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Scientific co-operation and centre-periphery relations: attitudes and interests of European and Latin American scientists

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ABSTRACT

This article approaches the issue of the so-called North-South scientific cooperation to understand why European research consortia incorporate research groups from Latin America (LA). This boils down to three questions: (a) at the political and institutional level, what is the European Union's interest in developing co-operation with Latin America? (b) at the level of cognitive strategies, what are the European projects leaders' motivations to enroll LA groups in the formation of research consortia? and (c) at the level of practices, what role do the LA groups play in these consortia? To underline the specificity of the cooperation under analysis, we take into account organizational and geo-political aspects as well as past and current trends in Europe-Latin America scientific co-operation in general, and in particular within the Framework Programs. We conceptualize several types of co-operation and the paradigms of North-South scientific collaboration that have guided the developed countries' policies. As a result of our research, we suggest a typology of the different configurations that frame the LA participation in international consortia, and the consequences in terms of policy issues that may be relevant for Latin American countries in the future.

Cooperação científica e relações centro-periferia. Atitudes e interesses dos cientistas europeus e latino-americanos

RESUMO

Este artigo aborda a questão da chamada "cooperação científica Norte-Sul" para entender por que os consórcios europeus de pesquisa incorporam grupos de pesquisa da América Latina. Isso condensa três questões: (a) No nível político e institucional, qual é o interesse da União Europeia em desenvolver a cooperação com a América Latina? (b) Em termos de estratégias cognitivas, quais são as motivações dos líderes de projetos europeus para incluir

KEYWORDS

International scientific cooperation; Europe and Latin America; Centers and peripheries; Asymmetries

PALAVRAS-CHAVE

Cooperação científica internacional; Europa e América Latina; Centros e periferias; Assimétricas

PALABRAS CLAVE

Cooperación científica internacional; Europa y América Latina; Centros y periferias; Asimetrías

grupos latino-americanos na formação de consórcios de pesquisa? (c) No nível das práticas, que papel desempenham os grupos latino-americanos nesses consórcios? Para sublinhar a especificidade da cooperação que analisamos, levamos em conta os aspectos organizacionais e geopolíticos, bem como as tendências atuais e passadas na cooperação entre a Europa e a América Latina em geral, e particularmente dentro dos Programas-Quadro. Conceituamos vários paradigmas de cooperação e também os paradigmas da colaboração científica Norte-Sul que orientaram o desenvolvimento das políticas dos países. Como resultado de nossa pesquisa, propomos uma tipologia de diferentes configurações que enquadram a participação latino-americana em consórcios internacionais e suas consequências em termos de questões políticas que podem ser relevantes para os países da América Latina no futuro.

Cooperación científica y relaciones centro-periferia. Actitudes e intereses de científicos europeos y latinoamericanos

RESUMEN

Este artículo aborda la cuestión de la llamada “cooperación científica Norte-Sur” para comprender por qué los consorcios de investigación europeos incorporan grupos de investigación de América Latina. Esto condensa tres preguntas: (a) en el nivel político e institucional, ¿cuál es el interés de la Unión Europea por desarrollar la cooperación con América Latina?; (b) en el plano de las estrategias cognitivas, ¿cuáles son las motivaciones de los líderes de proyectos europeos para enrolar grupos latinoamericanos en la conformación de los consorcios de investigación? (c) en el nivel de las prácticas, ¿qué rol desempeñan los grupos latinoamericanos en dichos consorcios? Para subrayar la especificidad de la cooperación que analizamos, tomamos en cuenta los aspectos organizacionales y geopolíticos así como las tendencias actuales y pasadas en la cooperación entre Europa y América Latina en general, y particularmente dentro de los Programas Marco. Conceptualizamos diversos paradigmas de cooperación, así como los paradigmas de la colaboración científica Norte-Sur que guiaron el desarrollo de las políticas de los países. Como resultado de nuestra investigación, proponemos una tipología de diferentes configuraciones que enmarcan la participación latinoamericana en consorcios internacionales, y sus consecuencias en términos de cuestiones de política que pueden ser relevantes para los países de América Latina en el futuro.

1. Introduction

It is a well-documented fact that co-operation among scientists from different countries as measured in publications has steadily increased, particularly over the last three decades (Adams 2012, 2013). Leydesdorff and Wagner (2009) point out that: “International collaboration as measured by co-authorship relations on refereed papers grew linearly from 1990 to 2005 in terms of the number of papers, but exponentially in terms of the number of international addresses,” confirming the hypothesis of Persson, Glänzel, and

Danell (2004) about an inflation in international collaboration. The proportion of internationally co-authored rather than “home-grown” articles is growing in a significant group of countries (in the United Kingdom or Switzerland it is already over half), while it is impossible in some small countries to distinguish “domestic science” (Adams 2013). Whereas in 1988 just over 10% of papers were signed by researchers from more than one country, 20 years later that figure had increased to 30% (Boekholt et al. 2009; Gaillard, Gaillard, and Arvanitis 2010). Against such a background it is not surprising to find that Latin American scientists’ co-operation on projects undertaken with groups and colleagues from more developed countries has risen very significantly over this period (Gaillard and Arvanitis 2013; Kreimer and Levin 2013). Indeed, following the general trend, international co-authored publications by Latin American scientists went from less than 20% of the total in 1986 to almost 40% twenty years later (Russel and Ainsworth 2013, 52). Therefore, it is worth to inquire about the features of these collaborations, both in qualitative and quantitative terms.

Some relevant literature on this topic highlights certain tensions, in particular, “optimistic” versus critical views. On the one hand, some studies have echoed the optimistic outlook, celebrating the intensification of co-operation as a means to develop the cosmopolitanism of researchers from the “South” that integrates them in “international science” (Sebastián 2007), or underlining the democratizing effect of the new forms of international co-operation and the “opportunities” that present themselves for developing countries (Wagner 2008; Anderson 2011). On the other hand, more critical perspectives have emphasized the asymmetries, subordinated relations or even dependency that structure the modes of collaboration among more or less developed contexts (Gaillard 1994; Vessuri 1996; Velho 2002; Cetto and Vessuri 2005; Kreimer and Meyer 2008; Kreimer and Levin 2013; Beigel 2014). At stake is whether such co-operation improves developing countries’ cognitive and technical capacities, whether it is a mode of marginal and subordinate insertion, whether there are asymmetries in the setting of research agendas and whether or not these agendas are suited to develop countries’ needs. This paper explores these questions using a methodological strategy focused on work dynamics within research consortia in order to chart the complex and often contradictory nature of relations of international co-operation among groups with different levels of development.

