



Deutscher Tropentag 2002
Witzenhausen, October 9-11, 2002

Conference on International Agricultural Research for
Development

Agroindustry R&D Partnerships in Chile and Uruguay: Cases of public-private partnerships for agroindustrial development

Frank Hartwich¹, Willem Janssen², and Jaime Tola³

Abstract

Though there has been a lot of thinking about the objectives and expectations regarding partnerships in R&D, little attention has so far been paid to the empirical question how partnerships actually function and what the effects of those partnerships are. This paper explores existing and emerging patterns of institutional innovation in agroindustry research and development (R&D) in Latin America. It elaborates on examples for public-private partnerships for agroindustrial R&D in Chile and Uruguay.

Results support the position that institutional issues and demands of partners involved warrant much greater attention when productive partnerships fostering veritable innovation development from R&D are at stake. If the public and the private share a strategic vision, provide resources mutually, and if the innovations generated respond to specific market conditions in which the private sector can realize economic rents then partnerships for agroindustry research are an appropriate development mechanism that can foster development of agrichains and the actors involved in them, not only the agroindustry companies but also small producers, semi-processors, transporters, traders, wholesalers, exporters, consumers and the public as a whole.

Introduction

Though there are broad expectations regarding partnerships in R&D, little attention has so far been paid to the empirical question how partnerships actually function and what the effects of those partnerships are. In particular, there is no formal and accepted way of evaluating partnerships. When evaluating R&D partnerships the analyst faces a number of challenges, namely: (a) the products of R&D are difficult to identify, (b) the relationship between the existence of partnerships and their effects on R&D are difficult to establish,

¹ Research Associate, ISNAR Regional Office at IICA, P.O. Box 55-2200, Coronado, Costa Rica, and Institute of Agricultural Economics and Social Sciences in the Tropics, University of Hohenheim, 70599 Stuttgart, Germany, e-mail: f.hartwich@cgiar.org

² Research Program Manager, ISNAR, P.O. Box 93375, 2509 AJ The Haag, The Netherlands, e-mail: w.janssen@cgiar.org

³ Project Leader, ISNAR Regional Office at IICA, P.O. Box 55-2200, Coronado, Costa Rica, e-mail: f.tola@cgiar.org

(c) partnerships are flexible arrangements which evolve over time, (d) and partnerships generate different values for different partners.

This paper aims to contribute to the understanding how R&D partnerships can possibly be evaluated. It describes ten examples of successful agroindustrial research partnerships in Chile and Uruguay and analyzes their contribution to agroindustrial development. With those experience we address to research administrators and managers which are interested in agroindustry research partnerships. We do not claim that the method applied here has fully matured, rather we want to present results of research work in progress which were retrieved while developing a more sophisticated method of partnership evaluation. In this regard specialists in evaluation methodology are invited to provide comments to our work.

R&D and Agroindustry Development: A theoretical background

Main functions of agroindustry are to reduce seasonality, variance in quality, and expiry of agricultural products. This generates value added in complementation to primary agricultural production, which can be of benefit to a variety of actors. It creates employment in rural or urban areas and provides income to primary agricultural production units. Meanwhile it generates convenience to consumers who demand reasonably priced and save food of high quality. The introduction of processed food also gives rise to merchandisers and supermarkets. Indirectly, the agroindustry sector induces a more diversified use of agricultural primary products; this stabilizes prices and markets, an effect that is of benefit to both, primary producers and consumers.

By now, only few Latin countries such as Argentina, Chile, Brazil, and Mexico have developed a considerable agroindustry; still a large part of the regions agricultural produce is exported as raw material and by international standards Latin American agroindustry classifies only as low to medium developed. But agroindustry is a growing enterprise: Food and non-food agro-industry is building on large urban markets in the region and on comparative advantages of primary production. The role of certification and quality control measures becomes more important as well as diversification to markets of healthy, natural and nutritional products. However, the question is if Latin American agroindustry companies will make the race. The sector is still the most important on the continent and, in relation to other macro-regions; Latin America is the world's biggest net producer of primary agricultural commodities. It has to be seen in how far Latin American agroindustry companies, be they small, medium or large scale, will maintain and increase there share in value added production and survive the race against multinational companies.

