

Independent External Review

# The Role of CIAT in the Pan-Africa Bean Research Alliance

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*Acronyms*

ASARECA: Association for Strengthening Agricultural Research in Eastern and Central Africa

BMGF: Bill and Melinda Gates Foundation

CCARDESA: Centre for Coordination of Agricultural Research and Development for Southern Africa

CIAT: International Center for Tropical Agriculture

DFATD: Department of Foreign Affairs, Trade and Development, Canada

DRC: Democratic Republic of Congo

EABREN: East Africa Bean Research Network

ECABREN: East and Central Africa Bean Research Network

FARA: Forum for Agricultural Research in Africa

HDDS: Household Dietary Diversity Score

ICM: Integrated Crop Management

IP: Intellectual Property

IPG: International Public Goods

KALRO: Kenya Agricultural and Livestock Research Organization

MAS: Marker Assisted Selection

NARO: National Agricultural Research Laboratories (Uganda)

PABRA: Pan-Africa Bean Research Alliance

RAB: Rwanda Agriculture Board

SABRN: Southern Africa Bean Research Network

SDC: Swiss Agency for Development and Cooperation

WECABREN: West and Central Africa Bean Research Network

WECARD: West and Central Africa Council for Agricultural Research and Development

## Executive summary

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PABRA is a consortium of three African bean networks, WECABREN, SABRN and ECABREN, respectively covering West and Central, southern, and East and Central Africa, which together represent the main 30 African bean-growing nations. The CIAT Regional Director for Africa coordinates PABRA with a team of 26 staff distributed among CIAT offices in Kenya, Tanzania, Uganda and Malawi. The foundations for PABRA were set in 1985 when CIAT began researching beans in Rwanda, Burundi and DRC. SABRN and EABREN were established in 1987, ECABREN came into existence in 1995 and in 1996 ECABREN and SABRN joined forces with CIAT to create PABRA. WECABREN became a partner in 2009 and PABRA then assumed a truly pan-Africa status. PABRA aims to improve nutrition, health, and food security, facilitate resilient production systems and address market challenges to contribute sustainably to better livelihoods and incomes for smallholder families in eastern, Central, southern and West Africa. Since 1996 PABRA members have released over 450 new bean varieties, which are grown by about eight million farmers.

The purpose of this center-commissioned review was to establish the extent to which CIAT assumes a leading role in PABRA, recognizing that CIAT has been involved in bean research in Africa for 30 years and that its role has evolved as PABRA and associated partnerships have evolved. PABRA is complex because of its reach, covering activities related to bean breeding and research, ICM, nutrition, seed systems, gender and markets in diverse geographic regions. It involves representatives from 30 NARS, it includes numerous national, regional and sub-regional partners, universities and NGOs, and has a wide and constantly changing range of donors. In total PABRA has over 350 partners throughout Africa and beyond. PABRA is a partnership and the essence of CIAT's role in PABRA is that of a facilitator, assisting with priority setting, planning and division of responsibilities. In addition, CIAT has provided bean germplasm and technical assistance throughout the duration of PABRA. It is a trusted partner that provides support without assuming all the responsibilities for managing PABRA.

The review was conducted according to a series of key evaluation questions, which, in the form of semi-structured interviews, were put to, *inter alia*, CIAT staff, PABRA representatives, key partners, private sector representatives, a major donor representative and research scientists in Rwanda, Uganda and Kenya. The PABRA Steering Committee meeting for the three component PABRA networks, held in Kigali between the 1<sup>st</sup> and 8<sup>th</sup> of February 2015, represented a good opportunity to interact with numerous individuals involved in PABRA.

CIAT is highly respected in Africa for its work on beans, particularly through PABRA, and is thus capable of significant leverage regarding funding and support. The evolving complexity of PABRA, particularly in terms of funding and partnerships, currently requires, to an even greater degree than in the past, a key partner that can oversee the entire enterprise and facilitate an enabling environment. CIAT's role as a supplier of germplasm, breeding expertise and technical backstopping goes unquestioned, but arguably its most important role is as a catalyst – the funds and resources it attracts stimulate additional support for national programs that they might not otherwise have access to.

Although CIAT contributes directly to strategic vision, innovation and division of responsibilities in PABRA, it also actively encourages these processes among PABRA members through expediting communication, in the full knowledge that national and regional priorities differ. Moreover, despite being actively involved in PABRA, CIAT is able to maintain a critical overview of it, ensuring that complementarities in activities and funding are recognized in the interest of greater efficiency within and among partner organizations.