We suggest four main divisions within the general topic of international co-operation. First, we are interested in analyzing co-operation commonly labeled “North-South,” between central countries and semi-peripheral or “non hegemonic” contexts (Kreimer 2006; Losego and Arvanitis 2008).¹ Second, within such relationships, we want to monitor scientific co-operation between Latin America and Europe for reasons we will soon make clear. Third, while we are aware that not all international scientific partnerships occur under the umbrella of co-operation programs, we focus here on co-operation within the framework of institutionalized projects with European Union financing and the participation of Latin American groups.² Fourth, unlike most international co-operation studies,

¹The label “North-South” cooperation misleads by mechanically transferring a geographical definition to each regional context’s capacities: strictly speaking, Mexico is in the North and Australia in the South. We use the expression because it is still strongly anchored in the discourses, but the labels “peripheral” or “non-hegemonic” are far better suited to our purpose.

²North-South cooperation usually falls within this type of framework. As Georghiou (1998) points out: “One of the difficulties in estimating the scale of scientific cooperation between industrialised countries is that it is dominated by informal cooperation between scientists as defined above. In consequence, frequently there is no accessible budgetary or other

we do not focus exclusively on publications (co-authored or otherwise) but provide also a qualitative study of the perceptions and motivations of the actors involved.

In a recent article, we investigated the point of view of Latin American leaders, studying the perceptions and attitudes of researchers who have participated in European projects (Kreimer and Levin 2013). Complementarily, in this paper we will show “the other side of the coin,” concentrating on the perspectives of European leaders (an aspect that appears to be less frequently treated in the literature), with the expectation of combining both views in a future text.

For that purpose, we have selected projects from the Seventh Framework Program (FP7) involving research groups from the five most dynamic countries in Latin America (Argentina, Brazil, Mexico, Chile and Colombia). These five countries are crucial because together they account for almost 80% of Latin American participation in European consortia. As we will show, although Latin America is not a specific target within European cooperation policies with third countries, the increasing participation of Latin American scientists in the Framework Programs (due to several reasons that we will explain below) justifies the relevance of studying this kind of bi-regional cooperation.

Naturally, we are aware that we are analyzing only a portion of the international cooperation of Latin American scientists. On the one hand, because we only take into account formal cooperation within Framework Programs and not all the participations in formal projects financed by individual countries (bilateral cooperation), by international agencies or by foundations. On the other hand, because we deal with formal cooperation, which shows only the tip of the iceberg of international scientific cooperation (Shrum, Genuth, and Chompalov 2007). Indeed, a substantive part of cooperation is deployed through informal channels and relationships, as some research in laboratories and other research sites has already shown years ago (Knorr Cetina 1999; Chompalov, Genuth, and Shrum 2002). We consider, however, that the type of links analyzed here has the peculiarity of providing us accurate information about mechanisms increasingly deployed by the most advanced countries, as well as about its consequences in terms of the dynamics of science, both in more advanced and in less developed regions.³

The overarching purpose governing the article is to understand why European research consortia incorporate research groups from Latin America. This boils down to three questions: (a) at the political and institutional level, what is the European Union’s interest in developing co-operation with Latin America?; (b) at the level of cognitive strategies, what are the European project leaders’ motivations behind including groups from Latin America in the formation of research consortia? and (c) at the level of practices, what role do the Latin American groups play in these consortia?

To answer these questions, Section 2 describes the methodology used, and the third section discusses several approaches and provides a set of precise statements about the object of study taking into consideration two elements that allow us to elucidate the first of these questions: (i) organizational and geo-political aspects to conceptualize types of co-operation; (ii) the succession of paradigms of North-South scientific co-

input record of its existence. This is in contrast to cooperation with less-developed or transition economies which is frequently supported by a formal framework and budget.”

³Certainly, we are also aware that there are *other modes* of scientific international cooperation, including South-South relationships. However, we decided in this article to concentrate on one particular and formal kind of collaboration between “northern” and “southern” research groups.

operation that have guided the policies of developed countries. In addition, we present some quantitative data that allows to situate the scientific co-operation with Latin America within the more general frame of European scientific cooperation activities. The fourth section sets out the results and analysis of the information collected through the sample of seventeen research consortia, analyzed in-depth. This is organized around two variables: European leaders' motivations to enlist Latin American groups; and the activities performed by these groups within the internal division of labor as well as the benefits obtained. We also offer here a preliminary typology based on these variables and we close by drawing some conclusions.

2. Methodology

Our qualitative research was oriented to inquire about the motivations of European leaders to enroll Latin American groups in European projects, and the type of practices they undertake within large consortia. We chose to observe paradigmatic cases that provide us with more detailed information about the object of study. The selection of cases that are studied in depth are not intended to be representative, but rather open the question to various possibilities and relations of the actors, their traditions, disciplines, working subjects, possible industrial applications, etc.

Our empirical work is based on an analysis of projects of the co-operation sub-program of FP7. Our first step was selecting, from the CORDIS database, projects with participation by at least one research group from Argentina, Brazil, Mexico, Chile or Colombia. Second, we organized this sample thematically, selecting areas where Latin America has both a greater research tradition (Health⁴ and KBBE) and a different research tradition, which unlike previous ones involves on-the-ground as opposed to laboratory research, chiefly aimed at studying global systems (ENV). However, the relatively more important Latin American participation measured in terms of the number of projects (not in the number of participations) is not focused on topics related to Health but in other three areas: KBBE (knowledge based bio-economy), Environment and Social Sciences, and Humanities, in all the cases approaching 10% of the total projects funded by EC. This is another reason to focus our empirical work in Environment and KBBE.

Our third step was selecting between five and six projects meeting the following requirements from each of the three areas: being financed by the "collaborative projects" scheme⁵ and addressing different topics within the area, in order to represent projects with a diversity of orientations.

The characteristics of the selected projects have been studied through two mechanisms. First, the website of each project has been explored (17 in total), which includes the coordinators, partners from different countries and institutions, the general description of the project (including the objectives of each working package), the activities carried out and the results obtained. Second, we conducted a semi-structured interview

⁴Indeed, 23% of the total documents published by Latin American scientists (retrieved from WoS in 2009) was in "biomedical research," while 25.5% corresponded to "clinical medicine" (EULARINET 2009). That is to say that around a half of LA publications are related to health topics.

⁵We focus on schemes that back strictly research projects, and disregard financing for establishing and/or strengthening international networks, where Latin American participation is less relevant.

with the coordinators of the selected projects. They have been conducted by phone, for about one hour, between April and June 2016.

Through the interviews we explored the following issues:

- (a) The origin of the project (coordinator or other group) and participation of Latin American groups during the formulation process.
- (b) The motivation to specifically convene these Latin American groups: advantages in terms of evaluation, the existence of highly trained human resources, access to resources in the Latin American region (specimens, populations), knowledge of technical or specific areas, counterpart funding contributions and so on.
- (c) The distribution of work packages.
- (d) The type of activities carried out by the Latin American groups: routine activities, innovative techniques, the development of new techniques and equipment, information or data collection, theoretical development, development of new processes or products, productive sector transfer.
- (e) The results obtained: joint publications, patent registration, new regulations, standards or norms.
- (f) The roles and characteristics of companies comprising the consortium.
- (g) Negotiations around the intellectual property of the possible outcomes.
- (h) Benefits for Latin American groups: human resources training, the opening of new lines of research, access to funding, contact with international scientific leaders and integration in global networks, the meeting of social needs, the creation of new companies.