What can be done to strengthen Latin American agroindustry? Latin America's Agroindustry is in its infancy; primary producers are often small scale and hardly capable to provide large quantities of products of stable quality, access to credits is poor due to dysfunctional banking systems, and managerial and organizational capacity of entrepreneurs is poor. Creative measures are needed, which give birth to competitiveness of local companies so that they can start to exploit value-adding activities. How, for example, can a cooperative of small-scale potato producers in the Andes develop a potato chips product that can be competitive on the local market? In relation to such situations, many authors have suggested the introduction of innovations and new technologies. Such

induced innovation strategies are usually constituted through the investment of a firm, most often substantially subsidized by the state, in either copying innovations, importing innovations, or developing innovations through R&D.

In the economic literature two basic approaches to innovation exist, the first pointing to market forces as the main determinants of technical change (demand-pull theories) and the second defining technology as an autonomous or quasi-autonomous factor, at least in the short run (technology-push theories). Developing further those approaches Dosi (1982) has suggested an integrated theory of technical change that takes into account complex feedback structures between the economic environment and the science and technology complex. He suggests that innovations originate in the context of research, which is conducted according to the paradigm of a technological trajectory. Then in the final stage of the innovation process market mechanisms operate as a selective environment.

By now, the existing innovation systems in Latin America are hardly in the position to provide the necessary information to initiate development of agroindustry. What happens is copy of technology from abroad (US and Europe) and this usually is not to the benefit of small to medium rural and urban agro-processors and enterprises which need innovations that responds to local social, economic and cultural needs. An organization or a company wishing to internalize innovations has a number of options to choose from (Vieira and Hartwich, 2000). Within the range of vertical and horizontal integration options, partnerships constitutes a flexible option. In public private partnerships, private for-profit and public sector resources – be they financial, human, or physical – are brought together to develop innovations that serve private and public interests. Those partnerships are subject to change according to processes within the organizations involved and the institutional, political and market framework in which they evolve.

Methodology

We aim at analyzing how public-private partnerships in agroindustry research create and evolve and which factors lead to its success. We applied the following procedure for analysis:

Step 1: Using Porters model of the five forces which determine a firms industrial competence (Porter, 1980) to analyze the situation of the product with which the partnership is concerned. The five forces are: (1) the risk that new competitors enter into the market, (2) the rivalry between existing competitors, (3) the bargaining power of the suppliers, (4) the bargaining power of the buyers, and (5) the risk of entry of substituting products. A scale from one to three (low to high) was applied for scoring. Porter also suggested that a companies strategy would be to set barriers of entry for those competitors which want to enter the market, one of them is to create a technology gap.

Step 2: Following Dosi's rational of the evolutionary approach Vieira and Hartwich's methodological framework was applied to explain boundary conditions of partnership development in agroindustry research. In brief, the framework assumes that partnerships for agroindustrial R&D evolve, interactively and evolutionarily, in response to technological demands, market demands and public demands. This process depends on the socio-economic framework conditions in which the status of development of the

agroindustry is the crucial boundary condition (see Figure 2). Those demands interact with creative ideas in the innovation system.

Step 3: Applying the concept of the partnership cycle in which we see partnerships evolving in a cycle of interrelated steps involving in: (1) getting together of partners to define the common interest and value the contributions of the partners, (2) designing of the partnerships with regard to its governance, financing, and legal issues, (3) implementing the partnership and conducting agroindustry research, (4) monitoring and evaluation of results, and (5) adjusting/termination of partnership arrangements. The cycle in which partnerships evolve stands in the context of its environment shaped through the agricultural and industry policies, development policies, the country's legal system and the country's conditions (degree of development, social conditions, culture) in general.

Step 4: Categorizing partnerships and reflecting on its success: This was done according to the strategic vision of the partnership (see Vieira and Hartwich 2002) in which we can distinguish between: representational partnership (one of the partners takes part only for the purpose of representation), contractual partnership (clear division of research funding and execution), accommodative partnership (when an organization is in need of concrete R&D results but is unable to develop them alone), mutual partnership (real sharing of finances, research execution, and risk) and strategic partnership (like the mutual partnership, but with a strategic and exploratory vision).

