Returns on Investment to Scientific Partnership: Reflections on Conflicts and Commonalities – A proposal

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Contents

Executive Summary

To propose returns on investment as an additional component of "scientific partnerships" that strives to orient North-South cooperation under the principles of solidarity and not competition[2] may appear challenging and even out of place. Science and technology occupy, however a globalized context, characterized by rapid technological change based on intensive investment in R&D, which affects production and daily life and exerts profound influence on regulatory frameworks, especially those referring to intellectual property (IP) and trade; and by the transformation of institutional schemes and types of organizations to generate and use knowledge, in both the public and private scenarios. This context affects both "North" and "South" (N-S).

An exploratory survey specifically carried out for this proposal[3] indicated three fundamental aspects to characterize North or South organizations regarding scientific and technological cooperation:

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[1] Professor, Universidad del Valle, and Director, Corporación Biotec, Cali, Colombia.
[2] Guía para el partenariado científico con los países en desarrollo: 11 principios. K.F.P.E. 1998.
[3] Exploratory survey involving 30 experts of 10 technological grassroots organizations: companies, R&D centers, and universities.

- Territoriality
- Topics involving the applicability of research, development, and technological innovation (R&D+TI).
- Resource availability and accessibility.

Two assertions were conclusive throughout the survey:

- Scientific cooperation has to do with a relationship between **peers**, regardless of whether they are from the North or South. And it is only through this acknowledgement that respectful and productive relationships, by universal standards, can be produced.
- The **asymmetries** generated by the different conditions between actors and organizations of the North and South, especially regarding cultural diversity and resource availability and accessibility, have profound implications that should be taken into account inasmuch as they condition cooperation and its impact.

In this framework, based on institutional observations and on the lessons learned during 12 years of experience in R&D+TI at Corporación Biotec[4] , three contemporary scenarios of scientific cooperation, especially that of N-S scientific cooperation , that could be potential sources of conflicts and risks have been identified , and therefore merit our consideration :

- **Differentiation** of local contexts and conditions of North/South actors and **globalization** of their spheres of action.

- **Solidarity** as an approach , and **markets** as a space for tapping science and technology (S&T) and, as a result, for **competition.**

- **Public interest,** as a basic function of knowledge generation, and **commercial interest**, as a legitimate return on the investment in R&D+TI, with a tendency to privatize results.

Contradictions may arise from these scenarios, but also commonalities, and innovative elements to assess scientific and technical cooperation should emerge.

The analysis of collaborative undertakings has helped identify key success factors in the S&T–society relationship, through technological innovation and its contribution to development. These factors are common to both North and South, although they take on different expressions in each case. These factors are as follows:
Social and productive appropriation of knowledge (building economic and social value).
Impact of R&D on society as a parameter to evaluate and legitimate S&T.
Investments that support S&T and take advantage of them (resource mobilization).
Organizational changes (new strategies, institutional reform, group efficiency, and competitiveness).
New capacities called for (new requirements and characteristics of human resources for innovative and changing environments).

Taking into account the analysis of these contexts, if we recognize that the outcome of scientific cooperation can be used and tapped as a collective good or as a commercial good, any type of

[4] The Corporación Biotec is an organization that generates biotechnology and places it at the service of the bioindustrial sector of western Colombia in associative schemes. Corporación Biotec.

cooperation (donation, alliance, cofunding, joint project) will be based on investments of the parts, generating expectations not only in the funding entities but also in the actors themselves (organizations, communities, and individuals), that will surpass the concrete outcomes of the project. Likewise, responses in interinstitutional interaction—understood as the relationship between different, but complementary peers—will be generated. We propose to make this social and commercial use of N-S scientific cooperation explicit as a return on investment and a key factor in scientific partnerships, which requires that agreements be established among stakeholders.

We therefore propose to include the analysis of returns on investment as another "component", additional to the 11 already proposed, that will facilitate the resolution of conflicts and contradictions in the situations set forth.

Although the potential commercial return : Iprights , distribution of benefits, participation in decision-making , should be explicit, **social return** should be a **requisite for cooperation** and considered , in all cases for South actors, specifically indicated in terms of:

1. The social and productive appropriation of generated knowledge, with special reference to related public policies.
2. The contribution to the sustainable development of participating communities through the continuity and liaison of generation, use, and tapping of knowledge.
3. Scientific and technological capacity building as a contribution to social and productive capital.
4. Institutional learning, involving the development of organizations that "learn" in changing contexts.
5. Capacity building of human resources, with excellent skills and operational and strategic capabilities.