The basic features of the consortia analyzed are set out in a table in the [Appendix](#), where we have summarized information on the objectives, the participant groups, European leaders' motivations and the activities carried out by the Latin American groups in the three areas chosen: Health, Knowledge-Based Bio-Economy (KBBE) and Environment (ENV).

3. The approach of international scientific co-operation: some details about our object of study

3.1. Some general considerations on international scientific and North-South co-operation

The definitions, scope, actors, institutions, regulations and specific practices of international scientific co-operation have been the object of numerous ambiguities and debates. Therefore, before delving into the specific analysis of our object, at least two points need to be established relating to North-South co-operation and linked with international scientific co-operation in order to set the parameters of our research object.

The so-called North-South co-operation presents specific interpretative problems and tensions. This is due first and foremost to the definition itself of the actors in play: some works on North-South co-operation refer to "developing countries" as a relatively homogeneous group. Wagner (2008), for example, points out that, after the emergence of new networks as a means to organize twenty-first-century knowledge production, there

are several operations in the uses of knowledge that remain in the local sphere, therefore developing countries, need to establish and develop a series of institutional arrangements if they wish to take advantage of these opportunities. According to Wagner (2008, 115):

Indeed, developing countries have an advantage over developed countries – they have not built a twentieth-century national science system. This may seem counterintuitive; after all, most developing countries want to have highly developed scientific capabilities. But because these countries do not have the embedded twentieth-century bureaucracies and institutions that were the hallmarks of the era of scientific nationalism, they have greater flexibility to pursue new developments in science. The absence of nationally driven constraints tied to a huge investment can actually be an advantage that developing countries can exploit by building a more nimble networked system.

The problem here is that the label “developing countries” includes only those with limited scientific traditions or weak national science systems. However, countries like Argentina, Chile, Brazil, Mexico, Egypt, South Africa and so on, belonging to the “developing world” at large have been highly dynamic in terms of knowledge production and scientific systems for more than a century.

Focusing on the regional level, Gaillard, Gaillard, and Arvanitis (2010) have shown that the performance of international co-operation in Latin America differs widely according to individual countries’ scientific robustness. Even if between 1985 and 2006 a steady rise in international co-publications is seen in the region at the expense of publications by same nationality authors, in countries like Brazil, Argentina, Mexico, Colombia and Chile with larger scientific communities and with higher scientific production, the share of international co-publications is lower than in countries with less-developed scientific systems.⁶ In Figure 1 we show the performance of these countries together with three small countries to confirm that the lower the overall scientific output is (WoS documents), the higher the percentage of international collaboration. Thus, while Ecuador has almost 75% of their scientific production in co-authorship, this figure is less than 30% for Brazil.

Indeed, the more scientifically advanced countries in Latin America have a smaller part of their production with international co-authorships, but they have a higher participation rate in European Programs. Table 1 shows the participation of the more active third countries (referred as “International Cooperation Partnership Countries” in EC’s jargon). Among them, we find only five Latin American countries, ordered according to the intensity of their participation: Brazil, Argentina, Mexico, Chile and Colombia. As we can see in Table 2, the five countries represent 15% of the third country’s participation in FP7 measured both by EU financial contribution and by a number of participants:

“North-South” scientific co-operation is often couched in a dual discourse by both European and Latin American decision-makers as something “good in itself”: on the Latin American side, it is something impregnated with cosmopolitanism, the benefits of interacting with world leaders and greater visibility for local science. On the European Union’s side, the discourses are more pragmatic, referring to co-operation as a strategic resource for strengthening European science and above all competitiveness.

⁶This finding is consistent with Adams’ assertion (2012) that small countries like Malta find it impossible to identify what its “own science” is.

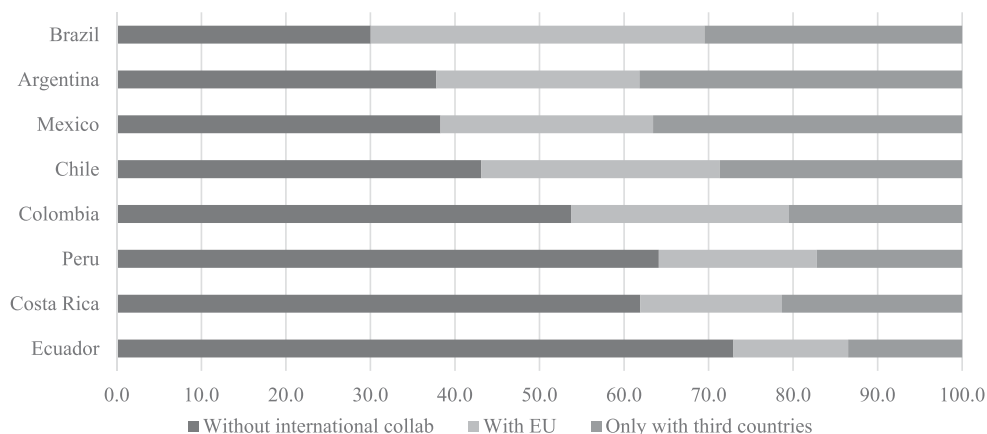


Figure 1. Percentages of international collaboration (co-authorships) for selected Latin American countries. Source: Authors' elaboration based on EULARINET (2009).

Where broader international scientific co-operation is concerned, Katz and Martin (1997) have pointed out the ambiguous definition of what is understood by co-operation. For example, there is an ample body of literature that takes scientific publications as material for the study of relations of international co-operation and co-authorships (the bibliometric perspective) on the assumption they are a good proxy of these practices (Gläser and Laudel 2001; Newman 2001; Leydesdorff and Wagner 2009; Wagner and Kit Wong 2012). While this

Table 1. Participation of International Cooperation Partnership Countries (ICPC) in FP7.

ICPC Countries	EC contribution (million Euro)	% of total EC contribution to ICPC Countries	Participations	% of participations from ICPC Countries
Russian Federation	73	14%	545	14%
India	39	8%	280	8%
China	35	7%	383	7%
South Africa	34	7%	240	7%
Brazil	32	6%	224	6%
Ukraine	24	5%	215	5%
Egypt	15	3%	125	3%
Argentina	15	3%	119	3%
Marocco	14	3%	126	3%
Mexico	13	3%	119	3%
Kenia	13	2%	77	2%
Tunesia	13	2%	103	2%
Tanzania	12	2%	50	2%
Chile	9	2%	68	2%
Burkina Faso	8	2%	28	2%
Ghana	8	2%	54	2%
Uganda	8	2%	44	2%
Thailand	7	1%	51	1%
Colombia	6	1%	50	1%
Jordan	6	1%	50	1%
Vietnam	6	1%	48	1%
Senagal	5	1%	50	1%
Others ^a	114	22%	1.060	22%
Total	509	100%	4.109	100%

Source: Fresco et al. (2015).

