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### **Research Capacity Building in Nicaragua: From Partnership with Sweden to Ownership and Social Accountability**

**Léa Velho**  
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# **RESEARCH CAPACITY BUILDING IN NICARAGUA: FROM PARTNERSHIP WITH SWEDEN TO OWNERSHIP AND SOCIAL ACCOUNTABILITY**

Léa Velho  
UNU/INTECH

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## **ABSTRACT**

This paper analyses the Nicaragua-Sweden partnership to build research capacity in Nicaragua with support from SAREC (the research division of the Swedish International Development Agency). It looks at the history of this twenty-years old partnership and identifies the main outcomes and impacts, based on extensive quantitative and qualitative data collection from various sources. The main intention was to contribute to the direction of the future co-operation between Nicaragua and Sweden both at a local level and at the donor's (SAREC) level. The paper, however, attempts to go further beyond a case study by proposing and developing a general argument. This is that modalities of support to research capacity building in the South need to move from old assumptions concerning knowledge production, utilisation and the nature of development. In order to develop such argument, the paper unveils and discusses the assumptions underlying SAREC's modality of support to Nicaragua and points out their limitations. It finishes by suggesting new assumptions to be taken into account when designing modalities of support to research capacity building, as follows: i) the notion of innovation as a non-linear process involving different stakeholders and forms of knowledge; ii) the need for social relevance and accountability; iii) the idea of self-determination and local ownership.

**Keywords:** development cooperation; capacity building; research partnership; ownership.



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## INTRODUCTION

SAREC (the research division of the Swedish International Development Agency) is the main foreign donor supporting research capacity building in Nicaraguan universities, and has been so for the last 20 years. During this period SAREC has carried out a few evaluation exercises of the outcomes and impacts of such support. After 20 years, however, SAREC thought it was about time to reflect not only on the efficiency of the co-operation programme on the basis of its own objectives, but also and mainly, on the future direction that the co-operation should take in order to attain the ultimate goal of contributing to development and poverty alleviation in Nicaragua.

This study originated from such a concern on the part of SAREC. From my part, the motivation for the study was twofold: on the one hand, to be able to continue previous work on research capacity building in Nicaragua<sup>1</sup> and, on the other, to collect empirical evidence for the general argument that modalities of support from the North to research capacity building in the South rest upon particular assumptions concerning knowledge production, the role of research capacity within development, and the donor-recipient relationship. Moreover, as the argument goes, we need to examine further (and with concrete examples) such basic assumptions because there seems to be evidence that they are limited, probably mistaken, and can be partly responsible for the low impact of donor-initiated capacity building programmes on sustainable development in the south.

In accordance with the above motivations, this paper analyses the impact and outcomes as well as the conceptual basis of the co-operation model adopted by SAREC to build research capacity in Nicaraguan universities. Before that, however, an overview of the economic and social context of Nicaragua is provided, in order to set the scene where the co-operation programme takes place. This is followed by a brief history of the programme and a description of the methodological procedures adopted to investigate it. The outcomes and impact of the programme are then presented and discussed. The next section, then, contains a discussion of what I believe to be the three main assumptions underlying SAREC's modality of support and each one of them is discussed in turn. It is in this section that I develop my main (and general) argument and illustrate it with empirical evidence from the case study. The concluding section draws lessons from the case study and proposes new assumptions on which to build modalities of support to research capacity building in the south.

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<sup>1</sup> A previous work of mine on donor-initiated research capacity building in Nicaragua is reported in Bautista et al (2001).



## **THE DEVELOPMENT CONTEXT OF THE PROJECT**

Nicaragua is the poorest country in Central America, with a GNP per capita of US\$400 in 2000. Although the service sector is responsible for 44% of the GDP, the main source of foreign revenues is agriculture. The largest part of the employed population is in the service sector, and migration to urban areas has been increasing. Only 9% of the Nicaraguan territory is covered with arable land, which indicates the difficulties that the country will face to increase the share of labour force employed in the agricultural sector. The country has also a young population, high unemployment (20%) and underemployment (38%) rates, and a problematic educational system. All these factors make the country's social situation all the more dramatic. Approximately 50% of the population of 5.1 million inhabitants live in poverty and 19% live in extreme poverty (World Development Indicators, 2002).

Prior to Hurricane Mitch in the fall of 1998, Nicaragua had been pursuing a number of orthodox economic reforms and had begun to shed the legacy of a decade of civil war and economic mismanagement by posting strong annual growth numbers (around 4%). Also, the country managed to reduce its foreign debt from US\$ 11 billion in 1990 to US\$ 6 billion in 1997. This adjustment had serious social side effects. To make things worse, the storm has put the reform effort on hold and has changed economic forecasts for the foreseeable future. Nicaragua sustained approximately \$1 billion in damages as the hurricane affected some of the country's most productive agricultural lands and caused major damage to key transport routes.

As the all-important agriculture sector, which is responsible for the majority of exports, was hardest hit, it was predicted that GDP growth would slow down by at least one percentage point in 1999. Although this prediction was not confirmed and GDP actually experienced a 7.3 % growth in 1999, this was at the expenses of an explosion in trade deficit and significant foreign aid relief helped to stabilise the country. In addition, the Paris Club and other creditors offered substantial debt relief. Nevertheless, additional financing is still needed to restore the production environment to its pre-Mitch condition.

The Nicaraguan economy has, for many years, been highly dependent on foreign aid. Between 1990-2000, Nicaragua received US\$6.5 billion in foreign cooperation - roughly 35% of its GDP a year. This amount included foreign loans as well as donations, and came from 66 sources (bilateral agreements, international organisations, and non- governmental organisations). For comparative purposes, if countries are ranked by aid as a proportion of GNP, exports or government revenue, the picture for Nicaragua is particularly dramatic since it is near the top of all three lists. Data on aid as % of GNP and exports are available for 119 countries: Nicaragua

ranks second in the former, with aid as 32% of GNP; and 15<sup>th</sup> in the latter, showing aid as 66% of exports (goods and services) receipts. Information concerning aid as percentage of government revenue is available for 67 countries and Nicaragua ranks 8<sup>th</sup>, comprising 101% (World Bank, 2000).

The social and economic problems of Nicaragua are well captured by the Human Development Report where this country ranks 106 among the total 162. Besides poverty, it is particularly striking that Nicaragua (together with Swaziland) is the country with the highest internal income inequality, what shows a very unjust social structure. (HDR, 2001). Some have attributed this increase in inequality after the Sandinista government to the impact of the economic policies adopted by the Chamorro government under IMF and World Bank guidance. It is argued that liberalisation and privatisation did not create a competitive market economy, but tended to favour a small group. Thus, even if the economic policies were successful in limiting inflation, the same was not true in achieving growth in production, nor in exports or investment. As a consequence, income distribution worsened and poverty increased. Furthermore, the foreign aid that accompanied the programmes permitted this discretionary government behaviour. (Dijkstra, 1999)

Under such circumstances, it is to be expected that enrolment in higher education is something for a privileged few. Indeed, the figures show that the mean years of schooling for the population as a whole is 4.6; enrolment in primary school reaches 77% for the 7 to 13 age group and in secondary education only 33% of the 14 to 19 age group. Not more than 12% of the 20 to 24 age group is enrolled in higher education, well below the average for Latin America (20% in 1997, the last year for which comparable information is available at UNESCO, 2000).

Government commitment to education in Nicaragua, as shown by public spending, is considered to be quite low: 5.4% of GNP in 1998. The largest percentage of such amount goes to primary education (45%), 17% to secondary education and about 23% to university education (Human Development Report, 2000). Data compiled internally in Nicaragua for the year 1998 indicates that around 50,000 students were enrolled in universities which are part of CNU (National Council of Universities which comprise public and not-for-profit universities) and 30,000 in private universities. A great part of those university students have difficulties in finishing their courses: drop out rates from universities reach 63% (Plan Nacional de Educación, 2001: 19). It must also be considered that official statistics do not clearly differentiate among those who finish university studies with a degree (*graduados*) and those who finish all course work but do not get their professional degree for the lack of a final monograph, research work, report of practical work or final general examination (*egresados*).

A revealing figure of the dramatic losses during the whole education system in Nicaragua and, consequently one that must be taken into consideration when planning, analysing and evaluating research capacity building is: for each 100 students entering primary education, only 2 graduate from higher education (Plan Nacional de Educación, 2001: 19). And then those graduates struggle to find jobs and many educated Nicaraguans leave the country to look for professional opportunities elsewhere. Census data on international mobility of high skill personnel from LDCs to the United States show that, in 1990 (the last year for which data is available), there were almost 25,000 Nicaraguans with university degrees who had (officially) immigrated to the US (Carrington & Detragiache, 1998). Although some may have returned to Nicaragua with the electoral defeat of the Sandinistas and although it is not known how many of those obtained their degrees in Nicaragua or in the US, there is no denial that 25,000 graduates represent quite a loss for a country like Nicaragua.