Regarding value-for-money, the 2014–2019 budget indicates that the funds from PABRA's two major donors (DFATD and SDC), totaling about USD 20,000,000 will catalyze an approximately equal sum from the NARS partners in PABRA and attract a further USD 50,000,000 in kind from partners. Thus the contributions from DFATD and SDC represent 'seed money', which generates substantial additional funds. It was estimated that over 17 years a USD 16 million investment generated USD 200 million in benefits. In addition, CIAT makes a very valuable contribution to capacity development. Over ten years CIAT contributed to the training of 4,000 national research partners, over 100 postgraduates and 23,000 farmers. CIAT also manages the ever increasing communication needs on behalf of PABRA.

The Steering Committee meetings, which this year included the three networks together, represented an example of planning, priority-setting, decision-making and budgeting carried out in a completely transparent, self-regulatory, democratic and inclusive manner. CIAT's role was to facilitate the process and provide assistance when needed,

and not to direct the process. Ownership of the process remained firmly with the PABRA representatives on behalf of their national agencies.

PABRA represents a model for how a continent-wide crop network can function for the benefit of smallholder farmers. The efficiency and effectiveness of PABRA are demonstrated by the potential for communication and cooperation in bean research and allied areas among 30 African nations. PABRA is becoming increasingly relevant with changes in African agriculture and market development across the continent. CIAT has played a key role in this, and its contributions to bean research and breeding have remained relevant during 30 years. PABRA would unlikely be sustainable without the contributions of CIAT, especially given that CIAT ensures that less well endowed members of the PABRA community, in terms of national capacities and resource bases, are not overlooked. In this respect, during the next five-year framework, Burundi and Zimbabwe will be the focus of PABRA activities.

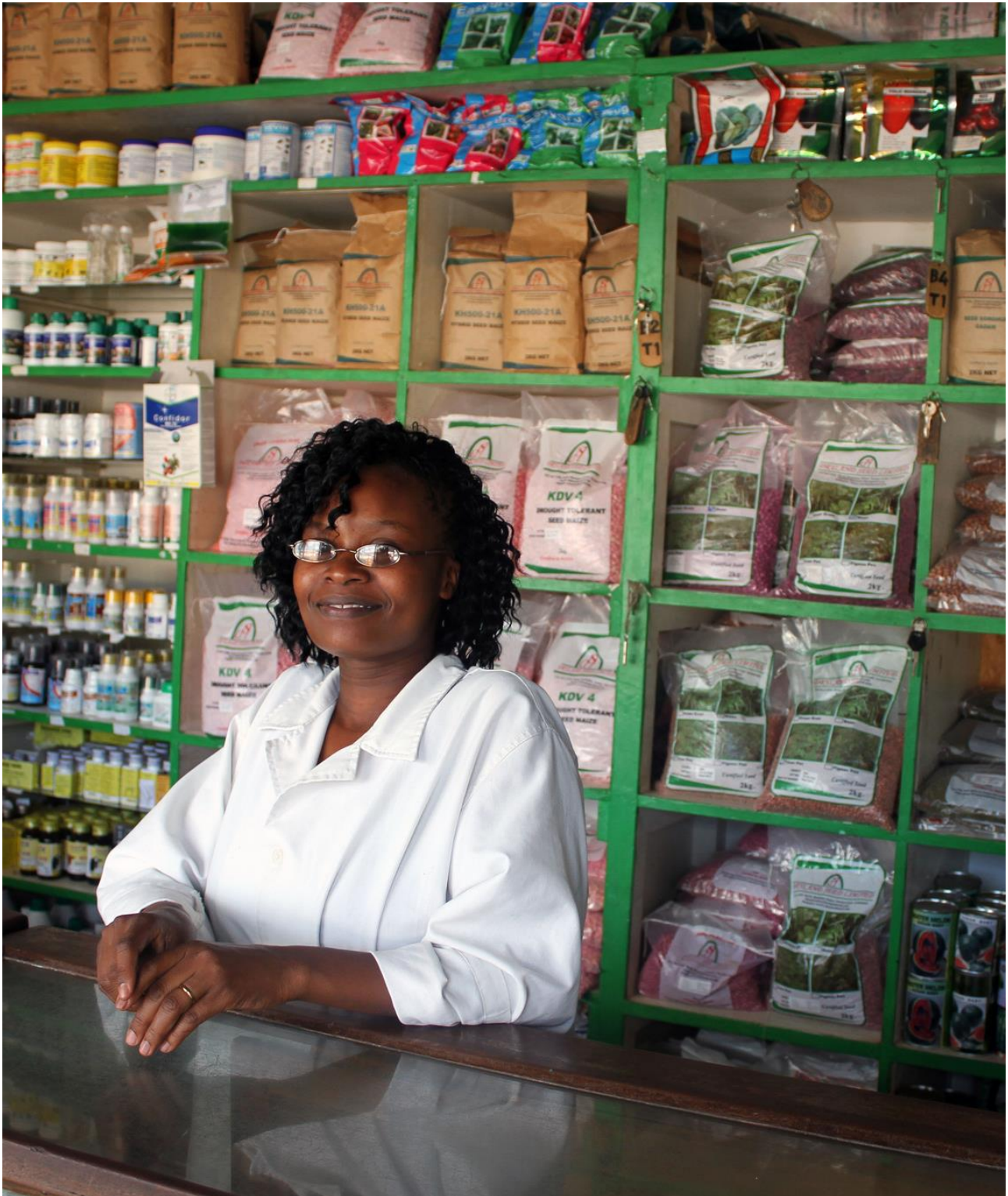
CIAT's involvement in PABRA has contributed to the quality of product in terms of adapted germplasm and processes, particularly how to coordinate a large and complex network of partners. However, the model represented by PABRA derives from a long evolution and could not be duplicated rapidly for another crop or situation. PABRA has got to where it is through continuous adaptive management that has responded to changes in the environment in its broadest sense.