^aThis category includes almost 90 other countries.

Table 2. Participation of Latin American countries in FP 7 (as members of ICPC).

ICPC countries	EC contribution (million Euro)	% of total EC contribution to ICPC countries	Participations	% of participations from ICPC countries
BRAZIL	32	6%	224	6%
ARGENTINA	15	3%	119	3%
MEXICO	13	3%	119	3%
CHILE	9	2%	68	2%
COLOMBIA	6	1%	50	1%
total	75	15%	580	15%

Source: Authors' own, based on Fresco et al. (2015).

macro-methodology does bring out a certain dynamic in terms of major trends in co-operation in given countries, in specific disciplinary fields and even in some thematic clusters (as we will show in the section), it shows only a part of the product of collaborations (papers) and tells us nothing about the methods of organization or motivations behind co-operation, despite these being crucial to an understanding of scientific relations between centers and peripheries. Indeed, many social activities and practices do not necessarily crystallize in scientific articles but in many other ways, such as exchanges of researchers and fellows, the development of joint training programs, industrial product development, the organization of seminars and so forth (Rodríguez Medina 2014).

In general terms, we can identify three contextual elements to explain some of the changes in the organization of co-operation in recent decades. The first involves the changes in scale beginning in the late twentieth century, when there was a shift from so-called Big Science (De Solla Price 1973; Galison and Hevly 1992) as it unfolded in the N period and throughout the Cold War (Hallonsten 2016) to science on a far larger scale, one expression of this – though not the only one – is various “mega-projects” (Beaver 2001; Kreimer and Meyer 2008; Wagner 2008), such as the sequencing of the Human Genome or the Large Hadron Collider, mobilizing thousands of researchers. Unlike the traditional model of big science, which has been associated with a brain drain from developing countries (Devan and Tewari 2001; OECD 2002), these projects do not necessarily involve the settlement of many researchers in the same physical place; with the spread of ICTs scientists from a variety of geographical locations can take part in the form of networks (Shrum 2005; Adams 2012).

The second involves the reorganization of traditional disciplines and the emergence of new fields. Areas of research have effectively become more complex, generating displacements and hybridizations across disciplines – and across academic and industrial research – in “technological research communities” (Joerges and Shinn 2001; Levin, Jensen, and Kreimer 2016) and new regimes of knowledge production (Pestre 2003, 104).

The third involves policies designed to stimulate international co-operation, which have imparted explicit momentum to such linkages both in discourses and the implementation of specific instruments: The European Union (European Commission 2008) and the United States (National Science Board 2008) have had specific instruments in place to promote international co-operation for several decades. Europe has promoted it at both aggregate and national level while the United States has done so in a diversified way through numerous public and private institutions and agencies (Whitley 2010).

These three elements are fundamental to understand the specific type of co-operation under discussion here.

3.2. EU international co-operation policy and the implications for Latin American countries.

The FP7 is organized in four sub-programs (European Commission 2007): *Co-operation* (funding for projects of European-backed international consortia and third countries); *Ideas* (funding for research excellence in individual groups not necessarily comprising third countries); *People* (funding for intra- and extra-European mobility projects), and *Capacity Building* (provision of instruments in which third countries can participate, and specific international co-operation activities (INCO)).

We decided to focus on some selected projects belonging to the *co-operation* sub-program for two reasons: first, because unlike other funding lines (like “people”) they are effectively *research projects*, and, second, because they account for 64% of the UE contribution to FP7 (see Table 3). These projects arise from calls directed at predetermined targets in each thematic area and involve the formation of medium or large international consortia lasting approximately four years in which each group plays a specific role within the topic or issue in question, transcending disciplinary barriers.

Given that European Union policies play a fundamental role in the kind of co-operation we analyze, a distinction needs to be made – as much of the literature has – between the political and individual motivations behind co-operation, and how these join up with other factors that stimulate or obstruct it (Beaver 2001; Bozeman and Corley 2004; Wagner 2006, 2008; Boekholt et al. 2009; Edler and Flanagan 2011; Gaillard and Arvanitis 2013). Therefore, in this section, we look at some of the general characteristics of extra-European co-operation policy within the Framework Programs to gain a better understanding of Latin American researchers’ roles in international research consortia.

Taking into consideration the scientific co-operation policies of international organizations and funding agencies located in developed countries, Gaillard (1999) identifies three successive phases in North-South scientific co-operation. The first runs from the colonial period through to the 1960s and 1970s and focused on finding solutions to the problem of development through the mobilization of (human and financial) scientific resources from the countries of the North. The second unfolded between the 1970s and the 1980s/1990s and focused on endogenous capacity-building in the countries of the South. The third and most recent is geared to producing co-operation structures with the leitmotif of mutual benefit.

The European Union’s policies of scientific co-operation with developing countries have followed criteria similar to those described by Gaillard. Such policies can effectively be traced back to the 1980s when the European Parliament set up the Science and Technology Development Program (STD). This had three phases: STD I (1983–1987), STD II (1987–1990) and STD III (1991–1994). These programs were aimed at strengthening research

Table 3. FP7 subprograms: projects, funding contribution and share.

Specific Program / sub-program	Number of projects	Total EC contribution (in million euro)	% of EC Contribution
FP7-COOPERATION	7.834	28.336	64%
FP7-IDEAS	4.525	7.673	17%
FP7-PEOPLE	10.715	4.777	11%
FP7-CAPACITIES	2.025	3.772	8%
Grand total	25.099	44.559	100%

Source: Authors’ own, based on Fresco et al. (2015).

capacities and increasing the impact of research in developing countries, especially in fields such as tropical and subtropical agriculture, on the one hand, and medicine, health and nutrition, on the other (Gaillard 1994).

After the Fourth Framework Program (FP4) (1994–1998) the European Union created a special sub-program to foster “Co-operation with Third Countries and International Organizations” (INCO), which included co-operation with developing countries (INCO-DC). INCO-DC expanded the range of areas, including some not related strictly to developing countries’ needs: (1) renewable natural resource management (forests, oceans, water, energy); (2) agriculture and agro-industry (improved production, storage and marketing); (3) health (disease control, vaccines, support systems); (4) topics of mutual interest established by agreement in sectors like information and communication technologies, new materials and so on (Gusmão 2000).

From the FP6 on, the structure no longer channels third-country co-operation exclusively through the INCO Sub-Program (which has become a funding line aimed at networking activities and building bi-regional agendas). Indeed, third countries can also participate on an equal footing with the member states of the “co-operation” sub-program. This is the most relevant in budgetary terms, absorbing 69.5% of the FP6’s resources and 64.1% of FP7’s (see Table 3 above) (<https://cordis.europa.eu/fp6/budget.htm> and European Commission 2005, 2007).