These five components are related to the above mentioned key success factors in S&T- society relationships. Its application is recommended for purposes of selection, negotiation, monitoring and evaluation of scientific and technological cooperation.

The current proposal sets forth these reflections and aims to contribute to the consolidation of scientific partnerships, conceived as an input to the sustainable development of a fairer and happier world.

Cali, February 2004

1. Introduction

The placement of knowledge at the service of Colombia's development has clearly triggered a radical change in institutional schemes, giving rise to the National System of Science and Technology (S&T) – Law 29 of 1990 – and to other facilitating mechanisms[5]. One of these mechanisms, the S&T Corporation, aims to promote associativity, allowing the joint incorporation of public and private resources in the generation, use, and management of R&D+TI.

Based on Colombia's policy framework and on the region's visionary recognition of the importance of biotechnology for western Colombia's bioindustrial sector, the Corporación Biotec was created in February 1995, with the leadership of the Universidad del Valle. The Corporación Biotec is a center of technological development and innovation, organized as a private, not-for-profit, mixed corporation, within the framework of Colombia's Law of Science and Technology, with the participation of the academic sector, the government, the industry, and the civil society. Its mission is to develop and apply microbial and plant-related biotechnologies to help optimize bioindustrial production chains, based on the understanding and sustainable use of the biodiversity existing in Colombia's Pacific region**.**

The Corporation aims to: (1) use biotechnology not only to satisfy the needs of the regional and national bioindustrial sectors but to also take advantage of new opportunities in the agricultural and agroindustrial sectors, specifically regarding new bioindustrial products; (2) apply biotechnological developments that have been tailored to production chain systems (increased added value); and (3) develop mechanisms that accelerate the rate of transfer of research results to production.

In view of the levels of and demands for biotechnological development, the Corporación Biotec firmly believes that only collaborative work, at the national and international levels, will help close the technological gap between North and South and "accelerate" the availability of technology at the service of regional production and well-being. Biotec's work model is based on a collaborative approach through networks, consortia, and associations, starting from the formulation of the projects themselves. All projects carried out are supported by laboratory and field work carried out by project partners and associates (CIAT, Biotecol, Sucromiles, Levapan, and participating farms, among others).

The Corporation is financed by partner institutions, COLCIENCIAS (seed capital), national and international collaborative undertakings, and direct resources of the different projects. As a part of a special collaborative agreement, the Corporación Biotec has been headquartered since 1999 at CIAT (International Center for Tropical Agriculture), located along the Cali-Palmira highway, Colombia.

The Corporation fulfills its mission within a national social context that can be described, from the agricultural and rural development viewpoint, as follows:

[5] COLCIENCIAS/ D.N.P. 1991. El Sistema Nacional de Ciencia y Tecnología: Instrumento Jurídico: C&T para una sociedad abierta.

- *Poverty amidst abundance*
  In a country that ranks second in biodiversity worldwide and with equally diverse cultural and agroecological conditions, poverty in rural areas reaches 82%[6].

- *Dispersion of efforts and resources*
  About 45% of the research and development efforts carried out in Colombia over the last 20 years have been related to agriculture[7]. A quick look at the array of institutions and enterprises of the national agricultural sector evidences the broad range of organizations and functions; yet the GDP of Colombia's agricultural sector is on the decline.

- *Growing importance of knowledge as a production factor*
  Technological innovations—in this specific case biotechnological—directly affect the competitiveness of the agricultural sector in terms of productivity, quality, and differentiation and diversification, "making the difference" regarding other products on the market, the added value generated in the country, and the sustainable use of biological resources, when sustainable development criteria are taken into consideration[8].

Colombia's policy of Innovation and Technological Development endorsed the creation and implementation of the National Innovation System to cope with the challenges arising in the Colombian society and productive sector as a result of the internationalization of markets, the globalization of the economy, and the information society[9].

The Corporación Biotec forms part of this National Innovation System, which has not only placed it in direct contact with national and international social- or business-oriented collaborative undertakings between public and private entities, but has also served to establish academic and commercial relationships. The organization's evolution, since its constitution under the leadership and assertion of the Universidad del Valle, has been one of institutional learning and development, being affected by policy changes and adjustments and by the decisions made by the scientific, business, and academic communities. It has not been exempt from crisis and has permanently suffered from volatile funding and deficient social and productive appropriation of knowledge, in view of other social and economic priorities of the country.