There are several areas in which CIAT might continue to make a valid contribution to PABRA in the future as beans become increasingly important in the countries of the PABRA network, and as the challenges and opportunities for beans have to be tackled in an increasingly integrated manner. Niche markets are developing within the bean value chain, there is growing demand for ICM support and nutrition is an area where beans are set to make increasing impact. There is also the possibility that PABRA might become, as suggested, a pan-Africa legume alliance, addressing much more than bean technologies, innovations and management practices. In all these areas CIAT is set to be a valued partner.



## Preamble

This report presents the results of a CIAT commissioned external (independent) review of its role in PABRA. It is not a review of PABRA and as such does not address PABRA activities in depth, except where there is a need to comment on CIAT's involvement. Neither does this report represent a full-fledged evaluation of 30 years of CIAT's bean work in Africa. This report focuses on CIAT's capacity to meet current and evolving requirements of PABRA.



## Introduction

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PABRA comprises three African bean networks, WECABREN, SABRN and ECABREN, respectively covering West and Central, southern, and East and Central Africa, together representing the 30 major bean-growing African nations. A CIAT staff member (currently Jean-Claude Rubyogo, previously Matthew Abang), under the CIAT Regional Director for Africa (Robin Buruchara), coordinates PABRA with a team of 25 staff distributed among CIAT offices in Kenya, Tanzania, Uganda (main office) and Malawi. PABRA is complex, covering activities related to bean breeding and research, ICM, nutrition, seed systems, gender and markets. It includes representatives from national research systems, numerous national, regional and sub-regional partners, universities and NGOs, and has a wide and constantly changing range of donors. PABRA has over 350 partners and CIAT's role in PABRA is essentially that of a facilitator, assisting with priority setting, planning and allocation of responsibilities. In addition, CIAT has provided bean germplasm and technical assistance throughout the duration of PABRA. Since 1996 PABRA members have released over 450 new bean varieties grown by about eight million farmers.

CIAT began researching beans in Rwanda, Burundi and DRC in 1985. In 1987 SABRN and EABREN were established, ECABREN came into existence in 1995 and in 1996 ECABREN and SABRN united with CIAT to become PABRA. WECABREN became a partner in 2009 and PABRA assumed a truly pan-Africa status. PABRA aims to improve nutrition, health, and food security, facilitate resilient production systems and address market challenges to contribute sustainably to better livelihoods and incomes for smallholder families in eastern, Central, southern and West Africa.

The purpose of this review was to assess the leadership role of CIAT in the current CIAT/PABRA partnership and CIAT's capacity to meet evolving PABRA needs, particularly with respect to the institutional arrangement, decision-making and clarity on processes and roles. Full details are provided in the ToR given in Annex 1.