Behind this organizational change lies a vigorous policy of strengthening the European Research Area (ERA), deepening intra- and extra-European international relations is seen as a necessity to that end. This policy was expressed in a 40% increase in FP7’s annual budget compared to FP6, an upwards trend that continued in the recent Horizon 2020 (Muldur 2006). This largely accounts for the increase in Latin American participation: various groups from the region participated in 308 projects in FP7 (2007–2013), against 204 projects in FP6 (2002–2006) (CORDIS 2009; EULARINET 2009).

It is important to ask what motivations underlie this policy. In an attempt to summarize and classify the motivations behind international co-operation policies, Boekholt et al. (2009) distinguish the “narrow paradigm” from the “broad paradigm”: the first one relates to objectives within “science policies,” how to improve the quality, scope and critical mass of research or *to make the European Research Area more attractive to highly-qualified human resources from third countries*; the second one refers to aims within “policies through science” like improving competitiveness, confronting global social challenges and supporting least developed countries in science and technology capacity-building. In either case, it is a strategy to overcome the European region’s disadvantages compared to other global competitors like the United States or Japan.⁷

On the subject of the “broad paradigm” a European Commission document (2008, 29) stated the following:

Europe can play a more active role in international agenda setting and formulation of policies and strategies and be more audible in international negotiations. Taking the fore on the international policymaking scene can be a way for the EU to reinforce the bases of its economic

⁷In fact, in terms of human resources the number of researchers in relation to the economically active population was lower in Europe than in Japan or the United States: in EU-25 in 2003 the ratio was 5.4 per 1000 against almost double in the United States and Japan (9 and 10.1 per 1000 respectively). Of course, there are significant differences within Europe (Muldur 2006).

competitiveness in the future through influencing early the design of international regulations affecting its private sector.

This concern over global agendas and competitiveness has led to two trends in the Framework Programs. The first is a higher concentration of resources for better-defined and more restricted (realistic) goals in calls for projects (Kreimer 2016, 2019).

The second trend in the Framework Programs is an increase in company participation: there was a fall in companies' participation in research consortia between FP4 and FP6, therefore the EU's economic contribution to industrial companies rose from 17% in FP6 to 25% in FP7, while the percentage of contracts with industrial companies compared to other participant institutions rose from 19% to 30% between the two programs (European Commission 2016). A 48% rise in the funding was concentrated in the various thematic areas comprising the sub-program "co-operation," with 21% due to the introduction of new instruments from FP7 (European Commission 2016). Considering only the Sub Program Cooperation, the private firms received 33% of the funds in FP7, 17% went to large private companies and 16% to small ones (Fresco et al. 2015).

Consequently, despite the fact that the Framework Programs include financing instruments for projects to target global challenges (like climate change) or to boost research capacities and solve problems in developing countries (like endemic diseases), the leitmotif of North-South co-operation of the 1970s–1980s has been losing ground to a policy which in the guise of "free access" to European instruments and financing, and "mutual benefit", poses fresh challenges regarding the (real or potential) asymmetries involved in the setting of the agendas and the (private) exploitation of knowledge.

4. Results and analysis

To give our analysis sharp focus we have organized the results in two main categories: European leaders' motivations to enlist Latin American groups and activities carried out by these Latin American groups within the internal division of labor, in addition to any benefits obtained.

4.1. Motivations for enlisting Latin American groups

The first thing we observe in the responses of European leaders regarding motivations to include Latin American groups in consortia is that as a rule the scientific quality of the Latin American scientists called upon is highly valued. This was stated as the primary justification by all the European leaders interviewed. As has been shown in previous works (Kreimer 2006), it should come as no surprise for elite groups from Latin America that display a strong correlation in degrees of prestige and internationalization. In other words, leading Latin American scientists build their reputations partly on local performance but above all by bringing their international relations to bear locally. This comes from two sources: on the one hand, because a part of the Latin American leaders has spent part of their training (typically a postdoc) in elite laboratories located in the most advanced countries (Kreimer and Meyer 2008). Thus, they tend to maintain important links with these groups, facilitating access to international research networks. In fact, most of the European leaders interviewed declared that they already knew the Latin American leaders before enlisting them.

Even in the past, when the publication of articles in peer-reviewed international journals had not yet been institutionalized as a standard measurement of scientific quality, a degree of local prestige was earned from recognition by international peers.⁸ Today, participating in international – and/or internationally funded – projects is a source of prestige in all countries but is most apparent in those with intermediate levels of scientific development.

There are, however, substantive differences in terms of stimuli to enlist Latin American groups. We have identified four types of motivation/relationship:

(a) The inclusion of Latin American countries as a condition for obtaining subsidies:

This is the case with Health-5; KBBE-6 and ENV-6. In these cases it is worth questioning the motivation behind the choice of *these groups over others* but not behind the inclusion per se of a Latin American group. The answer here seems to lie in two different sources: the first is technical and cognitive, for example, the additional capabilities provided by the Latin American groups invited, or access to such cognitive resources as the availability of specific strains, access to patients and so on; the second is sociological, referring to the linkages established between partners in the past, bonds of familiarity and trust, and even shared scientific paradigms, which are often mentioned by interviewees.

(b) *Consortia working on Latin American issues*:

This is the case with most health projects, including tropical diseases, like Chagas disease: Health-1, 4 and 5. In this case, we must pose an additional question: why does Europe decide to fund research into issues that do not – or only marginally – affect its own context? Here again, we find two different levels of response. The first relates to what research into local issues (diseases) can contribute to the understanding of more fundamental phenomena. In this respect, for example, the research into targets to attack the causative agents of these diseases may provide clues about fundamental physiological or biological mechanisms which can be extrapolated to other cognitive aspects beyond the cases in question. Moreover, testing brand new molecules in association with pharmaceutical companies can produce knowledge applicable to universal diseases independently of exclusively local issues.

The second level of response relates to the outcome of processes of globalization and migration flows: some traditionally “tropical” diseases have been spreading to other regions and creating fresh problems about which very little knowledge has been accumulated. This is true, for example, of Chagas disease in Spain, France or the states of Texas and California in the United States. In these cases, on top of the prestige enjoyed by Latin American researchers, there is a specific expertise related to the object of study and exclusive access to essential research resources like patients or various strains of parasites and other organisms.

(c) *Consortia investigating global problems with specific manifestations in a variety of contexts*:

⁸For case histories of this process of external scientific capital building see Romero (2004), Cukierman (2007), Buch (2006), Kreimer (2016, 2019) and others.