Many graduates seek career opportunities in the non-governmental sector, and a large share of the most educated Nicaraguans are working for local and foreign NGOs. These organisations mushroomed in the last ten years. During the 1980s, the Nicaraguan government registered 114 NGOs. From 1990 to 1997, the number of new NGOs increased to 1615. Between 1990 and 1995, these NGOs channelled US\$316 million into the country. (Nicaraguan Ministry of Cooperation; 1996 and 1997)

The higher education system is constituted by 33 institutions: 4 public universities, 27 private universities and 2 higher technical centres. The Nicaraguan higher education institutions are entitled by law to receive 6% of the national budget. For a number of years, there was a heated debate between government and universities about how such percentage should be calculated: the university rectors claimed that this number should be calculated upon the expenditures, which include foreign assistance. The government, on the other hand, transferred only 6% of its revenues to the universities and colleges. In 1996, for instance, this meant a reduction of US\$ 8 million in the actual total transfer of US\$ 20 million. This despite the existence of a law passed in 1992 which prescribed that state contribution to HE should take into account both regular and extraordinary government revenues, independently of the source of such incomes (Brunner & Eduards, 1994: 17). However, during the government of Alemán, an agreement was reached between government and CNU whereby a 12% increase per year in the transfers to the universities would be made until reaching the amount prescribed by the law. It was also agreed that investments in buildings or basic infrastructure would not be included in the 6% conventional transfer, but were to be negotiated on a case by case basis between the university and government (CNU-P, 2001). In addition, HE institutions are exempt from all kinds of taxes and freed from paying utilities tariffs such as water and electricity supply, telephone and mail service (Brunner & Eduards, 1994: 16). This certainly adds significantly to public spending in

HE in Nicaragua and is frequently forgotten by those who discuss the issues related to this kind of information.

Of the 33 higher education institutions, only ten are part of CNU and receive governmental funding. The latter is allocated by CNU to each institution according to criteria that include the number of students enrolled in each institution and whether or not those students have to pay fees. For example, in 2000 the Catholic University (UCA) decided to charge fees from students and was excluded from the 12% increase in that year. In practice, resource allocation follows closely a historical pattern, which reflects power distribution among institutions (CNU-S, 2001).

The same law that established the percentage of government income that should be allocated to universities also established the latter's autonomy. This has an obvious implication on HE governance structures, which tend to follow Latin American pattern. This means that there is "formal pre-eminence of collegial bodies, elected authorities and tripartite government in the tradition of the Córdoba Reform Movement of 1918, with the participation of teachers, students and non-teaching staff" (Brunner & Eduards, 1994: 14). Understanding the significant role that internal politics can play in such a governance structure, and that it is part of the Latin American culture and is very unlikely to change substantially in the near future, is essential for policy-makers, donors and analysts of all kinds.

Government funding is basically what the public universities may count on to carry out their activities. According to the rectors, present budgetary allocations cover only their needs for teaching. Faculty and administrative staff salaries account to over 80% of universities' budget. Therefore, rectors argue that there is practically nothing left to cover research activities. This fact in itself would not mean much. Actually, it is almost the norm for universities these days, even in many advanced countries, that research activities must be funded with extramural resources, such as national research councils, research foundations and the private sector. In Nicaragua, however, such external sources do not exist. A research council (Consejo Nicaraguense de Investigación, Ciencia y Tecnología – CONICYT) has been nominally created but has yet to be institutionalised. Despite the existence of an executive secretary for the Council, there is no budgetary allocation. Also, the interview with the then secretary in the Alemán government revealed that support for research was not contemplated by the Council in the short run. In his words:

"We have two priorities: technological development through the 'proyecto semilla' [seed money project] in the fishing, milk and tourism sectors with funding from IDB [Interamerican Development Bank]; and developing a legal apparatus for IPRs [intellectual property rights]. Scientific research is something we may think of in the future, if we have time, energy and money". (CONACYT-S, 2001).

Such statement coincides with the available hard data: research and development (R&D) expenditures as % of GNP is reported as zero, the same for private sector expenditure on R&D (HDR, 2001: 54). Besides the lack of adequate funding, research activities in Nicaraguan universities face other serious problems. These institutions are teaching-oriented, and do not reward or encourage research. This means that there is no academic career based on degrees or research publications. Faculty members are civil servants, have tenure and are promoted according to seniority in the job. Most of them are full-time teachers (about 75% for the 4 public universities) and are expected to spend 12 hours teaching per week. The rest of their time they should be preparing classes, attending to student needs, doing research, extension or administrative work. However, as salaries are considered to be very low, and administrative posts are the only ones for which they can receive extra pay, some (and many of the most qualified ones) go into administration and many others take jobs outside the universities.

It has been consistently shown that government underfunding and low salaries pose considerable threats to the sustainability of institutions and, obviously, of the functions they are expected to perform (Godfrey et al, 2002). And both of such conditions are present in the HE system in Nicaragua. Without proper funding and without financial or promotion incentives associated with research activities, research is clearly not a priority.

Without funding from local sources, research efforts are dependent upon foreign funding. As the international aid for research has been shrinking, due, among other things to donors fatigue caused by the “low performance of programmes”, research activities in Nicaragua are under threat. As the Rector of one of the four public universities declared: “SAREC is the only significant and long term source of research funding for the universities. Under these circumstances, any contribution we receive is important and we have to do what we can in order to guarantee its continuity”.

It is in such a context that this paper analyses the support granted by SAREC, the research division of the Swedish International Development Agency, to the Nicaraguan universities. A brief history of this support is the objective of the next section.



## **THE PROJECT HISTORY**

SAREC has been in Nicaragua since 1981, with the main objective to strengthen research capacity in the universities and develop research that contribute to the development of the country. The main component of the Swedish cooperation policy is the training of faculty members, but SAREC has also funded studies on the status of higher education in order to assess the impact of the recent efforts to reform the university system. (Brunner & Eduards, 1994; Rojas & Dahlgren, 1998). In the last 20 years SAREC has facilitated and supported partnerships between the four public universities in Nicaragua and a number of universities in Sweden, covering a wide range of scientific fields in agriculture, engineering, medical sciences, geology and ecology.

The partnership initiated in the agricultural field with a support granted by SAREC to a project on red beans developed by the Ministry of Agriculture, which was gradually transferred to the Faculty of Agricultural Sciences and Livestock (FCCA) of the National Autonomous University of Nicaragua (UNAN). FCCA later became Universidad Nacional Agraria (UNA) in 1990 and has during all this time collaborated only with the Swedish University of Upsalla (SLU). The partners have reassessed and broadened the programme in different occasions so as to include PhD training, besides the original MSc, and other crops and disciplines, like genetics and plant breeding, plant health, forestry and animal science.

SAREC's support to Universidad Autonoma de Nicaragua-León (**UNAN-León**) started in 1983 with a programme on infectious diseases. A negotiation process initiated when the university received the visit of 3 Swedish experts on mission for SAREC. In conversations with local faculty, the mission team was presented with projects which contemplated the study of health problems affecting the local population. The projects were also discussed with local government health officials, giving rise to two lines of investigation, namely infant diarrhoea and parasitic infections. A second co-operation programme with UNAN-León began to take shape in 1986 and started activities in 1987 on occupational health. The various projects involve three Swedish institutions, namely, Umea University (UU), Karolinska Institute (KI) and the Institute for Infectious Diseases Control (SMI)

The Universidad Nacional de Ingeniería (**UNI**) groups all state-funded engineering courses in Nicaragua, two of which receive support from SAREC. In 1986, the faculty of Chemical Engineering prepared a proposal for SAREC who responded by offering an agreement between UNI and the Swedish Royal Institute of Technology (KTH) in the fields of drying technology, extraction, and crystallisation. The faculty of Electrical Engineering of UNI became involved in

1991, although training activities started only in 1993 and both KTH and Lund University were appointed as Swedish counterparts. The selected areas supported are industrial control systems, data communication and applied electronics.

SAREC's support to the Universidad Nacional Autonoma – Managua (**UNAN-Managua**) began with an agreement between the geosciences research centre (CIGEO) in 1997, and the University of Lund in Sweden, being thus the most recent programme in Nicaragua. In 1999, SAREC and UNAN-Managua decided to extend this programme to other units of the university: the Centre for Aquatic Studies (CIRA), the College of Medicine, and the College of Natural Sciences (the latter two have not initiated yet). It became a multidisciplinary environmental programme. This change was aimed at constituting multidisciplinary teams in fields like environmental toxicology and environmental chemistry.

Besides the programmes in the four public universities, a small grant is provided to the National Council of Universities (CNU) for common development projects. This has been spent on audits contracted out to PriceWaterhouse consultants, other management related activities, funding of two national research conferences open to all Nicaraguan institutions, and the publication of the CNU journal entitled *Universidad y Sociedad*.

As seen above, SAREC has supported research activities in Nicaragua for about 20 years. Since its beginning, however, the kind of activities supported for capacity building have varied. Thus, the early focus on problem solving, aiming, for example, to increase the productivity of red beans with advice from Swedish experts, was soon realised as not contributing much to building research competence within the country. This approach was replaced by research training of local faculty members at master and doctoral levels, through the “sandwich model”, in accordance with SAREC's main policy (SIDA, 1998a).