The Corporation's sustainability has been favored by national and international associativity: not all the sectors have been in crisis at the same time. The Corporation's institutional process has also been strengthened by its approach to "technological development and innovation in regional processes of social capital building ", which has allowed it to strategically relate to complementary processes of regional development and strengthening of S&T.

Among the recognized strengths of the Corporación Biotec are the following:
Direct work with the production sector

[6] Cano, Carlos Gustavo. Ministerio de Agricultura y Desarrollo Rural. Centro Noticias del Estado (C.N.E.). 19 February 2003. In www.presidencia.gov.co/cne/2003/feb/19/13182003.htm.
[7] Conpes; Colciencias; Department Nal. de Planeación: UDE. 1994-1998. Política Nacional de Ciencia y Tecnología. 2 November 1994.
[8] Sánchez M., Myriam. 2003. "Construyendo sobre las fortalezas. Corporación BIOTEC en el Parque Científico AGRONATURA. Un estudio de caso en cooperación pública-privada". March 2003. Hyderabad (India).
[9] COLCIENCIAS. 1998. Sistema Nacional de Innovación: Nuevo escenario de la competitividad.

The Corporation is well-known for its effective management of technological research and development efforts and its liaison with agricultural and industrial enterprises, academic institutions, and governmental entities working in science, technology, and innovation.
New forms of research, development, and technological innovation for the bioindustrial sector
The Corporation has gained credibility and support in view of its **results** and its flexible, innovative mechanisms of management and liaison at the national and international levels.

The challenge is not only to make these strengths sustainable but their impact as well.

The learning process described above provides valuable insight into the experiences underlying this presentation. Five key success factors in the S&T–society relationship, through technological innovation and its contribution to development, were identified. These factors are common to both North and South, although they take on different expressions in each case:

Social and productive appropriation of knowledge (building economic and social value).
Impact of R&D on society as a parameter to evaluate and legitimize S&T.
Investments that support S&T and take advantage of them (resource mobilization).
Organizational changes (new strategies, institutional reform, group efficiency, and competitiveness).
New capacities called for (new requirements and characteristics of human resources for innovative and changing environments).

On the other hand, three scenarios of scientific cooperation, especially that of N-S scientific cooperation, that could be potential sources of conflicts and risks and therefore merit our consideration, have been identified. Conflicts and contradictions may arise from this acknowledgment, but also commonalities. Innovative elements to assess collaborative efforts should also emerge.

- **Differentiation** of local contexts and conditions of North/South actors and **globalization** of their spheres of action.
- **Solidarity** as an approach and **markets** as a space for tapping science and technology (S&T) and, as a result, for **competition.**
- **Public interest,** as a basic function of knowledge generation, and **commercial interest**, as a legitimate returns on investment in R&D+TI, with a tendency to privatize results.

The following sections describe each one of these three situations and proposes to accordingly include the analysis of returns on investment as another component, additional to the 11 proposed by the Swiss commission for scientific partnerships with developing countries.

2. Reflections on Conflicts and Commonalities in North-South Scientific Cooperation

2.1. North-South: differentiation and globalization

How can we characterize an organization from the North or South in terms of scientific cooperation?

To expand several viewpoints on this issue, a survey was carried out (see Annex 1) that involved 30 individuals of 10 organizations located in western Colombia: 4 companies, 5 public and private R&D centers (one of them international), and 1 university (Universidad del Valle).[10].

Although the survey is only illustrative and exploratory, the replies corroborate the existence of three fundamental aspects to characterize North or South organizations regarding scientific and technological cooperation:

- **Territoriality**
- Located in countries of the "South" (or the "North ", depending on the case, for all observations).
- With staff predominantly from the "South".
- Involving goals and actions related to the "South".

- **Topics involving the applicability of R&D+TI**
- Relevance of the R&D+TI activity to problems and opportunities of the "South".
- Prioritized application of South-oriented outputs.
- Geographical, cultural, political, institutional, and social characteristics of the context.

- **Resource availability and accessibility**
- The "South" was clearly characterized by the precariousness of the resources assigned to R&D+TI, the low priority given to S&T in public policies, the instability of budgets, and the lack of programs financed in the long term. On the other hand, scientific development and state-of-the-art technologies are predominantly recognized as belonging to the "North".
- The modest remuneration of staff in the "South" and the lack of job opportunities in S&T are considered characteristics of the "South".

Two assertions were conclusive throughout the survey:

- Scientific cooperation has to do with a relationship between **peers**, regardless of whether they are from the North or South. And it is only through this acknowledgement that respectful and productive relationships, by universal standards, can be produced.