During the 30 years that CIAT has been involved in bean research in Africa, and since the CIAT/PABRA relationship was established in 1996, there have been substantial changes in agriculture in Africa, and these have not been uniform or consistent, requiring in-depth knowledge of the constantly changing physical and socio-economic environment. Regarding beans research, production and marketing, there are enormous differences across the continent. Some countries export fresh green beans grown under irrigation, others can beans for urban markets, while many support bush beans, and climbing beans more recently, for rural income generation and improved nutrition. Biofortified beans with high iron and zinc contents are also available and are being promoted. Growing conditions differ enormously over Africa in terms of soil, rainfall and its distribution and pest and disease incidence. The current 30 members of PABRA represent the major bean growing nations of Africa and consequently also represent all the potentials and constraints for bean growing throughout the continent.

CIAT support in Africa has evolved with evolving circumstances and CIAT has been able to provide the much needed assistance during this time, not only in terms of adapted germplasm and support to breeding, but also in terms of facilitation, funding, operational assistance and management in its broadest terms. While being a 'player' CIAT has also filled the role of 'referee'. The key question is, 'Could PABRA continue to function effectively without CIAT involvement?' This review explores this question in terms of continuing *relevance* of CIAT's contribution to PABRA, the *effectiveness* and *efficiency* of CIAT in the CIAT/PABRA relationship, the *impact* of the partnership and its *sustainability* into the future, and the *quality* of the CIAT/PABRA products.



## Review process

The review was conducted according to a series of key evaluation questions, some of which are provided in Annex 2 in the form of an evaluation matrix. The matrix does not designate all the questions asked of each individual interviewed, but represents the approach to establishing views, and confirming them, on the current and future role of CIAT in PABRA. In most cases questions were posed in the form of semi-structured interviews. During the course of the Steering Committee meetings held in Kigali between the 1<sup>st</sup> and 8<sup>th</sup> of February 2015 and subsequent visits to Uganda and Kenya I was able to talk with CIAT staff, PABRA representatives from various countries, key partners, private sector representatives, a major donor representative (Swiss Confederation), research scientists and national agricultural research service personnel. In Rwanda I spoke with representatives of the RAB, in Uganda with directors and scientists of NARO in Kampala and at Kawanda, and staff of KALRO in Nairobi.

I decided early in the process that formal surveys were unlikely to yield useful results in that there would need to be follow-up, which would be time-consuming and expensive. Furthermore, because of its reach, it would inevitably be difficult to identify individuals and organizations involved with beans that are not associated in some way with PABRA. A less formal approach to getting information was therefore adopted – this review followed a qualitative rather than a quantitative approach.

Much of the information included in this report derives from the personal views of a large number of individuals and I have not referenced the discussions. I also promised anonymity in the case that responses were sensitive. Therefore, the views expressed in this report represent my synthesis of information got from numerous sources. In addition to interviews, a large number of reports, communications and presentations were reviewed. I have not put forward any opinions that were not suggested or corroborated by others during the review process – the report therefore remains external and independent.



## Review findings

For convenience these are discussed under relevance, effectiveness, efficiency, impact, sustainability and quality of product.

### Relevance

CIAT has been providing bean researchers in Africa with technical and logistical support for approximately 30 years, during which time the importance of beans to national economies has changed and the science associated with bean research and breeding has also changed. The importance of beans in African agriculture, and thereby the relevance of CIAT's contributions, is indicated by the data included in Table 1.

Table 1. Dry bean data for Africa, and for Rwanda, from 2003–2013.

	Africa		Rwanda	
	2003	2013	2003	2013
Area (ha)	5147784	7694513	356519	480012
Yield (kg/ha)	590	632	672	913
Total production (t)	3037297	4860480	239394	438236
Seed production (t)	237439	340089	9580	14400

THE DATA ARE FROM FAOSTAT.FAO.ORG. OVER THE PERIOD 2003–2013 GREEN BEAN PRODUCTION IN WEST AFRICA NEARLY DOUBLED, FROM 54000 T TO 90000 T – INDICATING THE GROWING IMPORTANCE OF GREEN BEANS AS AN EXPORT EARNER.

The work of CIAT has been widely recognized and appreciated, particularly among the three networks that make up PABRA, but also among national agencies, NGOs, private companies and sub-regional bodies such as ASARECA, FARA, WECARD and CCARDESA. Such recognition and appreciation would not be apparent had not the CIAT support, through technical assistance, capacity development and management remained relevant throughout this period. Molecular approaches to bean breeding, awareness of the increasing importance of markets and the bean value chain (indicated by the bean corridor work – production, distribution and consumption routes), a move towards promotion of biofortified beans and better nutrition, and championing of climbing beans are among the numerous inputs that indicate that CIAT's contribution to PABRA remains relevant. Current relevance is also, naturally, indicated by the consistent demand for bean germplasm from the CIAT genebank and breeding program.