Today, SAREC has moved from almost exclusive support to individual PhD students to also fostering the development of an institutional research environment. Current forms of support are: research council (open competitive research funds); institutional support (administrative development and research management; information and communications technology and equipment; library support); and the traditional training of faculty members through MSc and PhD “sandwich” training.

All such forms of support were investigated in the course of this study. Information was collected from various sources and using different means. First of all, official documents were provided by SAREC, ranging from policy documents to annual reports produced by the coordinators of the programmes in Nicaragua, to all evaluation reports on the Nicaragua co-operation programmes. Then a site visit and interviews were carried out with the Swedish partners in the various universities. Swedish partners are, without exception, *supervisors* of the

Nicaraguan faculty members who are enrolled in graduate programmes in Swedish universities. Therefore, partnership in this case is to be understood as a relationship between a supervisor, who is a professor/researcher in a Swedish institution and a faculty member of a Nicaraguan university who, at the same time, is a graduate student.

Before I went to field work in Nicaragua, local co-ordinators of the partnership in each university prepared a detailed report of the programmes' history, achievements (quantitative and qualitative), problems, and links developed with other organisations, social groups and sectors. Workshops were held in the 4 universities with the participation of university personnel linked and not linked to the programme, as well as external persons such as government officials, professionals in the private sector, representatives from various NGOs. These workshops resulted in 14 group reports dealing with the same questions. Finally, individual interviews were conducted with a variety of stakeholders: ambassador of Sweden to Nicaragua, SIDA representative in Nicaragua, rectors of the 4 universities, executive secretary of CNU, SAREC programme co-ordinator in each university, faculty members linked and not linked to SAREC programmes, undergraduate students, and different sorts of people from government, private sector and NGOs. The analysis which follows is, therefore, based on the information obtained from the above sources.



## OUTCOMES AND IMPACT OF THE PARTNERSHIP

The information contained in the documents revealed from the beginning that, despite the different types of instruments that SAREC is currently supporting in Nicaraguan universities – institutional support of various kinds, research council and faculty training- the greatest part of the financial resources are still concentrated on giving faculty members of Nicaraguan universities the opportunity to pursue Masters, Licentiate and PhD degrees in Sweden, adopting the “sandwich model”. This is illustrated by the figures in Table 1.

**Table 1. Distribution of SAREC’s Financial Support to Nicaraguan Universities (2001)**

	Total Budget (10 <sup>3</sup> SEK)	Institutional support (%)	research council (%)	faculty training (%)
UNAM-León	6 700	14	5	86
UNAM-Managua	4 300	25	7	75
UNI	4 600	11	6	89
UNA	4 000	7.5	7.5	85

Source: Asdi (2001)

Given the centrality of training of university faculty members in the research support provided by SAREC, it is important to discuss in detail the various dimensions of its conception, implementation and impact. Has the partnership in the various universities been able to build research capacity? Has it being able to create a critical mass of competent researchers? The next section tries to answer these questions.

### **Building research capacity by Training Masters and PhDs**

As defined by SAREC, “research capacity involves the ability to independently: identify and define researchable problem areas; plan and implement research tasks; participate in and utilise international research; evaluate, select and adapt research findings; publish, disseminate and apply research findings; offer attractive research environments; the capacity to reproduce its own capacity”. (SIDA 1998a: 23)

Let’s start by looking at the number of faculty members which have been trained in the framework of the SAREC programme in each university. The data contained in Table 2 show a considerable effort made by the universities and by SAREC in order to create local research

capacity in the last 20 years. With all this effort, 3 PhDs were produced in the 4 universities and a considerable number of Masters and Licentiate<sup>2</sup> – 32 and 9, respectively (41 in total).

**Table 2. Number of Faculty Members of the 4 Nicaraguan Public Universities who obtained graduate degrees or are enrolled in graduate studies with SAREC support**

	MSc/Lic Granted		PhD Granted		MSc/Lic Students		PhD Stud.	
	Female	Male	Female	Male	Female	Male	Female	Male
<b>UNA</b>	2	20	-	2	-	-	1	9
<b>UNAN-León</b>	6	7	1	-	2	3	3	6
<b>UNI</b>	2	4	-	-	3	6	-	4
<b>UNAN-Man</b>	-	-	-	-	-	-	2	3
<b>TOTAL</b>	10	31	1	2	5	9	6	22

Source: Synthesis documents provided by the universities for the evaluation mission

The number of male and female faculty members involved in the programme is very different indeed: 22 female and 64 males (almost 1:3). This is not a new finding. It has been widely recognised by SAREC and also by Nicaraguan universities that something had to be done in this respect. Most international development agencies have made explicit commitments to promote gender equity through their development programmes. Some commitments are more explicit than other, some are more recent than others. Those of the Scandinavian and Dutch bilateral agencies are probably the most explicit, the most ambitious, and the most longstanding. (Leach, 2000: 334). Even so, SAREC has, apparently, not taken any action to remedy this.

The reasons frequently put forward for the gender difference in participation in the programme are that fewer female than male teachers have command of the English language which is a requirement for enrolling in the programme. If this is true (and it was repeated over and over during the interviews), it is hard to understand why measures have not been taken yet – suggestions like selecting the best candidates, irrespective of their knowledge of English, and then supporting their training in English were also common during the interviews.

Another common explanation is that women, given their family responsibilities are less mobile than men and, therefore cannot go abroad to study and leave the family behind. I will argue later

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<sup>2</sup> Licentiate is a post-graduate degree in between a MSc and a PhD, granted by Swedish universities. As the Licentiate is internationally recognised as equivalent to a Master degree, it is here considered as such.

on this paper that sandwich training is particularly hard on women and that it is more likely that a woman will face a full doctorate abroad (taking the children with her) than travelling back and forth and leaving the kids behind. Gender differences historically accumulated will not go away without higher investment and pro-active attitudes. Therefore, I strongly believe that the universities, together with SAREC, has to put forward a serious assessment of what is holding down the female faculty members, with an eye to a plan in the short and medium term to remedy this unacceptable gender differences in terms of opportunities and achievements.

Looking at Table 2 one can ask: is it possible to judge exclusively by the sheer numbers whether research capacity, as defined by SAREC, has been built? Of course, not. For this kind of analysis we need to refer to other quantitative data, but mostly to qualitative information collected in the course of the interviews.

If we take at face value the list of abilities that define research capacity according to SIDA's policy document as presented above, we may have to conclude that research capacity has not been achieved yet. Actually, it is very unlikely that, the greatest majority of the faculty members involved in the SAREC programmes are, at this stage, able to accomplish, *independently*, the tasks listed in that definition of research capacity. Some of such abilities have just started to build up, the most evident, the ability to participate in international research and to publish.

Nicaraguan researchers have published a some papers in national and international journals. A closer look at the publication lists can reveal some further aspects of the relation between partners.

For example, the list of publications of the occupational health programme at UNAN-León shows 14 items which may be classified in the following categories: 3 Licentiate Theses and 11 publications of articles in specialised refereed journals. All 11 articles were written jointly by Nicaraguan and Swedish researchers. This, of course, is the tendency for most experimental science and could well indicate that real partnerships is taking place in this programme. More significant, however, is that all publications were derived from thesis and dissertation work.

The programme of Infectious diseases of UNAN-León show similar behaviour. Of the 31 publications listed, 24 were articles published in international refereed journals and all of them were co-authored by a Swedish researcher and most often, more than one.

The picture for UNI is very different. In the case of the Faculty of Electrical Engineering, no papers have been published in refereed journals so far and all presentations in conferences were authored exclusively by Nicaraguans. For the Faculty of Chemical Engineering, again, few papers appeared in refereed journals (2 out of 32 publications listed) both of them co-authored

by the Swedish supervisor. In addition, all 5 papers published in international conference proceedings were co-authored by the only supervisor of 8 current students.

UNA, as we can see in Table 2, had 22 Faculty members trained at the MSc level, of which 17 remain in the institution and publish very little by whatever means we analyse it. UNA's publication list reveals Master degree holders produced 16 articles which except for 1, were published in in-house series (either at SLU or UNA) and therefore, have not been submitted to the normal selection criteria of refereed academic journals. The exception was one publication in *Tropical Agriculture*, which has a Swedish researcher as first author. The PhD holder have just begun to show some scientific production in refereed journals (1 in *Agronomy Journal*, 1 in *Plant Disease* and 5 others submitted, plus 1 chapter in a FAO book).

The programme at UNAN-Managua is yet very recent and all reports list only a few presentations in national or regional conferences.

What the information presented above shows is that the partnership between Nicaragua and Sweden with support from SAREC has, in the last 20 years, been able to qualify a few faculty members (more males than females) who have acquired some ability to carry out research and publish their results in recognised journals.

Does this mean that the co-operation has been successful? In order to reply to this question it is necessary to look at the objectives of the co-operation as well as at the conceptual basis on which it rests.

## **CONCEPTUAL ASSUMPTIONS OF THE SAREC MODEL OF CO-OPERATION**

I believe it is reasonable to argue that underlying SAREC's choice to support academic research and training in Nicaragua one can find three main assumptions, as follows:

**A1.** Research capacity in local universities will, by some kind of implicit and not-stated mechanism, sooner or later, contribute to the development of Nicaragua.

