of your production is for household consumption, and what portion for the market (or for trade)?

7. What have been the major technological changes on your farm in the last five to twenty years?
8. In general, what have been the major changes you have seen in farming here in the last five to twenty years?

***About relationship with IDIAP:***

9. What, kinds of agricultural advice do you receive from government or other agencies?
10. What kinds of agricultural services are available in your community, and which do you use?
11. What relationships do you have with IDIAP in carrying out your farming activities?
12. Are you familiar with the process of institutional change underway at IDIAP?
13. What have you learned about the SPME project at IDIAP, and from whom did you learn it?
14. Has this process of institutional change at IDIAP had any impact on your relationships with the institute, i.e., has it changed at all the ways in which you interact with them or with whom you interact?
15. What implications or consequences might the process of institutional change at IDIAP have for farmers such as yourself?

***Closing:***

16. Are there any other related issues that we haven't discussed? If so, what are they?
17. Our goal is to gain insights into the full range of perspectives on the SPME project. With that in mind, could you suggest other persons whom I might interview whose orientation or philosophy is significantly different from your own?
18. Would you mind talking with me again at a later point if I need to clarify points of this interview, or if additional questions arise?
19. Do you have any questions for me?

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