- The **asymmetries** generated by the different conditions between actors and organizations of the North and South, especially regarding cultural diversity and resource availability and accessibility, have profound implications that should be taken into account.

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[10] A senior manager, a knowledge manager, and an active researcher were selected from each organization, based on their current responsibilities within the organization. The questionnaires were sent and their replies received by e-mail. In nearly 80% of the cases, contact was made prior to the sending of the questionnaires, followed by a personal interview. Replies were received from nine of the organizations and of the 17 respondents, 3 were senior managers, 8 promoters, and 6 active researchers.
In two cases, the respondents said they did not agree with the North-South classification regarding scientific and technological cooperation. In one case, the respondent said he did not want to place his organization in a compromising situation by classifying it, but expressed interest in being informed about the results.
Organizations surveyed all belong to the bioindustrial sector because of the author's field of work. In all cases, the organizations were involved with R&D+TI and sustainable development
Replies have been duly filed for possible expansion of the analysis.

Relationships between **peers**—considered as active partners providing different and complementary inputs—must be established as part of N-S scientific partnerships. Even though the sphere of action for peers is site-specific, its referents are global.
s. Regardless of whether we are dealing with N-S or S-S undertakings, all asymmetries and differentiations should be considered separately, case by case. This minimizes concomitant disadvantages and risks that could compromise: (1) the continuity of the collaborative undertaking because of reduced resource availability or accessibility (this type of collaborative efforts could prove expensive for entities with reduced access to resources); (2) decision-making, because of shortcomings or instability in policies or collaborative mechanisms; (3) reduced capabilities because of experts leaving the country or because of lack of understanding of local "identities" regarding prevalence of resources, for example infrastructure.
It is worth noting that asymmetries and differentiations can also appear in collaborative initiatives between South-South organization
The challenge consists in overcoming the disadvantages of the asymmetries and in respecting local conditions, cultural diversity, and social and institutional identities, in generalized spaces of action in which standards and patterns tend to be universal and conditions are those of open economies, high competitiveness, transnational flows of products and technological services, and expertise and technology.

To summarize:

- A potential source of conflicts and risks is the **differentiation** of contexts and conditions of actors of the North and South as well as the **globalization** of their sphere of action.

- A proposal for the scientific and technological cooperation :
  This potential source of conflicts can be overcome looking for expected outcomes, as returns, that cover the following aspects:

- Institutional learning. Development of organizations that "learn" in changing contexts, characterized by the diversity among different and complementary organizations.
- Scientific and technological capacity building as an input to the South's social and productive capital; internationalization, with respect for identity.
- Impact on relevant official policies and on resource allocation for R&D+TI, especially in the South.
- Review of policies and procedures regarding budget allocation and remuneration between the "North and South" in joint projects.

2.2. Solidarity in market contexts: asymmetries and implications

The National Innovation System promotes the use and advance of R&D results and formulates favorable policies and instruments.

The rapid rate of scientific and technological change worldwide also generates a "continuum", whose limits are increasingly difficult to identify, between knowledge generation (known as basic research), use (technological development/innovation), and application (impact on society)[11].

[11] The scientific community as is the case at the Colombian S&T Observatory , is reconsidering the concept of science/technology supply and demand , taking instead the continuum generation, use and tapping of knowledge , because of the rate at which knowledge is being incorporated in the form of technological innovation.

Target markets and communities are increasingly participating in the strategic definition of R&D+TI, providing valuable insight in terms of public opinion and assessment regarding cultural or consumer preferences for technologically based products and services. GMO is just one example that clearly illustrates this situation and still triggers controversial decisions between communities of the North.

Knowledge, as a factor of production and competitiveness, has caused changes in the financial portfolios of R&D+I, which face increasing uncertainty and competitiveness.

The actors involved in S&T cooperation are not predominantly researchers,- it was neither the case before,- but have increasingly involved market forces with greater decision-making power, for example financiers and end users of results. These "other actors" and their expectations especially influence cooperation and affect aspects ranging from the prioritization of R&D to job markets for researchers. The South community is particularly vulnerable to this situation because of unfavorable availability and access to resources for developing their activities.

Cooperation, when assumed with a solidarity approach, grants an inclusive dimension that makes R&D+TI an alternative form of social investment that contributes to the formation of social capital and promotes sustainable development that is socially equitable, economically profitable, and environmentally sound. The use of knowledge in production, however, locates cooperation in relation to market forces (e.g., capital, technology, and labor) and involves risks such as technological dependency or intellectual *diaspora* (where people from the best trained groups of developing countries emigrate in search of better conditions), with all their consequences.