**A2.** The preferred (because believed to be the most effective) way to obtain academic research capacity is through the formal Master and Doctoral training of faculty members.

**A3.** The Master and Doctoral training should be provided by Swedish universities which are involved as collaborating partners in the programmes, and take the format of a "sandwich" training.

In my view, these assumptions should not be taken for granted and, therefore, must be reflected upon. In what follows I will tackle each of such assumptions in turn.

### **A1. Research capacity will contribute to development *OR* The discourses of North-South Co-operation: has anything changed (in practice) in the last 50 years?**

The main argument here is that the model adopted by specific research co-operation programmes rests upon particular concepts of science, and consequently, upon particular ways to understand knowledge production and the means whereby such knowledge feeds into technological innovation or social change and, consequently, contributes to development.

Since the creation of the government institutional apparatus for science and technology policy after World War II, different "paradigms" have dominated the practice and were adopted both in advanced and developing countries<sup>3</sup>. From this time up to the beginning of the 80's, science operated under what might be described as the "Vannevar Bush social contract". Under this, governments provided funds for scientific research in the general expectation that, sooner or later, it would revert in technological development. Science was believed to be socially and historically neutral and the starting point for technological development. This view, based on

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<sup>3</sup> A number of authors have examined the evolution of the conceptual basis, assumptions or paradigms underlying science and technology policies in different countries and proposed a periodisation. Despite some differences derived from the objectives of the exercises, a number of features are common to most of them. The periodisation I use here draws freely from many of such authors and highlights a few caricatured features about which there is wide agreement. See, for example: Ruivo (1994); Bozeman (1994); Rothwell & Dodgson (1992); Rip (1994); Sagasti (1989); Dagnino & Thomas (1999).

the linear model of innovation which was dominant in the period, reflected on the ways research was evaluated (by reference to internal quality criteria as defined by researchers only), on the policy tools designed (mostly to foster the “best” scientific research) and also on the model of North-South cooperation most widely adopted. Thus, this is the problem-solving phase of the North-South collaboration when it was believed that developing countries did not need to develop their own research capacities<sup>4</sup>.

The underlying logic was that, being science historically and socially neutral, then research results produced in the advanced countries could be just transferred to the developing countries and directly applied to the solution of the latter’s technical problems. Coherently with such logic, and for the countries under the sway of Western liberal capitalism, modernisation theory, which advanced the thesis of unilinear development leading to industrialisation, provided the justification for funding assistance and Northern intervention in the South. Such intervention, at this time, took predominantly the form of extending technical assistance and the granting of a few scholarships. The latter derived from donors’ realisation of the dearth of an organised and critical mass of intellectuals or academics with the training to analyse scientific needs for development. Since it was believed that the absence of this group hampered the internal development of their societies, donors also provided training fellowships that enabled students in the natural sciences, social sciences and the humanities in the South to pursue research or graduate degrees in Northern universities.<sup>5</sup>

During the 80’s, however, the neutrality of science began to be questioned and government resources even in the richest countries could not cope with the increasing financial demands from “good” quality science. This implied that choices had to be made to provide financial support to some research projects and not to others, despite all having similar scientific merit. The solution was to identify priority areas for research, which seemed to be linked to demands from society. This notwithstanding, the prevailing view of technological innovation was still a linear one, only that innovation was then seen as pulled by the market, instead of pushed by science. Since market demand was important to give direction to science, it was natural to expect that the “product-mix” of science in each country would be different, responding to local demands. Actually, bibliometric studies which mushroomed in the 70’s and 80’s gave considerable support to this idea and showed for example, that the former Soviet Union, the US and the European countries gave different emphasis to the various research fields. Such

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<sup>4</sup> The periodisation for the evolution of development cooperation rationale follows broadly Shinn et al (1997) and Gaillard (1998).

<sup>5</sup> The Ford Foundation, Rockefeller Foundation, Fulbright-Hays Programme and Colombo Plan, for instance, provided funds for a critical mass of future professionals from developing societies to pursue training in particular disciplines.

bibliometric evidence was assumed to reflect the different needs and demands from society in those countries.

The focus of North-South cooperation in this period changed accordingly and reflected the general prevailing paradigm and its constitutive concepts. The priority of Northern donors became to invest on the development of research capacities in the South in the fields that were believed to be most needed to solve local problems. And since markets in the developing countries, apparently, did not make explicit demands on local science, donors believed they should be the ones to identify the economic sectors and the scientific disciplines which needed to be developed. In line with this approach was the massive support to agriculture granted by all donors to the South.

This was a considerable shift in perspective and one that SAREC was fast to embark on. For example, in a joint brochure of their achievements in development cooperation, SAREC and International Development Research Centre of Canada (IDRC) claim that while the ideology and practice of technology transfer assume that all technologies emanate from the North, they are to some extent dependent on the cultures and environments that create them. In reality, both agencies recognised that a great deal of innovation takes place in the developing world and thus, to build local research capacity to support innovation is essential. (SAREC & IDRC, 1991: 5-7). Nonetheless, the process leading to innovation was still believed to be a linear one whereby researchers identify society's needs, translate the latter to researchable problems, work scientifically on them, disseminate the results to some kind of intermediary institution (a firm, a government institute, an extension organisation, etc) which would, then, make use of the results by incorporating them into an innovation. Only after this process the innovation would be transferred to the final user, or to "society".

During the 90's, evidence began to accumulate that the linearity of innovation was illusory. Studies in technology history, for example, provided clear evidence of the complex interaction between various social actors in the configuration of a new technology. Thus, it became clear that it would be advisable, from a policy perspective, to foster the links between the various knowledge-producers and users (academy/industry/government/civil society organisations of all kinds) – stimulating the most varied types of alliances. Moreover, it was also realised that a distinction between knowledge producers and knowledge users was not always so clear-cut. Studies went so far as to suggest that society impinges not only on technological development and on the direction of scientific research but also on the contents of science itself. Despite considerable debate about the latter, the contours of a new paradigm of science and technology policy which paid attention to the preferences and participation of other social actors beyond the research community began to be delineated.

The whole process of technological innovation and of its impact on economic growth and quality of life also began to be more clearly understood. Evidence accumulated that the countries which have been able to develop a coherent national system of innovation have fared better in economic and social terms<sup>6</sup>.

Such a system of innovation is seen as made up of actors – firms, government laboratories, universities, professional associations, grassroots organisations, etc. However, the most important element in the system is not so much the strength of the individual actors as the links between them. A national system of innovation made up of actors which are not particularly strong, but where the links between them are well developed, may operate more effectively (in term of learning and in generating innovations) than another system in which one or other actor is strong but the links between them are weak. Thus, according to this conception, it is not sufficient to make the research system strong if it has weak or no links with other parts of the system.

This also reflected in the discourse of North-South cooperation: participatory methods were introduced in the hope to identify the needs of local research “users” and to foster linkages between knowledge producers and knowledge users. The concept of capacity was expanded so as to include not only development of individual skills but also “the conditions that must be in place, for example, knowledge, competence, and effective and development-oriented organisations and institutional frameworks, in order to make development possible”. (SIDA, 2000: 21).

SIDA’s discourse of North-South co-operation has completely adopted the new paradigm of the systemic approach to capacity development. After enumerating the various forms by which SIDA has supported the knowledge and human resources development in the South, a recent policy document points out that: “What is lacking is a greater focus on systems and a systems approach. Human resources development is always needed, is always requested, and can always be justified. [...] Rapid technical developments justify *reviewing present forms of support for educational programmes*” (SIDA, 2000: 23, emphasis added).

The document also argues that North-South institutional cooperation has been the predominant method to human resource development adopted by SAREC. However, in such type of arrangement, experience shows that what often happens is that different parties learn from each other in their own specialist fields. “This method does not often lead to development of organisations or to changes in the institutional framework which stipulates what the organisation may do.” (SIDA, 2000: 23) More efficient support should contribute to develop

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<sup>6</sup> The system of innovation approach has a huge literature these days. As reference to the early and best known conceptions of the idea, see Freeman (1988, 1995), Lundvall (1992) and Nelson

and strengthen institutions and organisational structures as well as to foster a *process of interactions between those institutions and organisations in the public domain, in the private sector and in civil society* (SIDA, 2000: 9, emphasis added).

Having said this, the point I want to make is that SAREC's support to Nicaragua still adopts a linear model of innovation framework. Although, in *discourse*, SIDA and SAREC have adopted the systemic approach, the *practice* of the co-operation is still shaped according to the paradigm of the 80's. It is the adoption of such a linear model that explains, in part, the privilege it grants to research capacity building in terms of Master and Doctoral training in the four Nicaraguan universities. As this conception goes, society (the market, the civil organisations) will draw on the research results produced by the universities if and when necessary – all the universities have to do is to identify the needs of society and make sure that research results will be published and disseminated to those that may need them (this despite the fact that the evaluation mechanisms of the collaborations tend to value more the scientific publications than the communications with the lay public). The linear model suggests that the dynamics go from a source (new knowledge, new options) through its elaboration to eventual adoption, diffusion and effects on society. This is why the preference in this model is, first, to strengthen the research system.