Ten partnerships for agroindustrial research were analyzed in Chile and Uruguay during May 2002. Data collection was carried out through guided interviews with researchers and private sector agents involved in the partnerships (3 to 5 representatives per partnership). Entry point for the study were the National Institutes for Agricultural Research (INIAs) in Uruguay and Chile. The choice of partnerships was made on the basis of success and relevance of the partnership. The INIAs also organized the schedule for data collection. According to the above objectives, data analysis comprised four steps:

Research Partnerships in Uruguay

In Uruguay two lines of research exist being relevant to the agroindustrial complex: research on primary agricultural production at the National Institute for Agricultural Research (INIA) and research on post-harvest-technology and agroindustrial processes carried out at the Technological Laboratory of Uruguay (LATU). INIA receives a tax of 0.04% of the value of products raised at the point of primary collection. This amount is matched to equal parts with funds from the state. Together those sources currently constitute 90% of INIA's budget the rest complemented with donor and some private funding. LATU receives a tax of 0.03% on the value of exports of non-traditional agricultural products. In addition to the above parastatal research entities the universities (State and Catholic) are strong players in agricultural and agroindustrial research. Lately the state university (funded by the government) has set up a fund for the promotion of private sector industry. Further funding for agricultural research is provided by the National Council for Science and Technology (CONDICYT).

The arrangements for funding of agricultural R&D in Uruguay provide incentives for partnerships. Project proposals submitted to INIA's competitive grant scheme are

evaluated against the level of collaboration offered by the project. Following this criteria partnerships are induced. Partnerships are also facilitated through the fact that in a small country such as Uruguay, researchers in a field know each other and collaboration is not difficult to initiate. The choice in collaborating partners, however, is limited. Five partnerships in agroindustry research were selected for analysis:

1. The national barley round table (mesa de cebada), which regroups two breweries (formerly three malting companies) involved in malting, INIA and LATU. Its objective is to improve the quality of barley production through genetical improvement of barley varieties and improved cultivation of barley, particularly nitrogen management (Díaz, no date).
- 1.2. The national rice round table (mesa de arroz), which is formed by a representative each from INIA, LATU, the association of rice producers, and the association of rice millers. The objective of this partnership is to develop adapted technologies which foster adding value in the rice sector, e.g. through new channels of commercialization (e.g. ready food), environmental friendly processing, quality certification, and alternative use of cascaras.
- 1.3. The project on ecological meet production that an Abattoir has developed together with INIA and an Association of Beef Producers in the Tacuarembó region. The objective of the alliance is to support beef producers to convert to ecological production and set up a chain of ecological beef production and processing for distribution to international niche markets.
- 1.4. The project on alternative beef production, which the national commission for rural development (CNFR), some of its associated producer associations, and INIA have developed together with a local abattoir. The objective here is to introduce new intensive animal raising techniques, which will provide small crop and vegetable producers in the region with complementary income from their small farm enterprises. The thus produced beef is distinct and of high quality; it allows the abattoirs to commercialize it with a higher margin.
- 1.5. The project on characterization of beef in which INIA, the national meet institute (INAC), the University of Colorado, an American meet analysis equipment company (RMS) and 10 private abattoirs are involved. The objectives of the alliance are (1) to introduce a methodology of improved calibration of meet quality (using video-imaging equipment) and adjusting payment schemes according to quality, and (2) to identify opportunities for improving quality and efficiency of beef production through a problem diagnosis and discussions in a stakeholders-workshop.

Research Partnerships in Chile

The country is known for the exorbitant progress it made in fruit, wine, and salmon production and many other agrichains producing high value agricultural products. This progress was often achieved on the grounds of substantial public sector support, by importing foreign technology and subsidizing of agro-enterprises. The role of local R&D was not always significant in this development. Most agricultural research is conducted at

the National Institute of Agricultural Research (INIA), to 48% funded by the Ministry of Agriculture. The government contribution covers the salaries of its staff. 35% of funds are provided through various competitive funds from different ministries. Researchers at INIA have to solicit operational funds from competitive grant schemes, if not, they will have no funds to operate their research. This has created a highly competitive situation in which research organizations such as INIA and the Universities compete for the various funds supporting different sectors with different perspectives. The following five partnership arrangements were chosen for analysis:

1. A partnership between an association of wheat millers (Molineros del Sur), its member grain milling company - COLLICO, a private company analyzing **wheat** quality and producing baking additives - GRANOTEC, INIA, and the University of Concepción. The objectives of the project were: To increase the competitiveness and profitability of wheat production in Chile, improving the agroindustrial quality component of marketed varieties.

1.2. A partnership between **rice** milling (and importing) companies and INIA's rice improvement program (two researchers). The private sector provides some 60.000 USD annually which is used for breeding and varietal adaptation and farm management research. The partnership already exists for more than twenty years.