The PABRA Steering Committee meeting represented a unique opportunity for bean scientists from 30 countries (two representatives were absent, therefore there were only 28 countries represented) to meet and think collectively about the challenges and opportunities for bean production across Africa. The value of such a meeting should not be underestimated – it was a learning experience for all for all those who attended, including for CIAT staff from regional offices. Aspects of strategy, planning and budgeting were discussed formally and informally, and CIAT staff played key roles in supporting and contributing to the discussions without necessarily leading them. Innovations have come directly from CIAT, such as the pre-cooked (par-boiled) beans project, but innovation is also generated through meeting people and swapping ideas and experiences, and the Steering Committee meeting was an ideal forum for this.

An additional indicator of relevance is that CIAT has managed to maintain its major funders, SDC and DFATD, and many additional funding agencies, interested in PABRA since inception by remaining up-to-date and consolidating its comparative advantages in leveraging funds, maintaining international partnerships and delivering its products. CIAT has no apparent competitors (and its activities are not duplicated) in Africa for bean work (private bean breeding is not yet a significant issue), only partners, although if CIAT moves further into nutrition it will face competition. Tellingly, when ASARECA rationalized the 17 commodity-based networks in its mandate countries, PABRA (ECABREN) was not included because of its relevance and strong position relative to other networks.

CIAT's contributions to PABRA have been relevant and currently remain so, but what of the future? Beans will continue to be important in African agriculture and CIAT, as the world's premier bean breeding organization, will continue to make substantial contributions to improving bean production. However, the bean work has to be

integrated into evolving agricultural systems, particularly the bean value chains, and to remain relevant CIAT will have to contribute in allied areas, as it is currently doing in markets and nutrition for example. Were PABRA to become a network incorporating legumes additional to beans, CIAT, with partners, would need to adapt its support mechanisms and methods to remain relevant, ensuring that it does not impinge on the responsibilities of NARS.

## Effectiveness

The PABRA Annual Narrative Report of April 2013–2014 (and the actual Annual Report) provides ample evidence that planned outputs and outcomes (intermediate and immediate) were largely achieved, based on three outcome pillars: (I) increasing utilization of improved and marketable bean varieties, new crop management techniques and micro-nutrient rich bean-based products particularly by women, (II) increasing trade in a gender equitable manner, and (III) increasing response to demands in the bean sector, and utilizing information and knowledge to influence bean policy in a gender equitable manner. All PABRA research has gender targets and there is an effort made to create an environment for gender mainstreaming. That the targets were primarily reached is attributable, at least partially, to the effectiveness of CIAT as a facilitator.

CIAT has invested considerably in monitoring and evaluation on behalf of PABRA, and this is harmonized with monitoring and evaluation systems of other agencies, including ASARECA and FARA, through a periodically updated ‘performance-monitoring plan’. A new PABRA database ([database.pabra-africa.org](http://database.pabra-africa.org)) is nearing completion and is located on the updated PABRA website ([www.pabra-africa.org](http://www.pabra-africa.org)). This database will host all the PABRA monitoring and evaluation data and information needed to gauge CIAT/PABRA effectiveness over time and will become a very useful management tool. The database contains tabs for breeding, ICM, nutrition, seed systems, gender, linking farmers to markets and capacity building, and is thus useful to a wide range of users. In the near future partners will be able to input data and information directly, without the need for quality control by CIAT staff. The annual report referred to above represents evidence for monitoring and evaluation having been taken very seriously by CIAT in that it provides detailed information on annual outputs and outcomes, accounting for impacts and assessing progress to date.

Some key features of the monitoring and evaluation process are:

1. Production of semi-annual reports prepared by each national research program in the PABRA framework, which are shared with CIAT outcome leaders. These reports are ultimately compiled into a PABRA semi-annual report that is widely circulated among partners.
2. Production of an annual report following a similar process, which is presented to the PABRA Steering Committee.
3. Backstopping visits ‘as needed’ by outcome leaders/CIAT staff to National Research Programs to gain insight into activities specified in the work-plan.
4. Regional Steering Committee Meeting at which National Research Programs present their annual reports, detailing progress made against activities specified in the work-plan. The presentations provide evidence that the activities reported by the National Research Programs in their reports are actually occurring.