There is a need here for various observation points located in different contexts. This is most often the case in environment-related projects and, in our study, in the ENV-1, 2 and 4 consortia. The phenomena investigated are due to more general phenomena like climate change and manifest in very specific geographical locations (the concentration of mercury in rivers or the consequences of the melting of glaciers, for example). The incorporation of Latin American groups is due to two complementary modalities: the first is the need to collect data on specific observation points that produce a “global view” of the problem. Latin American groups must have access to those resources (rivers, glaciers, different species of fauna or flora and so on) and the technical capacity to generate standardized data according to the consortium’s protocols since the use of the methodology here is key to the homogeneity of the data collected.

The second modality refers to the fact that the Latin American groups must be able to mobilize cognitive – and technical – resources, like knowledge of their specific contexts, and above all to be able to use equipment that allows them to carry out work consistent at the other observation sites.

Then the results are processed by program coordinators (some projects have already undergone a degree of local processing) and the products are developed. These may take the form of intervention protocols, policy recommendations (to international agencies, the European Union or national governments), of scientific papers and, exceptionally, of transfers to private companies, although in the case of environmental projects participation tends to be less than in other thematic areas.

(d) Latin America is an important – sometimes indispensable – context for observation and/or experimentation:

This is true of the development of genetically modified organisms (GMOs) from the KBBE-1 consortium. While testing is authorized at a laboratory level in Europe, it is virtually impossible to carry out field trials on any significant scale. In Latin America, on the other hand, there are very few restrictions on GMO testing provided certain basic technical norms are respected. It is then imperative for consortia, performing activities prohibited or limited in Europe, to acquire a field beyond their region in order to conduct such testing. Something similar occurs in KBBE-4 and Health-1 consortia, which involve clinical trials on patients which, although not banned in the European Union, are far more rigidly regulated than in Argentina and Brazil, where such testing has been carried out in both the above consortia with less control and therefore speedier results.

4.2. Latin American groups’ activities and benefits

In our sample of research consortia, the predominant activities performed by Latin American groups in all thematic areas are *data collection and systematization*, and *technical work*, be it routine or innovative. This refers us to a specific type of insertion in research planning consistent with the causes behind the recruitment of these groups: as we have seen, the predominant reasons in most projects are to do with observation sites of phenomena, either specific to Latin America (albeit with global interests) or local manifestations of phenomena far broader in their scope.

There are a two more facts of great importance: on the one hand, in the majority of cases Latin American groups were invited to participate in consortia *once the broad lines of the work plan had already been drawn up*, and their participation in the methodological design and distribution of tasks has therefore been extremely limited. There are only three exceptions in the cases of Health-1 and 4 and KBBE-6, where Latin American groups were actively engaged in the design. On the other hand, Latin American groups led the coordination of a *work package*, administrating some of the resources allocated to the project, in just two of the consortiums analyzed. These are Health-4 and KBBE-6, (the only two projects where the groups participated in the overall research design), both cases involving international benchmarks FioCruz and EMBRAPA: highly prestigious groups from Brazil with very strong research traditions and high visibility.

Where company participation is concerned, European firms participate in all the consortia analyzed (with three exceptions: ENV-1; ENV-4 and ENV-5), while Latin American companies participate in two projects (one Chilean firm and one Argentine firm). Under European Union provisions companies involved in consortia must be small and medium-sized enterprises. Judging by consortia directors' statements, none of the companies participating in them has provided specific research funding; their contributions have instead been "in-kind": chemical compounds, data processing capacity, marketing and outreach or specific equipment. We tried to investigate the nature of the industrial property and research results exploitation agreements in all these projects, but it proved impossible because the provisions are confidential.

That said, we must highlight certain special characteristics displayed by different thematic and disciplinary fields:

Among health projects, two target Chagas Disease, an endemic native to Latin America for which the most active research groups worldwide are found in Brazil, Argentina and to a lesser extent Colombia. The participation in the design of research and at the various different stages in these consortia is truly significant. One of them (Health-4) is one of the very few cases in which a Latin American group administrates a work package. Indeed, it is also one of the few to point out that the main benefit for the group is economic, since "the resources they administrate are very significant."

Similarly, all the health projects involve company participation, usually pharmaceutical laboratories, yet only one of these companies is Latin American. When we came to investigate who would be responsible for the industrialization of the results obtained from the consortium, we found out that a European industrial laboratory would be in charge of new drug production, while the Latin American laboratory would only see to distribution.

Moreover, in the area of health almost all the Latin American groups have links with patients and only in the case of Health-2 does the Latin American group (Chilean in this case) provide biologically interesting compounds and the capacity to carry out big data analysis.

We must not think that in the field of health data "collection" and "systematization" tasks are *purely technical* activities without any scientific content: since it is about experimental developments scientific capacities are crucial. These activities are, however, subordinated to a centralized information processing capacity always located in one of the European centers.

The situation in KBBE is fairly similar: it generally involves research processes in agriculture and agro-industry, where the availability of cognitive resources on the local

environment and the Latin American groups' strong research traditions are decisive factors. Two of the projects are geared to conducting field trials in their own countries, these being banned in Europe (KBBE-1) in one case and regulations being slacker in our region (KBBE-4) in the other. Other groups also conducted clinical trials (KBBE-5) or field trials (KBBE-6), which are clearly their predominant activities.

Interestingly, the groups in KBBE that carry out more complex scientific activities are both from Chile: one is a veterinary center producing vaccines (KBBE-3) while the other is an expert in an international benchmark technique for bio-waste valorization (KBBE-2).

In the field of environmental research, a tradition that is weaker in Latin America than the two fields of health and agriculture discussed above, *all the groups identified perform information gathering and data production activities*, and do so according to already established protocols across the board. The data generated by the Latin American groups target various different goals: systematizing the concentration of mercury in the water in various regions' (ENV-1); using global models with specific observation points (ENV-2 and ENV-4); producing conceptual models (ENV-3); or proposing policies and intervention tools (ENV-6). However, the participation of scientists from our region in these global objectives is either extremely low or non-existent, as their practices often stop after the processing and systematization of the data produced.

In terms of research benefits for Latin American groups, the findings are conclusive: the greatest benefit was seen in the increase in international publications. Added to this is the opportunity to interact with prestigious research groups at the international level. Contrary to expectations, according to their European coordinators, the securing of funding does not emerge as the main benefit for most Latin American groups. This may be for various reasons: first, as elite groups their basic funding needs may already be covered; second, there are *intangible* benefits like access to state-of-the-art methodologies, shared international databases or other tacit knowledge; third, while the scope of the consortia's overall resources is relatively significant, the proportion received by Latin Americans (with the few exceptions where they are also administrators) is perceived as insignificant when weighed against other benefits.

4.3. Towards a typology

In conclusion, taking all of the above into account, we propose a preliminary typology of the various modalities of insertion of Latin American groups in international consortia based on our empirical work. For this purpose, we identify four types of participation and take some of the consortia analyzed as concrete examples to illustrate them.