1.3. A partnership between two **forest** exploitation companies and INIA's biotechnology unit. The three-year partnership was developed in the frame of a project financed through the FDI fund (Ministry of Economy). The objective of the research was to improve the profitability of forestry plantations of one of the three main commercial forestry plants, *Eucalyptus nitens*. Work focused on molecular analysis of planting material.

1.4. A partnership between Chile's principal brewery and INIA's **barley research** program. The partnership dates back to 1978 and has developed very fruitfully. Over the years the brewery has funded the entire barley improvement program contributing some 15.000 USD annually. Significant results were achieved with regard to improving the quality of brewing barley varieties and per hectare yields (Beratto, no date).

1.5. A partnership between five **milk-processing** cooperatives, the Universidad Austral and a INIA researcher from a regional research program. The project seeks to raise the competitiveness of the South Chilean milk sector through sustainable management of the forage pest *L. bonaerensis*, affecting rye grass, the major forage plant in the region. There are no financial implications on the side of the cooperatives; their expectations in the project are also low.

Results

Market situation and industrial competence

Apparently, the partnerships with the highest relative and absolute private sector contributions, i.e. barley in Chile and Uruguay, evolved in situations where the private companies profited from substantial barriers of entry for other barley processors, and hence from high economic rents. Probably it was among the companies' strategies to

maintain barriers of entry for competitors by maintaining the technology gap. The partnerships in barley research have lately phased out because the companies, due to takeovers by multinationals, lost interest in developing the national barley production. Partnerships in rice research also have been subject to high private sector contributions, regardless the competitive market situation. Here, as well, the partnerships phased out because competitiveness of local producers, particularly in Uruguay, declined as other rice producing countries, particularly the U.S.A., augmented their subsidies.

In general the analysis of the market situation did not reveal a homogenous picture for situations that enable development of research partnerships. The market situation is not a sufficient condition to explain when private companies get involved in partnership research. The industrial competence of firms involved in research partnerships meets very different market situations reaching from highly competitive markets to almost monopolistic conditions.

Technological, private and public demands

The results with regard to technological, market and public demands suggest that most partnerships have clear technological demands that meet demands of the private sector (to penetrate and maintain markets) and the public (to develop the sector, primary producers, or the region). In few cases there are less clearly spelled out public demands, e.g. in rice and wood production in Chile. In those cases the contribution of the public sector tends to be lower and the partnership is more of a contractual than a mutual basis. The project on ecological beef production in Uruguay, which is of high national importance, does not receive any substantial contribution from the public; an indicator that the public sector sometimes, due to scarce resources, cannot meet its responsibilities. The Project on improved milk production by management of forage pests had less clearly spelled out private/market demands such as the project on improved agroindustrial quality of wheat. In both cases the private sector contribution was insignificant.

The partnership cycle

It can be shown that the partnerships, which were initiated (at least partly) by the private sector, enjoyed higher shares of private funding. Public initiatives are often guided by the aim to get access to funding sources and conduct research in the area of interest of the research institute. Though there is nothing wrong with those partnership initiatives, it has to be admitted that private commitment to those partnerships is low and the private tends to become a representational partner.

Special partnership governance mechanisms are only existent in the Uruguayan round tables. The Chilean projects on rice and barley variety improvement, initiatives going back for two decades, have used contracts between the two partners which set the frame of activities and particularly established how property rights and benefits from research were to be distributed. The other governance mechanisms take the shape of collaborative research projects in which the activities and set according to a project plan with little flexibility to reorient activities according to changing preferences of the private sector.

Legal arrangements, apparently, are not decisive for the existence of a partnership. Many legal arrangements are ad-hoc and have informal character. Fighting for property rights and benefits from research results did not occur in the partnerships analyzed and is a minor preoccupation to the private sector. The arrangements for distribution of barley and rice varieties through private companies providing royalties to the INIAs are exemplary.

Evaluation of partnership success

Evaluation of the benefits of partnerships is carried out poorly and often is inexistent. The partnership initiatives which go back to project proposals prepared by INIA researchers usually include measures of Net Present Value (NPV) and Internal Rate of Return (IRR) but their relevance and accuracy of calculation are doubtful. In the cases of the barley research partnerships some more sophisticated economic estimations were carried out and the results suggest high profitability of the partnership, particularly for the breweries. The decision of private sector companies to involve and continue in research partnerships, apparently, is not made on such evaluation measures, but on strategic visions taking into account market conditions, trust in the capacity of the research organization, and contribution to funding from the public.