Evidence of such underlying linearity in the conception of SAREC's support to Nicaragua can be found in a number of programme documents. As early as 1992, Olsson had already pointed this out as problematic and argued strongly in favour of a change towards a systemic and institutional approach. (Olsson, 1992)

In spite of this, the dominance of the linear conception from research capacity to the solution of the problems of development is still noteworthy. For example, in the Terms of Reference for this study, it is asked the evaluation mission to: “describe the main areas of current research and the relevance of current research to the development of the country in the light of the aim to reduce poverty” (ToR 2001-06-12: 4(7)). Research in the context of Nicaragua-Sweden partnership is always, as explained earlier, work for Master or PhD dissertation. None of such dissertations was designed according to society's needs or to reduce poverty. Dissertation topics were picked from general consensus problem areas. Thus, if the country has a high infant mortality rate by diarrhoea, a thesis on this topic is assumed to be socially relevant. It may well be that infant diarrhoea does not need any research to be solved – what it needs is other kinds of public policy, public services and income distribution. Similarly, if beans are the main staple food, and coffee the main export crop, it is assumed that research on beans or coffee, by definition, will be relevant. Not only the relevance is assumed, but also the impact of the results

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(1993).

on poverty alleviation. This, obviously, is quite a long shot to expect from a piece of research carried out for a MSc or PhD degree.

The assumption of a direct and relevant relation between the *topic* of a graduate research piece and society's problems is shared by the Nicaraguan side of the partnership. Reports of the discussion groups carried out in workshops organised in the four universities pointed out that one of the strong points of the cooperation with Sweden was that *the research projects* were relevant for Nicaraguan society. The same reports, on the other hand, listed, as a negative aspect of the cooperation, the fact that "there is no dissemination of research results to users" and "research results have not been useful to provide answer to [practical] problems".

Similarly, faculty members involved in the graduate training stated in the interviews that they believed that their dissertation research had the potential to contribute to the solution of some specific problem. At the same time, they stated that they need to put greater effort in disseminating their findings to the productive sector.

The above evidence reveals the assumption of a linear process from the choice of a research topic, to the production of research results which are then disseminated to and adopted by users. The reason why the research results are not used is not because the research project is not relevant, but because the results do not reach the users – it is, therefore, a problem of *communication*, to be solved by the extension services.

However, what the system of innovation framework proposes in this new paradigm is a non-separation between basic and applied (problem-solving) research, between knowledge producers and knowledge users. It has been clearly demonstrated in the most different contexts, including in Nicaragua "that applied research can go hand in hand with more fundamental research and also with community-oriented services that are research-based and can create new opportunities for the training of students through learning by doing" (Brunner & Eduards 1994: 72), even in the absence of favourable institutional conditions. A good example are some research projects at UNAN-León supported by Sarec which have had some impact on health policy, being responsible for basic epidemiological information (EM-DR 2001).

The lack of impact of UNA's research activity on agricultural production has been emphasised by outsiders. An interviewee who has long-standing close relations with UNA but is not part of the faculty there, said:

"UNA never had so many qualified researchers as it does now. But, I ask: in 20 years of collaboration with Sweden, what has been the impact of the UNA-Sweden collaboration on Nicaraguan agriculture/husbandry sector? I can say as a close witness that this impact is very, very limited, to say the least. There are no links between UNA and the production sectors."

The same concern is expressed in the discourse of the Swedish Ambassador and of the SIDA officer in Nicaragua. In an interview to the evaluation team the former declared:

“A major concern of donors in Nicaragua is the role of the local universities to national development. The universities need to be more open to society’s needs.” (SWA, 2001).

Despite this concern, it is not very clear why it is that SIDA, according to their officer in Nicaragua, is starting to fund a project to increase productivity in coffee and milk with the Ministry of Agriculture and Forestry of Nicaragua and is “thinking to involve National Agricultural University (UNA) to see if UNA will open itself more to the public...”(SWS, 2001).

Why was it not the case that UNA was invited from the beginning, as one of stakeholders, to participate in the discussion and design of the project and also be involved in its implementation? To this question he replied “because they are too busy doing their dissertation research work”. (SWS, 2001)

A concern with the rationale for the Swedish support in Nicaragua according to which “a basic science platform is needed *before* it is possible to build up a viable applied research activity”(Hasselgren & Nilsson ,1990:43, as quoted by Brunner & Eduards, 1994: 71) has already been expressed earlier. Brunner & Eduards argue, in a similar way as I do here, that this model “phase I basic research and then phase II development research” is not appropriate (p.71). I totally agree with them that “the assumption that having some basic research will in itself reflect on better teaching programmes, will ensure appropriate education and training manpower, will give access to competent people in order to properly assess imported technologies and will enhance a country’s capability to define, evaluate and plan for research in general, is not to be taken for granted” (Brunner & Eduards 1994:71-72).

Although many times it is not possible to have the institutional conditions right, such as an innovation policy, or a conducive environment for innovation (such as economic investment, the right institutions in place), even then it is possible to support research capacity building which is not locked inside the university context and which tries to build links with other segments of society.

At this point, it is legitimate to ask: By saying that the impact of the Swedish collaboration on solving development problems in Nicaragua (such as reducing poverty, or contributing to agricultural production) has been very limited, am I implying that the co-operation programme has *not* been successful?

My reply is **no**. The programme has been, as far as I can see, *successful if assessed against the objectives it had*, that is, *building academic research capacity and taking into account the*

*country context* (as outlined before). There is no doubt that the programme was *able to build some academic research capacity*. The achievements of the programme in this respect are:

- masters and doctors were trained, as shown in Table 2. More revealing than absolute numbers, for some universities, is the proportion of Masters and Doctors trained under the Sarec programme in relation to the total. This is the case of UNA where 25% of the teachers who are MSc holders obtained their degree in the UNA-SLU co-operation programme. And, of the existing 5 PhDs in the university, 2 were trained with Sarec support (9 PhDs are supposed to finish by 2003, which will be a considerable increase). For the older and largest universities like UNAN-Leon the impact of Sarec programme in the formal training of researchers has not been pronounced, but still relevant – 8% of the existing MSc degree holders.
- It may be argued that those enrolled in PhD programme take too long to obtain their degrees and this is used many times as evidence that the co-operation has not been successful. It seems reasonable to argue that degree completion time is not as long as many think, *relative* to other countries. A recent study for the US found that the average time for PhD degrees in that country was around 7 years (Baird, 1990). The equivalent figure for the UK is 5 years for fully-dedicated and fully-funded students (OST, 1998). For Sweden a recent study found that, in the social sciences from 1969 to 1996, “only one out of five doctoral students obtained a PhD, and it took this one, more than a decade to do so” (Frischer & Larsson, 2000: 132). Even with the much stricter rules established by the National Agency for Higher Education in 1999 concerning admission to graduate studies in Sweden, it is expected that part-time doctoral students will take 8 years to complete the programme and obtain the degree (RRV, 2001: 32).
- Taking the case of Nicaragua, for UNAN-León, for example, the average time for doctoral degree was 10 years for part-time students. Part time students in the social sciences in the US take an average of 13 years to complete (Baird, 1990). For UNA faculty members, the average time for PhD so far has been 5 years. The time taken by the Nicaraguans to obtain their degree seem reasonable particularly given the circumstances under which the training takes place, such as: part time dedication to the graduate studies; moving countries every once in a while; leaving the family behind; having to build local laboratories, import equipment and put them to work before doing the research; having no financial incentive to obtain a degree; doing research in an isolated way and not being part of a research team; having communication problems with a far away supervisor.
- the faculty members involved in the Sarec programme have been able to train a significant number of undergraduate students in research, if it is taken into consideration that there are no incentives for undergraduates to do research. UNA involved about 186 undergraduates in activities related to Sarec projects (UNA-SR, 2001). UNI produced 65 undergraduate

dissertations directly supervised by faculty members who are part of the Sarec co-operation.

- Research laboratories have been built and equipped in the 4 universities as result of Sarec's support. Most of them, however, are not planned labs, but a collection of equipment, not connected among themselves, bought for the various dissertation work, put together in the same space. A few were established with longer term concern, such as the laboratory for infectious disease at UNAN-León, which is considered to be "the best in Nicaragua"(EM-DR, 2001: 4).
- Another important result of the Sarec programme in terms of stimulating a research environment at the universities was the establishment of research councils – competitive funds to support small projects, participation in conferences, organisation of scientific meetings, which are open to the whole university community and not only to those faculty members who are directly involved in the programmes. Despite functioning with very modest funds, it already shows some impact in terms of increasing internal appreciation for research activities.
- A significant (yet unplanned) impact of the Sarec programme, and one that is considered by some as a loss, is the fact that some of the faculty members trained under the framework of the programmes left the universities. This is the case of 5 MSc from UNA: except for one who passed away, 4 currently work for the Ministry of Agriculture and are important links of government to UNA. A similar situation took place at UNI: 5 faculty members who had already obtained their Licentiate degrees left the university to the private sector to companies such as Café Soluble (instant coffee), Esso (oil refinery), and sugar cane factories. "In these companies, former Sarec students (Lic. degree) hold significant posts, as for example Director of production/process quality. In the case of Café Soluble, the two former Sarec students have performed quite well, improving product quality, achieving ISO 9000 certificate, as well as increasing the export market for the company's products. The Café Soluble has also received undergraduate students as trainees in several occasions" (TA-DR 2001).
- The programme has also contributed to capacity building of the Swedish counterparts: over 20 master students from Sweden did their dissertation in Nicaragua from 1994 to 2001.
- Nicaraguan faculty members enrolled in the programme have not only carried research , but have also published (as discussed above).
- Libraries and access to computer facilities have improved, and so did research management (purchase and import of equipment) as result of Sarec support

The results presented above were said, written and emphasised in the reports of all groups in the workshops, may be inferred from the documents and were explicitly mentioned in the course of the interviews. I have no doubt in stating that SAREC's modality of support has been very successful in doing what it meant to do: build research capacity, more specifically individual research capacity in terms of qualifying university faculty members and to give them conditions to carry out the work needed for their degrees. In the course of doing that, other colleagues and undergraduate students occasionally benefited from the resources allocated.