- Type 1: Participation based on local resources in Latin America essential to the research.
- Type 2: Participation via "outsourcing" for specific contributions to some global research or to produce regulations.
- Type 3: Participation based on the international reputation of the group in Latin America or the specific knowledge needed for the research.
- Type 4: Participation based on the opportunity to conduct (clinical, agricultural) trials that are less regulated in Latin America than in Europe.

Let us look briefly at each of these modalities:

Type 1: BERENICE (Benznidazol and Triazol Research Group for nanomedicine and Innovation on Chagas Disease)

A consortium coordinated by a Catalan group to test the toxic profile of Benznidazol, the only drug in existence to treat Chagas disease.

The Brazilian group (FioCruz and Ouro Preto) devotes its energies to designing and conducting clinical trials. According to the coordinator “they are a key piece: the trial is based exclusively on the data produced by the Brazilian groups (with Chagas patients).” It is also responsible for in vivo models. The Argentine group (ANLIS) is responsible for testing new alternative molecules to benznidazol, and their contribution is also “indispensable thanks to their experience with *T. cruzi*.”

In spite of their apparent importance, the Latin American groups played no part in the project definition (objectives, methods or distribution of tasks).

Type 2: VIROCLIME (Impacts of Climate Change on the Transport, Fate and Risk Management of Viral Pathogens in Water)

A consortium coordinated by an English group to analyze the contamination of river water by different viruses as a result of climate change.

The project studies various European rivers and contrasts them with a tropical region (studies in the Amazon basin). The Brazilian group UFRJ was called because “it is highly respected internationally,” but mainly because “it was necessary (and timely) to have a tropical location, and they have access to the Amazon.” Its job was “to take samples according to the protocols, make the measurements – which is a delicate task – and produce the relevant reports.”

The coordinating group had already two requests from the European Commission (and two European projects) to prepare a policy report on the epidemiology of the rivers and the measurements of viral concentrations.

Type 3: EPIMIRNA (MicroRNAs in the Pathogenesis, Treatment and Prevention of Epilepsy)

A consortium coordinated by an Irish group to find treatment using microRNA (small cellular molecules) for cases in which traditional medicines are ineffective in treating epilepsy.

The Brazilian group (Campinas) was called because –according to the European coordinator- it is

very well-known internationally, with important publications in the field of epilepsy. Above all, they are very strong in genetic aspects and what we wanted in this project was to look at the genetics of a particular type of gene in epilepsy. This Brazilian group really has incredible competences in the field of the genetics of epilepsy.

On the other hand, it was very useful for the consortium to carry out testing on “other populations – genetically speaking – outside Europe [...] which is why we imagined running trials in the USA and Brazil” (the group is linked to a clinic in São Paulo, where patients are available). The genetic work outside Europe, however, was coordinated by an American researcher from Columbia University.

Type 4: AMIGA (Assessing and Monitoring the Impacts of Genetically modified plants on Agro-ecosystems)

A consortium coordinated by an Italian group to assess the environmental and economic impact of GMO crops. One of crops assessed in this project is the genetically engineered potato, a topic on which the Argentine group (INTA) has been working for several decades. The Argentine group's particular task is to work toward the validation of the control methodology in areas where GMO crops are grown on a large scale. A first validation of the methods is foreseen in the United Kingdom, but it needs to be tested in large-scale production, something which is permitted in Latin America but not in Europe.

5. Conclusions

Through our empirical analysis we have been able to observe that, whereas scientific relations are becoming more complex and Latin American research groups' participation in international consortia is on the rise, the basic structure of these relations is still organized around "subordinate integration" modalities: the activities most frequently undertaken by Latin American researchers in the research consortia's division of labor are data production, organization and systematization. The spread of technologies for sharing both materials and research results does not seem to have altered the structure of previous relationships. Meanwhile, with few exceptions, European groups tend to concentrate research design – in both theoretical and particularly methodological terms – in the ability to centralize any data generated and to produce conceptual interpretations.

Regarding the thematic orientation of the projects, data on publication by Latin American leaders participating in European Programs also show that there is a slight trend to gradually concentrate research agendas in "universal" topics rather than collaborate on the basis of "local problems." The decreasing of topics like Chagas disease versus other emerging themes like neurosciences are good examples of this tendency.

Given that almost all Latin American research groups (with the above exceptions) are invited to participate in consortia once the research design has already been established, their capacity to steer the results of their work towards the needs of or potential use in Latin America is extremely low.

Furthermore, as we pointed out in the last section, European companies, usually medium-sized enterprises, participate in almost all consortia. As we have seen, this was a general trend in FP7, since around 33% of the Cooperation Program went to private firms. Although for reasons of confidentiality we were unable to access industrial property and results-exploitation agreements, it is reasonably safe to infer that, should commercially viable results be obtained, they will be used first by companies participating in these consortia and swiftly thereafter by other European companies. The industrialization of knowledge – if it takes place – will be deployed primarily on the European continent.

The last fact may pose serious challenges to Latin American cooperation policies, insofar as they tend to stimulate the participation in international networks regardless of who and of how they can industrialize and take profit from the knowledge produced by research consortia. This fact became more evident, for example, in the case of Mexico, where more than 50% of the participation of local groups in European projects has been funded by Mexican resources (Kreimer and Levin 2013).

Let us look again at the two paradigms that form part of the European Union's explicit discourses: the "narrow" and "broad" paradigms. Based on our research, the implementation of the narrow paradigm – namely, the aim "to improve the quality, scope and critical mass of research" – has involved participation by a growing number of Latin American researchers, who provide specialized research capacities in specific thematic fields. The work conducted by LA researchers is added to the European human resources force/base. Unlike in the past, this takes place without any permanent scientific or long-term migrations; instead, Latin American groups work from their own countries and also provide the infrastructure already existing there for that purpose.

Moreover, an effect of "cultural proximity" and extended communities is produced among peers from the two regions, swelling the amount of knowledge available for potential use by Europe.

It is worth considering the "broad paradigm" – namely, the policy level and the aim to improve competitiveness, tackle global social challenges and support the least developed countries in science and technology capacity-building. Briefly, given the features of the significant development of scientific groups in the countries in question, the strengthening of these countries' capacities is undoubtedly the result of the co-operation analyzed but is not a decisive factor (as it would be for less developed countries). On the other hand, the nature of the projects considered and their dynamics clearly help to strengthen the European Union's global view due to both "observation points" of various global phenomena *in* Latin America (like climate change) and the opportunity for testing in less regulated fields, and even to the opportunity for generating local knowledge to complete a broader picture or contribute to the production of regulations in Europe.

At this point we might hypothesize the existence of a "functional interdependence" between European policies to stimulate the participation of extra-European scientists and Latin American elites: whereas the European Union effectively expands the number of researchers tackling specific questions of interest to Europe, Latin American elites find a means to formalize their international linkages, and to increase their publications and the general international visibility of their work.