To summarize:

- A potential source of conflict and risks is the use of **solidarity** as an approach and of **market** as a space for proving S&T and, hence, of **competition**.

- A proposal for the scientific and technological cooperation :
  This potential source of conflicts can be overcome looking for expected outcomes, as returns, that cover the following aspects:

The commercial return on investment takes up special strength and should be made explicit within the cooperation unit, at least in terms of the distribution of possible benefits of cooperation, schemes of decision-making in cooperation, and using and taking advantage of the results of cooperation.

In terms of social influence, cooperation is expected to contribute to:

- Influence related public policy. The South should be aware that cooperation requires investment to support policy and make it sustainable.

- Review policies and procedures for the allocation of budgets and remunerations between the North and South in joint projects.

- Support mechanisms to retain trained personnel under desirable conditions in the South.

- Support the strengthening of R&D+TI capacity in the South and mechanisms for employing the South's expatriate intellectuals. The Caldas Network of Colombia is an example of one such mechanism.

2.3. Public Interest versus Commercial Interest: a major conflict ?

The summits of heads of State and Government, with goals for trade and integration (e.g., the European Union or the Andean Group), increasingly involve the topic of S&T to make decisions related to the WTO, ALCA, or NAFTA. They provide an example of how knowledge is part of commercial interests and, of course, public interests.
The high profitability of investment in R&D+TI is currently commonly accepted.

The central concern of N-S cooperation in S&T is **who will be the beneficiaries of the cooperation,** between North and South and between the different actors, whether directly or indirectly linked to each cooperating partner.

This theme poses crucial aspects such as the relationship between university (U) and industry (I), which, some argue, alters the traditional role of the university, which was aimed at serving the public, without necessarily considering the commercial viability of the results of the R&D in progress. Scientific and technological communities as highly accustomed to this relationship as they are in USA, when analyzing the U-I relationship in biotechnology for agriculture, require more information and analysis of the effects of the current relationship in terms of its implications, as these can affect, for example, research agendas, funding patterns, and strategic priorities. Others argue that, precisely because public science has been the basis of industrial development, industry constitutes an important source of (1) funding for R&D+TI; (2) access to technological developments, infrastructure and transfer mechanisms; and (3) capacity to place generated knowledge at society's disposition.

Other crucial aspects of the public versus commercial interest situation are the efficiency of public investment in R&D+TI; the role of the academe in collective efficiencies such as clusters and production chains; social and productive appropriation of knowledge, including public perception but not limited to it; international negotiation of agreements that are committed to the technological modernization of production and, accordingly, to competitiveness and employment; intellectual property; and the management of intellectual heritage—all these themes are involved in scientific and technological cooperation.
We would like to note that public and commercial interests related to R&D+TI results, are different AND complementary. They are not necessarily exclusive . To differentiate them should help to avoid conflict of interests .

To summarize:

- The potential source for conflict and risks lies in the **public interest** being the basis for the generation of knowledge, and **commercial interest** being in the legitimate return on investments in R&D+TI, with tendencies to privatize results.

- This potential source of conflicts can be overcome looking for expected outcomes, as returns, that cover the following aspects:

- Social and productive appropriation of generated knowledge, with special influence on related public policy.
- Programs for information, training, and participation in the benefits and in decision-making to contribute to the social appropriation of knowledge.
- Development of scientific and technological capability as a contribution to social and productive capital. The capacity to act as accepted representatives in a range of interests. Access to the public and commercial benefits of cooperation.

- Institutional learning. Development of organizations that "learn" within the context of change.
- Training of human resources with competencies of excellence and with operating and strategic capacities. Training of technical experts with initiative. Training in technological management and negotiation.

3. Return on investment, an additional component of scientific partnerships. A proposal

Taking into account the analysis of these contexts, if we recognize that the outcome of scientific cooperation can be used and tapped as a collective good or as a commercial good, any type of cooperation (donation, alliance, co-funding, joint project) will be based on investments of the parts, generating expectations not only in the funding entities but also in the actors themselves (organizations, communities, and individuals) that will surpass the concrete outcomes of the project. Likewise, responses in inter institutional interaction—understood as the relationship between different, but complementary peers—will be generated. We propose to make this social and commercial use of N-S scientific cooperation explicit as a return on investment and a key factor in scientific partnerships, which requires that agreements be established among stakeholders.