Therefore, if Sarec believes that by creating this kind of research capacity it will, sooner or later, contribute to the development of Nicaragua, then the future co-operation needs only to be adjusted so as to solve a few practical problems (such as establish a more competitive and efficient mechanism for selecting new PhD candidates; solve the gender bias; provide incentives to early completion of degree) and continue in the same track.

But, on the other hand, *if SAREC wants the collaboration to have a direct impact on development, the future collaboration will have to be devised in a very different way and not concentrate only on Master and PhD training and on building a research environment at the Nicaraguan universities.*

Various suggestions in this direction appeared during the interviews. For example, in a joint conversation with faculty members from UNA, it was said:

“We now have our house in order. We want to contribute more to solve real problems of Nicaragua. We need to build closer contact with farmers associations. We are planning to do this using participatory methods. We would like SAREC to support this activity”.

“It is not only farmers and agricultural producers and ONGs. I think that our links are very weak with policy-makers as well. We need to have a more pro-active role in terms of interacting with government and thus participate in macro-level decisions and priority setting concerning agriculture. But we have no experience in doing that – we have to learn how to foster the necessary links.” (UNA-RP, 2001)

In a similar vein, a consistent suggestion coming from researchers both in Sweden and Nicaragua was the need to make SIDA's and SAREC's actions in Nicaragua more coherent and complementary so that the research system could be integrated to development programmes and actions. It is quite clear to all involved that the amount of SAREC's financial support to the universities is not sufficient to fund a much broader programme involving other institutional actors. However, SIDA could be brought in the process and, together with SAREC, provide a

support devised in terms of innovation systems, fostering links among actors towards an envisaged end. A specific suggestion in this direction came from experienced Swedish participants in the collaboration, one of whom expressed himself in the following words:

“Actions funded by SIDA in Nicaragua are of a social and economic order. The ones supported by SAREC are scientific. They not always go in the same direction. SIDA should work together with SAREC. For example, SIDA could tackle the complex issue of funding projects to improve technical conditions of the hospital in León. Without a considerable improvement in infrastructure routine in the hospital (register of cases, database collection, laboratory sample collection, standardisation of diagnostic kits, etc), even the quality of the research work performed by the university (UNAM-León) suffers. The point is that the hospital is not part of the university, but still the university depends on the hospital for sample collection to be used in research. Because the hospital is not part of the university, it does not qualify for training under the collaboration (besides they have no interest in PhDs). But, SIDA could support the hospital” (SMI/IMPI, 2001).

What is being suggested, then, is a systemic approach to research and hospital routines and that this could be jointly supported by SIDA and SAREC. Actually, the need to integrate SAREC’s and SIDA’s activities have been stressed in the reports of all evaluation missions to Nicaragua from the early 90’s. Brunner & Eduards (1994: 78), for example, call attention to the need to coordinate SAREC’s programme at UNAN-León with SIDA’s support to the public health structure. It also points out the desirability of strengthening links with the Ministry of Health and with PAHO (Panamerican Health Organisation) and UNICEF, adopting a systemic approach. In the same year, a specific evaluation mission to UNAN-León stressed that “collaboration with SIDA is needed on several issues” and goes on to explain where and by which means (Allebeck & Nieto, 1994: 42). It is thus difficult to understand why steps have not been taken in this direction.

I believe that a shift in the collaboration in the lines suggested above, that is, using a systemic approach is needed, if impact on development (poverty alleviation) is desired. Let us move now to discuss the second assumption which, as my analysis goes, lies on the conceptual basis of the support of SAREC to the universities in Nicaragua.

## **A2. Formal Graduate Training of Faculty Members**

As said before, SAREC's modality of support not only focuses on research capacity building in the academic context, but also gives a privileged attention to the training of faculty members in formal Masters and Doctoral programmes.

The emphasis on research training was recommended by an independent review of SAREC that took place in 1985 (SIDA, 1998a: 28). At this time, as described above, the linear model of innovation was still quite dominant. Therefore, it is to be expected that a recommendation to build research capacity through formal research training would be seen as a necessary pre-condition to technological and social change and, consequently, to help find solutions to development problems. It is reasonable to assume that the rationale underlying SAREC's decision is that researchers with MSc and PhD degrees are a pre-requisite to academic research capacity in the universities and "have greater competence to identify, analyse and find solutions to the country's development problems" (TOR 2001-06-12).

Such assumption is very widely held, particularly among the members of the research communities. It is quite common to read statements such as "research training at doctoral level is the longest, most important and comprehensive form of training given to young graduates from developing countries to prepare them for careers and future leadership in research [...] such trainees provide the indigenous expertise and competence that all countries need for their national self-reliance" (Nchinda, 2002: 1705).

I want to argue that such an emphasis on formal doctoral training is misplaced for a number of reasons.

First of all, there is no evidence that the number of Masters and Doctors and the number of papers published in refereed journals are in any way related either to economic growth or to human development index, as far as the developing countries are concerned. Brazil is a good example: the country has invested considerably in building and strengthening a scientific system since the 1960s. The graduate schools in Brazilian universities are looked at with a mix of envy and pride by all Latin American country neighbours: over 6,000 PhDs and 20,000 MSc degrees are granted every year in the country (Capes, 2002)<sup>7</sup>. The scientific contribution of the country to mainstream science jumped from .4% in 1986 to over 1% in 1999<sup>8</sup> (Science and Engineering Indicators, 2002). Yet, a recent analysis of the Brazilian experience in using knowledge for development concluded that "Brazil's potential in the global knowledge economy remains

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<sup>7</sup> The US, which has by far the strongest graduate system produced about 41,000 PhDs in 1999, of which 30% are foreigners (Science and Engineering Indicators 2002, Appendix table 2-26).

<sup>8</sup> Science and Engineering Indicators 2002, Appendix table 5-43. Latin America is referred to as the region which had the largest increase in scientific publication in the period from 1986 to 1999, due to the Brazilian and Mexican contribution.

largely unrealised. Its competitive position is weak and the country is definitely on the fragile side of the knowledge divide” (OECD, 2001b: 7). In order to cross the knowledge divide, it is predicated that Brazil has to strengthen the country’s innovation system, particularly “by establishing effective links with industry and ensuring that results are turned into commercially viable products” (Ibidem: 8).

Moreover, in terms of human development, Brazil is very far behind: the country shows only a modest 73<sup>rd</sup> place among 162 countries, after poorer countries like Costa Rica, Colombia and Venezuela (HDR, 2001). This illustrates that a strong scientific system does not lead automatically to innovation or social development.

A second reason why I believe that the emphasis on formal graduate training is misplaced is because PhD research is not the most efficient manner to stimulate team work in the conditions of developing countries. And, as I have argued forcefully above, if research is to be linked to innovation and social change, it must be a collective endeavour. In the advanced countries, PhD candidates usually work under the leadership of a professor, many times funded by the private sector, who has a broad conception of a problem, who promotes weekly or so discussion groups and make students see the connections among their work. The Nicaraguan graduate students in Sweden, however, carry out their research in Nicaragua, in the conditions of their own university, each one being the only person working in the topic. In addition, they have little opportunity to acquire tacit knowledge<sup>9</sup>.

Tacit knowledge is transferred and acquired by physically participating in the demonstration and instruction of those who possess this knowledge. “This stresses the importance of a close interpersonal relationship in [doctoral] supervision” (Frischer & Larsson 2000: 151). This kind of relationship was considered very weak by many of the Nicaraguan faculty members interviewed.

Thirdly, it is well known that not every research topic is adequate for a PhD dissertation. During a collective interview with professors in a Swedish university, I asked how research problems are chosen for dissertation work, and the reply was:

“the areas of research and the candidates are proposed by Nicaraguans. However, we in Sweden have a final word accepting or not the proposed candidates and the topics. We have had no problems with the proposed candidates but we do have

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<sup>9</sup> Scientific knowledge is created by a combination of codified (explicit) knowledge and tacit knowledge (Polanyi 1958). Codified knowledge is contained and transmitted by books, articles, manuals, reports, etc. Tacit knowledge, on the other hand is experience, personal skills, attitudes and scientific craftsmanship (Collins 1995). The idea is that to obtain tacit knowledge, one has to work close to those who possess the knowledge, since it is not transmittable through codified sources

changed proposed research topics when we believed that it would not be feasible or interesting for dissertation research”.