Partnerships generate different values for different partners. When evaluating public private partnerships for R&D a distinction has to be made between the public in general and the public research institutes; their demands may not necessarily have to be the same. The public usually refers to demands such as income generation, poverty alleviation, sustainable use of natural resources, food supply and other. The public research organization, however, further to those objectives may have its own proper interest, which is often guided by the aim to continue and survive working in a particular scientifically relevant research field. In an attempt to classify the partnerships studied and to identify if they met the demands of the partners involved the study found that partnerships of accommodative or representational character tend to fail meeting the demand of the private sector. However the general picture is that partnerships usually meet the demands of all partners.

Conclusions

The paper aimed at evaluation how public-private partnerships in agro (industry) research create and evolve and which factors lead to their success. With this we want to contribute to the analysis of the usefulness of the public-private research partnership concept for development. We presented work in progress. In our aim to evaluate partnerships we have put together a methodology that draws from internal and external factors predicting success of partnerships. Factors internal to the partnership relate to the process of initiating the partnership, governance, funding, legal framework and evaluation mechanisms applied. External factors related to the technological, public and private demands the latter resulting from the situation of the product of concern on competitive markets. Any evaluation of partnerships should be based on the thorough understanding of the markets and technological demands and development potential of the products and commodities the partnership is dealing with.

There is no public-private partnership without reason and it is difficult to say there was a failure because they all have served a purpose. However, partnerships can be used as a vehicle for broad based agri chain development, which can have many positive effects of public and private concern. But in cases when the partnerships are not based on a mutual strategic vision the commitment of either one of the partners is low and the goal of chain development most likely will not be achieved. In many cases the interest to partner originates from the aim to get funding. Such "poor-vision", small-scale partnerships tend to terminate after a short, often planned, period of time. Partnerships also terminate when market conditions change or the contributions of one partner decline.

With respect to the public sector, in both countries Chile and Uruguay, there has not been any public policy identifying how research should be put at the disposition of agri-chain development. It could be beneficial if a central policy unit of the research organizations would identify which chains should be supported (with support also going to the private sector) and which not. This would also require the definition of public goals with regard to the development of specific agri-chains. Such a liaison unit may link up with other non-research initiatives for agri-chain development, which prevail in all countries. At the moment, there are isolated efforts of researchers to partner with the private sector but those do not form part of a conducive policy to support chain development. Researchers also need support to design partnerships with regard to governance, financing and legal issues, a service which also could be provided through a central liaison unit.

Literature

Beintema, N.M.; Hareau, G.G.; Bianco, M.; Pardey, P.G. (2000). I&D Agropecuario en Uruguay: Politica, Inversiones y Perfil Insitucional. INIA, IFPRI, FONTAGRO, Washington D.C..

Beratto, M. (no date). Contributions of Breeding and Crop Management to Increasing Barley Yields and Grain Quality in Chile. INIA Chile, Unknown publisher.

Díaz, R. (no date). Relacionamiento de un INIA con la Agroindustria: El caso de la cebada malteada en Uruguay, INIA, Unknown publisher.

Dosi, G. (1982). Technological Paradigms and Technological Trajectories: The Determinants and Directions of Technical Change and the Transformation of the Economy. Research Policy, Vol. 11, 3. June.

Dosi, G. (1983). Technical Change and Industrial Transformation. The Theory and Application to the Semiconductor Industry. SPRU, Univesity of Sussex, Macmillan, London.

Gereffi, G. (1994). The Organization of Buyer-Driven Global Commodity Chains: How U.S. Retailers Shape Overseas Production Networks. In Gereffi and Korzeniewicz (eds.), Commodity Chains and Global Capitalism, Praeger, London.

Kaplinsky, R. and Morris, M. (2001). A Handbook for Value Chain Research. IDRC, www.idrc.org/value chain??

Mowery, D, and Rosenber, N. (1979). The Influence of Market Demand upon Innovation: A critical Review of some recent Empirical Studies. Research Policy, 1979.

Porter, M. (1980). Competitive Strategy: Techniques for analyzing Industries and Competitors.

Porter, M. (1995). Competitive Advantage: Creating and Sustaining Superior Performance. The Free Press, New York.

Vieira, LF. and Hartwich, F.; (2002). Approaching Public-Private Partnerships for Agroindustrial Research: A Methodological Framework. ISNAR Office at IICA, Coronado, Costa Rica. www.isnar.org/ppp