In closing, we hope the (preliminary) typology proposed will provide a springboard for further analysis of the participation of Latin American groups in international consortia and, more generally, of certain modalities upon which the relations between hegemonic centers of knowledge production and semi-peripheral contexts are structured. We also hope the typology will be enriched with new empirical research that, alongside co-operation with Europe, takes account of the linkages funded by the various agencies of the United States and also by less formalized co-operation modalities in order to detect whether they follow a similar pattern to those we see here or whether any distinct modalities can be identified.

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Appendix. Sample of selected consortia involving at least one research group from Argentina, Brazil, Chile, Colombia or Mexico

Project acronym	Thematic area	Main objective	Coordinating country	Participant LA country	WP country	Company participation	Main benefit to GL	Primary motivation to include GL	GL task
BERENICE (HEALTH-1)	Health	To improve existing drugs for Chagas Disease with nanomedicine	Spain	Argentina (2 groups: Fatale, Chaben, ELEA company) Brazil (FioCruz)	NO	YES	Access to international networks	Previous experience of both groups Argentine groups have <i>patients</i> Brazilian groups have <i>in-vitro testing</i>	Clinical trials and in-vitro testing
DIVINOCELL (HEALTH-2)	Health	To develop new components for treating infections caused by gram-negative pathogens	Spain	Chile (University of Chile)	NO	YES	Significant resources	Properties of certain target compounds	Composites testing, Highly specialized technical data analysis
EPIMIRNA (HEALTH-3)	Health	To gain fresh understanding of and develop treatment for epilepsy via microRNA	Ireland	Brazil (UNICAMP)	NO	YES	Development of methods totally new to LA Publications Incorporation in international consortia	High prestige Has clinic and patients	Clinical trials with Pre-designed Protocols They collect, produce and analyze data
PARADISE (HEALTH-4)	Health	To test the findings of the targets and molecules for three parasitic diseases: Chagas' Disease, malaria and leishmaniasis	France	Brazil (4 groups: FioCruz, USP, UFRJ and UF de Viçosa)	YES (FioCruz)	YES	Financing is extremely important for FioCruz and the USP	Need to work on endemic areas Leading-edge expertise of Brazilian groups Availability of biological material (parasites)	Big Data production and processing
SETTREND (HEALTH-5)	Health	To describe new therapeutic targets for schistosomiasis	France	Brazil (4 groups: FioCruz, USP, UFRJ and UF de Viçosa)	NO	YES	Publications and some financing	Need for groups from endemic areas International expertise	Rio de Janeiro: Bioinformatics validation of targets São Paulo: Transcriptomics

AMIGA (KBBE-1)	KBBE	To use model cultures to design biosecurity protocols (assessment methodologies) for GMOs	Italy	Argentina (INTA)	NO	YES	Opening of new lines Access to international networks	The group's skills/ expertise in GMOs The possibility of conducting field tests (banned in Europe)	Monitoring: evaluating plant and insect resistance; evaluating whether resistance is exclusive to a region. Sophisticated technical work
GRAIL (KBBE-2)	KBBE	Biowaste recovery in biorefineries	Spain	Chile (Pontifical Catholic University of Valparaíso)	NO	YES	Significant resources Access to international networks	High prestige group Expertise in industrial biotechnology Use of an international benchmark technique	Innovative technical activities and development of new processes and products
TARGETFISH (KBBE-3)	KBBE	To develop new antigens and improve existing ones to design vaccines for diseases of farmed (bred) fish	Netherlands	Chile (Centro Vet, company)	NO	YES (50% of total institutions)	Interacting with global universities and companies Product placement in European market	Expertise in vaccine production	Product development
PLANTLIBRA (KBBE-4)	KBBE	To carry out risk assessment on plant-based food supplements Chemical and clinical toxicity analysis	Italy	Argentina (UBA) Brazil (USP)	NO	YES	Argentine group: resources, materials Brazilian group: international networks Both: publications	Potential to conduct less regulated clinical trials	Data collection and processing
LOWINPUTBREED (KBBE-5)	KBBE	To improve animal health in terms of the quality of European organic and "low impact" products in milk, eggs and meat	United Kingdom / Switzerland (scientific coordinator)	Brazil (UF de Viçosa)	NO	YES	Training human resources and incorporating new techniques	Different varieties of pigs, as they worked with many countries, and this added diversity to them.	Innovative technical works

(Continued)

Continued.

Project acronym	Thematic area	Main objective	Coordinating country	Participant LA country	WP country	Company participation	Main benefit to GL	Primary motivation to include GL	GL task
SWEETFUEL (KBBE-6)	KBBE	To optimize sorghum yields in semi-arid, temperate and subtropical zones, for genetic improvement and agricultural practices	France (CIRAD)	Brazil (EMBRAPA Mexico (Nuevo León)	YES (EMBRAPA)	YES	Resources, international networks	Brazil: necessary for the call and a benchmark in biofuel Mexico: potential pilot plant	Brazil: Field tests Mexico: Pilot plant
GMOS (ENV-1)	Environment	To produce data on mercury concentrations in the environment and in fluids across the world	Italy	Argentina (INIBIOMA) Brazil (USP-LBA)	NO	NO	Equipment, resources, HR training, publications	Observation points in South America	Field data collection and analysis from GMOS-established protocols
ACQWA (ENV-2)	Environment	To use models to quantify the influence of climate change (glaciers) on the determinants of mountain river flows (impact on agriculture, tourism and hydropower)	Switzerland	Argentina (ITDT, economy) Chile (2 groups: La Serena, Valdivia)	NO	YES (hydroelectrics)	La Serena and Buenos Aires: resources and international networks Valdivia: strengthening its networks	Comparing the Andes with other regions Valdivia: high prestige and great international expertise	Sample collection, data production
SPECS (ENV-3)	Environment	Conceptual structure to join up climate predictions and information services with users (from policy-makers to industry)	Spain	Brazil (INPE)	YES	YES	Human resources training Strengthening international networks Resources	High prestige group with great expertise	Innovative technical activities Data processing and analysis
VIROCLIME (ENV-4)	Environment	To use hydrological models to determine the effects of climate change on viral variation in water and to establish risk of disease	United Kingdom	Brazil (FioCruz)	NO	NO	Publications Strengthening international networks	High prestige group Access to natural resources (Rio Negro)	Innovative technical activities Data processing and analysis

THESEUS (ENV-5)	Environment	Comparative studies on "climate proof technology" in coastal areas: risk assessment and mitigation policy proposals	Italy	Mexico (UNAM)	NO	NO	Publications Access to international networks HR training	Access to local natural resources (Cancún)	Innovative technical activities
FORCE (ENV-6)	Environment	To study the causes of the change in the coral reef ecosystem To propose management tools: policies, governance frameworks, human behavior control, regulations	United Kingdom	Mexico (2 groups: UNAM and Colegio de la Frontera Sur)	NO	YES	Resources Publications	EU call requirement Access to local population and natural resources	Data collection Innovative technical activities