We therefore propose to include the analysis of returns on investment as another "component", additional to the 11 already proposed, that will facilitate the resolution of conflicts and contradictions in the situations set forth.

The high profitability of investing in R&D+TI has been assessed and is currently recognized. Numerous studies exist on assessing the profitability and impact of this type of investment, using various methodologies. We could mention those private R&D centers in Colombia that evaluate increases in productivity related to results of R&D for each Colombian peso invested.

It is important to note that returns can be measured in terms of (1) scientific and technological capacity and productivity, and (2) development. Each case has different indicators and terms, and also different beneficiaries. All cases, and beyond, can include the number of scientific publications, which sometimes erroneously seem, both in the North and South, the ultimate purpose of R&D.

It is essential to call attention to the importance of the South—at least for Colombia—strengthening its policies and **strategies** for scientific and technological cooperation. Hernando Gómez Buendía[12] suggests that "it is indispensable to understand how to appropriate and how to construct technological and scientific knowledge, and to institutionalize R&D as social practice". It would be desirable for the South to have a clear understanding of cooperation as a way of mobilizing resources, with synergistic effects.

Strategies would have to be based on: internationalization of a country's scientific-technological community to the benefit of the country's purposes; articulation of the scientific-technological community and researchers' mobility; investment for cooperation, as much to consolidate the capacity of R&D+TI as to contribute to cooperation and facilitate continuous flows of committed resources; the promotion of negotiation capacities with regard to S&T and its social, political, and commercial interrelationships; and a long-term vision of construction and accumulation.

[12] "37 formas de hacer ciencia en América Latina", 1997.

Our proposal would incorporate good practices of partnership, and would include *a priori* agreements, verifiable through measurable and assessable indicators. Explicit agreements on the commercial and social returns expected from the cooperation would be established in each case.

Although the potential commercial return : Iprights , distribution of benefits,participation in decision-making, should be explicit, **social return** should be a **requisite for cooperation** and considered in all cases for South actors, specifically indicated in terms of:

1. The social and productive appropriation of generated knowledge, with special reference to related public policies.

2. The contribution to the sustainable development of participating communities , through the continuity and liaison of generation, use, and tapping of knowledge.

3. Scientific and technological capacity building as a contribution social and productive capital.

4. Institutional learning, involving the development of organizations that "learn" in changing contexts.

5. Capacity building of human resources, with excellency skills and operational and strategic thinking capabilities.

These five components are related to the above mentioned key success factors in S&T-society relationships. Its application is recommended for purposes of selection, negotiation, monitoring and evaluation of scientific and technological cooperation.

Although some of the existing information on the theme as well as the lessons drawn from past and ongoing experiences have been systematized, there is still a pressing need to broaden the information available.

To conclude, I would like to emphasize the following issues brought out during this presentation and in previous presentations on the subject :
a)Institutional cooperation in S&T is not improvised, but based on the principles that orient the organizations involved and built jointly by the cooperating parties.,b)Cooperation is supported by the public policies that facilitate it.,c)Funding and financial sustainability, and mobilization of resources are conditioning and restrictive factors in cooperation, d)Cooperation requires understanding and comprehension of the rhythms and characteristics of research and production to take advantage of knowledge as technological innovation e)The concepts of S&T and R&D+TI as social investment, with criteria for sustainable development, are basic to the success of cooperation, particularly for N-S cooperation.

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Annex 1: Survey

North-South Scientific Cooperation: Social Demands and Technological Challenges for Sustainable Development[12]

Survey answered by: _____

Entity: _____

1. Do you consider that ( ) is an entity

   Of the "North"? ☐ Of the South? ☐

Based on three characteristics of your entity did you make this classification?

a._____

b._____

c. _____

2. How would you describe the North-South cooperation of ( )?

a. _____

b. _____

c. _____

3. Does . ( ) contribute to the development of the South?

   Yes ☐ No ☐

How? _____

_____

_____

4. Does your organization ( ) form human resources:

From the South? Yes ☐ No ☐

Observations: _____

_____

For the South? Yes ☐ No ☐

Observations:_____

_____

What **competencies** do you consider **essential** for R&D staff trained at ( )?

_____

_____

Date: _____

[12] /Survey carried out by Myriam Sánchez Mejía de Corporación Biotec/Valle University, Cali-Colombia, in preparation of the participation in the "S&T Cooperatión & Development Annual Conference E.P.F.L Lausanne/2004." /