Although there is no doubt that relevant research has to be of acceptable scientific standards, not all relevant research attends the scientific requirements for a PhD. Thus, by supporting graduate training, SAREC is, in a way, leading Nicaragua faculty members to select their research topics more by scientific than by social and economic relevance criteria.

And finally, while PhD degrees serve a clear function in the advanced countries, this is not the case in Nicaragua. In the former, a PhD is an important “market” indicator and an entrance requirement for positions in academic settings and some industrial R&D labs. Basically, people invest in a PhD in the ACs to be able to pursue a career that would be unattainable otherwise. Therefore, PhD candidate’s incentives depend mainly on his career potential after graduating. (Mangematin, 2000).

However, in the case of Nicaragua, the PhD title has no functionality: PhD candidates are already tenured university teachers and they are not promoted for obtaining the degree. Therefore, while they may have high incentives to enter a PhD programme (personal pleasure of learning, opportunity to travel, enhance their visibility), they have no incentive to finish it, since incentives for PhD completion are based on students’ expectations to get a more interesting job.

It should be noted that the need for reform of doctoral education has been widely discussed in the advanced countries<sup>10</sup>. Controversies involve the relevance of doctoral training to the world outside higher education, the demand for high quality scientists and engineers across the economy, and the attractiveness of the academic workplace for the new generation.

To summarise the argument, although research capacity is essential for Nicaraguan universities and also for contributing to development, it does not seem to be the case that PhD and MSc training is *the only* or *the most appropriate* and *efficient* way to achieve it. It just seems not appropriate to try to replicate in a poor developing country which is open to new structures and ways to organise research according to its own needs, a model of graduate education and degree achievement that is presently under questioning even in the North.

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<sup>10</sup> In the US, in 1995, the Committee on Science, Engineering, and Public Policy (COSEPUP) recommended broadening the education of doctoral students beyond research training. Because more than one-half of all doctoral recipients obtain non-academic employment, COSEPUP recommended that doctoral students acquire, besides an education in the broad fundamentals of their field, also familiarity with several subfields, the ability to communicate complex ideas to non-specialists, and the ability to work well in teams (Science and Engineering Indicators 2002). Similar questions have been raised in the European countries since the beginning of the 90’s up to the present (Blume, 1991).

Other forms of research training should be devised and implemented with SAREC support. As a matter of fact, there are examples in Nicaragua of institutions that are pursuing innovative paths to train researchers, namely, NITLAPAN and ADESO, two action-research NGOs. An exchange of ideas and practices with such institutions could be valuable for the universities. Actually, a close association and partnership between UNA and NITLAPAN had been strongly recommended by SAREC evaluation mission in 1994 and was implemented (Brunner & Eduards, 1994: 79).

In short, if SAREC really wants to support research capacity building that is of high quality *AND* at the same time is relevant for the country, there needs to be a participatory discussion centred on this topic involving all stakeholders. It is very important to let the Nicaraguans themselves decide what kind of training they need and want and do not decide beforehand that what SAREC will support is Master and PhD training *only*.

### **A.3 Graduate Degrees to be taken in Sweden and the sandwich model**

The third assumption underlying the modality adopted by SAREC, is that Master and PhD training is to take the form of a sandwich programme with the degree being granted by a Swedish university. One motivation for this choice seems to be to involve Swedish researchers in collaboration with Nicaraguans and thus foster links between the two communities and build capacities in both sides. Other motivation, specifically as it relates to the sandwich model, is to avoid brain drain. As the argument goes, if the students do the research in their home country, it is more likely that they will work on a topic of relevance to the country. Moreover, they do not lose contact with their reality and are more prepared to face the research conditions they will encounter when returning home after getting the degree. An additional, and important, point is the contribution to foster an institutional research environment because laboratories are built in the Southern institution for the researchers doing their thesis work, what contributes to build a research environment (SIDA 1998a: 29)<sup>11</sup>.

Despite well-intentioned (and despite relative success), the above motivations are not sufficient to justify one and only model and to exclude other options. Why this is so?

Let's look first at the mandatory degree to be granted by a Swedish institution. It is clear that, in many cases, the Swedish institution is not very interested in the partnership. A few Swedish supervisors were quite explicit in the interviews that they do not like to go to Nicaragua (which

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<sup>11</sup> The practice of sandwich doctoral training for Southern researchers became very popular among donors, being used by the Danish and British development cooperation agencies (DANIDA and DFID, respectively), as well as by the World Health Organisation (Nchida, 2002).

is part of the deal), and that such collaboration is very low in their priority list. In another specific research field, all eight graduate students are supervised by the same and only Swedish faculty member. This person is a very dedicated supervisor, who pays significant attention to the students, travelling to Nicaragua once a year. However, there was consensus among all 8 Nicaraguan students working under his supervision that he is the *only* faculty member with whom the students have contact when they are in Sweden. They do not attend seminars or participate in discussion groups at the Swedish university and do not take part in any other activity, they do not have Swedish colleagues and do not interact with Swedish students by any means. According to the students, when they are in Sweden they only take courses and do activities related to their thesis and, what they found more distressing, course work many times is difficult because some are cancelled at the last hour and there is no offer of discipline in English that is of interest to them. Of course, in such circumstances, some of the students have no pleasure (even academic pleasure) in spending time in Sweden and, consequently, it is obvious that their research suffers and the time to complete the degree becomes longer.

The two cases above are illustrations of the fact that the bilateral cooperation (with the idea of fostering links between research communities in Nicaragua and in Sweden) can be merely ritualistic – each partner is following his own paths and interests and what holds them together is the requirement of the degree to be granted by a Swedish institution put forward by SAREC and, obviously, the financial support. It must be borne in mind that even if the partnership does not work so well, still a considerable proportion of the budget stays in Sweden, as shown in Table 3. There it can be seen that even if some Swedish universities put so little effort in the collaboration with their Nicaraguan counterparts, they still keep more than 50% of the budget destined to research aid in Nicaragua.

**Table 3. Percentage of the SAREC’s financial support given to the Nicaraguan Universities (the remaining part up to 100 stays with the partner universities in Sweden)<sup>12</sup>**

	1998	1999	2000	2001
UNAM-LEON	49	45	44	40
UNI	39	49	50	40
UNA	47	36	42	41

Source: Asdi 2001 (Appendix II)

<sup>12</sup> Comparative data for UNAN-Managua was not available in the documents provided by SAREC.

With the amount of financial resources paid to Swedish universities to train Nicaraguan researchers, a much larger number of faculty members could be trained inside Latin America, visiting professors could be hired with a greater multiplying effect for the universities, collaborative research projects of all kinds could be funded.

Wishes concerning more autonomy to choose where to go for graduate studies were expressed by almost all interviewees in the four universities. And, actually, prior analysis of the cooperation programme had already argued that it makes much more sense, for a number of research fields, to establish training programmes for Nicaraguan researchers within Latin America (Brunner & Edwards, 1994: 78).

Concerning the division of financial resources between Nicaraguan and Swedish universities, it should be noted that SIDA has a Development Research Council which funds development relevant research projects on a competitive basis for Swedish researchers only. Development research is also invited by other SIDA departments to Swedish universities, making up 10% of SIDA's research funding budget. Comparatively, research co-operation with poor countries accounts to 28% of total SIDA's research funding budget. (SIDA, 1998a: 33)

The point I want to make here is that Swedish researchers do have special funding opportunities to build their development research capabilities as well as their international co-operation capabilities. It just does not seem appropriate that Swedish universities keep over 50% of the resources destined to build research capacity in the very few countries that qualify for this kind of support. While in 1999 only 8 countries had active bilateral research programmes (Eritrea, Ethiopia, Mozambique, Tanzania, Zimbabwe, Sri Lanka, Vietnam and Nicaragua) supported by SIDA, more than 130 institutions (departments) at Swedish universities and colleges were participating in programmes of bilateral research co-operation. (SIDA, 1998a: 33).

### **The Sandwich model: should it be the “universal model”?**

When SAREC decided to support research training (as recommended by the independent review of 1985), the option for what became known as the “sandwich model”. “This model requires doctoral students to be active in their home institutions and only spend short periods of time abroad. The training takes place within the framework of a project carried out at the home institution”.(SIDA, 1998a: 29)

The reasons put forward by SAREC to institutionalise the model are: it avoids brain drain and, since the research training is based at home, it is combined with support for research facilities, thus helping to build local institutional capability in terms of laboratories, equipment, library support, etc. It is also believed that this would help to foster a local research environment and thus help to pave the way to develop local research training programmes at the local universities.

Among the interviewees both in Sweden and in Nicaragua, the general feeling is that the advantages listed above do hold in many cases, but they are not to be taken for granted and they must be weighted against the limitations of the sandwich model.

First, to obtain the PhD degree in the sandwich model takes longer, by definition. The reason is that it is clearly a *part-time* enrolment for the PhD, what is many times forgotten by evaluators as well as by donors. Even if the researchers in their period in the home institutions have a lower teaching load, they still teach, attend department meetings, supervise undergraduate students, and have institutional duties. Actually, some of them even have high administrative positions such as head of departments, deans of faculties and even rector. Although it would be desirable that those enrolled in the programme would not take such positions, given the highly politicised culture of Nicaraguan universities, having research committed people in such positions is beneficial for a research environment. Therefore, this is a reality of Nicaraguan universities which cannot be ignored or circumvented by the creation of rules.

Second, the sandwich model requires students to have periods of adaptation back and forth: even if one is getting back home, months away ask for catching up time in domestic and university matters.

Third, being away from the family is not easy for those who go and even worse for those who stay, requiring considerable negotiation within the family and emotional effort from all involved. Also, it tends to be easier for men to leave than for women, as the low percentage of women participating in the programmes indicates (UNA is a particular case in point where only 2 of the 22 MSc degrees were received by women and only 1 of the 12 PhD candidates is a woman).

Fourth, the sandwich programme makes much more difficult for the students to work as part of a team while in Sweden and to participate fully in the academic life there. It also restricts the experience and opportunity to acquire tacit knowledge, as discussed above.

Thus, even if the long period for PhD completion is normally attributed to weaknesses of the Nicaraguan university system – to excessive teaching load, lack of financial incentive to those who have a PhD, difficulty to purchase equipment, university politics, etc- without denying that those factors do play a role, I believe that the reasons for the delay should be looked for in the intrinsic limitations of the logic and functioning of the sandwich model.

In view of that, I believe that it is for the Nicaraguan participants to decide if, even with the limitations pointed out above, they still believe the sandwich model to be a good model in particular occasions. But, probably, this sandwich model *does not* seem suitable as a *model for all occasions*.

## **OWNERSHIP, ASYMETRY AND RELATION WITH THE SWEDISH COUNTERPART**

Ownership of the programme is, clearly, SAREC's. This agency, as donor and facilitator of the partnership, devised the main features of the bilateral cooperation and the Nicaraguan universities together with the Swedish institutions have implemented it according to the requirements.

Evidence of this was abundant, as the statements below illustrates:

“there was no discussed process to select the research lines to be pursued by the cooperation. They were picked up somewhat randomly and increased by inertia. Last year we presented SAREC a new project, a product of a long internal process which involved all university teachers. This project was a change in current cooperation research lines and SAREC's reaction was: No new line, no new student. The reason stated was that cooperation money for Nicaragua had decreased. What we wanted with the new project was a qualitative jump to our projects, giving them internal coherence, abandoning the theme of infant diarrhoea which we have been studying in the last 20 years and look at problems which are really important for the local population such as “dengue hemorragico” – SAREC did not let us change the project, nor add new students, nor change the Swedish counterpart.”

“SIDA is not very consistent in its ideas and often does not know how to interfere in the projects. Sometimes they think that they can even select the Nicaraguans who will participate in the project; other times they fail to perform what is to be their main role, namely provide basic information, in due time, of how much money we will get and when this money will arrive. Without this information we cannot plan anything.”

The situation in Nicaragua is such that SAREC is the only long-term research donor. In these circumstances, Nicaraguans have not much bargaining power to negotiate with a donor offering a more or less closed package whose core component is PhD and Master sandwich training for faculty members with at least 50% of resources staying in Sweden.

In addition, as the core of the collaboration between Nicaragua Sweden takes place in the form of Master and PhD training, it is, by definition, asymmetrical. There can be no symmetry in

student/supervisor relation: student is the one who learns from the most experienced, namely, the supervisor.

Under the two conditions above, it is very difficult to conceive the possibility that the relations between Nicaraguan and Swedish universities will be symmetrical to any extent in the short term. Thus, even if most of the interviewees insisted on the fact that the relations were horizontal, there is considerable evidence to the contrary.

For example, most of interviewees in Sweden referred to the Nicaraguans in terms of “many lack sufficient theoretical background”, “their English is not good”, “they are hard working”, “they have evolved from sample collectors to researchers”, “they have docile attitudes that are difficult to interpret”, “if x were a Swedish student I would already had abandoned him”. These are not collegial statements.

In some universities even the place where the students will live when in Sweden is decided and paid for by the Swedish counterparts, with resources destined to the Nicaraguan students. And many times the living arrangements made are far from satisfactory for the Nicaraguans. Those who told me this were very reluctant and uneasy to say so, as if they were “betraying” the trust of their Swedish counterparts. This is certainly not a symmetrical feeling.

A number of interviewees and group discussions called for more autonomy for selecting tutors and for budget distribution (EM-DR, 2001: 4-7). Recent studies have shown that heavy dependence on donor’s support, with related underfunding by local government, have considerable impact on programme ownership (Godfrey et al 2001). In the context of the project as described here, , it is not surprising that Nicaraguan partners negotiate from a weak position and are willing to accept whatever is offered. Repeating what one of the rectors said to the evaluation team:

“SAREC is the only significant source of research funding.  
Under these circumstances, any contribution we receive is important and we have to do what we can in order to guarantee its continuity”

From the above, it seems that Nicaraguans have to face asymmetry at two levels: in relation to the Swedish counterparts who, by being supervisors are, naturally, in an authoritative position; and in relation to SAREC who, by being the only long-term research supporting agency, negotiates from a strong position and has an almost unlimited decision power.

It is well known that local ownership is not something to be passively awaited. It needs to be nurtured by local project participants and university officials, as well as by donors. One way whereby donors may nurture ownership by Southern partners is by actively and directly involving them in evaluation exercises. It is important that the Southern partners are the ones

identifying their “success and failure stories”, helping to understand what works, why and how, and ensuring that policies and further planning could build upon the experiences gained. This is important to allow Southern partners to “acquire not only a positive spirit about what [they] have been able to achieve, but also the improved capacity to analyse policies and practices, with a view to consciously promoting an ‘endogenous’ approach to problem-solving – as opposed to the entrenched ‘exogenous’ approach long since promoted by the donor agencies” (Hoppers, 2001: 467).



## CONCLUDING REMARKS

The analysis here indicated that the 20 years old initiative of SAREC to build research capacity in Nicaragua have produced a number of qualified researchers and have had some impact in terms of creating a research environment in the local public universities. This is, in a way, remarkable in light of the social, economic and political difficulties faced by the country in the last 20 years. In circumstances where most of the institutions do not work properly, the fact that the universities were able, not only to perform their functions but also to achieve the results presented here is very laudable. In this respect, the role of SAREC as donor and facilitator was of major importance.

Having said that, it is important to stress that part of the achievements of the Nicaragua-Sweden partnership, as well as of the continuing functioning of the universities, must be attributed to the fact that the universities receive, by law, a fixed proportion of 6% of government expenditures, plus additional funding for major buildings and reconstruction, plus exemption of all government taxes and utilities tariffs. This, of course, is in detriment of other spheres of public spending. In a country where 50% of the population live below the poverty line; where only 70% of those in the relevant age group are enrolled in primary education, 33% in secondary education and 12% in higher education, the commitment of a fixed budget to universities is a demonstration of the priority given to higher education (and research, since most teachers are full-time and expected to do research) in the country. This is true even if the budget of the universities is not enough to pay compatible salaries and to fund research activities as desired.

In view of the effort that is asked from society to fund the local universities, it is expected that the latter will contribute to local development by training qualified human resources and producing relevant knowledge. In order to do these, it is necessary to devise different strategies or modalities of support to research capacity based on different assumptions than it has been done thus far.

Thus, instead of the current assumption of knowledge being produced at the universities and linearly transferred to be used by the productive sector (as we discussed in A1. Research capacity in local universities will, by some kind of implicit and not-stated mechanism, sooner or later, contribute to the development of Nicaragua), capacity building needs to be based on a *systemic approach* to innovation and social change. This implies the recognition of the existence of multiple knowledge sites and views the scientific practices lodged in universities as one of the many sites that are brought together in the search of solutions to particular problems.

Consequently, interactions and links between the various social actors are essential to knowledge production.

In view of the above, the old assumption that the most effective (and only) way to build research capacity is through the formal Master and Doctoral training (as discussed in A2 and A3) must also be revised. I have presented a number of reasons for this and have sufficient grounds to suggest that new training procedures need to be developed and tried out, forms that make the best use of new types of learning. The latter imply the need to incorporate indigenous knowledge and the experience accumulated in developing countries when training local human resources.

Finally, there is need to change the assumption that a partnership between donor and recipient countries is, inherently, fair and beneficial for the latter. It is necessary to recognise that in donor-recipient relations, asymmetry is inevitable. SAREC ultimately controls the funds and where they are disbursed. The recipient's final recourse is the exit option, as we have seen in the discussion of findings above. Nevertheless, it is possible to level the playing field by applying some measures, such as: i) have a board of local stakeholders to negotiate, monitor and evaluate systematically the programme; ii) be more concerned with social accountability than with scientific accountability; iii) strengthen the voice of the recipient country in negotiating the programme; iv) support the national budgets of recipient country. The idea here is to create conditions that recipient countries could move from partnership to ownership over donor funds and determine themselves what type of training, advice, etc, they need to build their capacities.

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