Effectiveness of organization of CIAT/PABRA is enhanced through its relatively straightforward organizational structure – complex but not complicated. The network comprises three African bean networks, WECABREN, SABRN and ECABREN that together represent 30 bean-growing African nations. A team of 27, spread among four CIAT country offices under the CIAT Regional Director for Africa, coordinates PABRA. Ideally there would be a regional coordinator for each of the regional networks, but currently Jean-Claude is interim coordinator for ECABREN, Rowland Chirwa (CIAT) coordinates SABRN and Laurent Nounamo (Cameroon) is the regional resource person for WECABREN. The Steering Committee comprises PABRA donors, representatives of sub-regional organizations (ASARECA, CCARDESA, CORAF), the PABRA Coordinator (Secretary), Chairpersons of regional bean networks, ECABREN, SABRN and WECABREN Coordinators, CIAT Regional Director, host country NARS leader and PABRA/CIAT representatives. Organizationally, the management structure is clear and effective (the 2006 evaluation report referred to “the lean and effective management team”), but it should be appreciated that much of the actual work of PABRA is done at national level under the management of the NARS, and is, in this respect, largely independent of CIAT. This *modus operandi* apparently is effective, bearing in mind that among the 30 member countries there are those with strong NARS and those with less strong. Naturally, given the complexity of partnership networks even at national level, when it comes to regional and pan-Africa status the complexity is increased many fold (PABRA has over 350 partners). This appears not to result in confusion however, and is realistically the best way to organize and manage such a large, multi-faceted network. In this

respect PABRA, with all-important CIAT support, represents a model that could be adopted elsewhere. But it would not be possible to replicate it in the short term – the success of the PABRA model is a result of evolution. Much of its success results from taking advantage of all the complementarities such a large partnership network offers – duplication is avoided by knowing all the gaps and being able to arrange the best technical and donor partnerships. Because all members of PABRA are informed what all other members are doing, there is no reason to repeat work that is being done elsewhere unnecessarily: germplasm, data, information and advice are freely available among the PABRA members and the greater partnership network. Regarding donors, because CIAT has an overview of all PABRA activities it is able to identify and attract donors for specific activities that need funding support.

CIAT is an effective back-stopper for PABRA in terms of technical issues and bean germplasm. Effectiveness could be enhanced in this respect by CIAT providing more research results and support on soils, agronomy, pathology and entomology, which are among many disciplines that have apparently been in decline across Africa in recent years. As beans seem set to be managed as part of a much more integrated approach to agriculture, including value chains and nutrition, CIAT will be required to expand its back-stopping services in the future. This has already begun with the greater emphasis being placed on ICM, markets and nutrition.

## Efficiency

A concise account of funding allocations to PABRA for 2015–2019 is given in Annex 3. CIAT plays a key role in fund disbursement and management, the details of which, along with national contributions, were discussed within and among representatives of the three networks at the Steering Committee meeting (there is a 50:40:10 split of the core budget respectively among ECABREN, SABRN and WECABREN).

Planned use of the available resources is transparent and adjustments are made according to national requirements, less well endowed programs receiving proportionately more than those with more resources to hand, and unspent funds being reallocated. There are some difficulties however. Sudan, for example, presents a budget after discussions with other ECABREN representatives knowing that funds cannot be transferred because of banking restrictions. South Sudan, one of the countries most in need of support to get a bean program established, also represents a problem in terms of transfer of funds. Bureaucratic issues such as these hamper efficiency and result in some of the more needy programs missing out.

The transparent budgeting and funding processes for grant dispersal, which are largely managed by CIAT, are designed to cultivate trust and accountability among PABRA stakeholders, and are divided into eight steps:

1. National stakeholder forums, where previous year's work, new activities, work-plans and budgets are discussed.
2. Reporting of previous year's results and preparation of national Annual Work-plans, including discussion of progress against activities.
3. Regional Steering Committee meetings for each regional network. Country representatives discuss PABRA-attracted funding initiatives and request catalyzing support where needed.
4. Outcome leaders consolidate PABRA Work-plans for respective outcomes for all member countries.
5. Regional coordinators take the 'Outcome Work-plans' and consolidate them into three Regional Work-plans.
6. The PABRA Secretariat and Regional coordinators consolidate the Regional Work-plans into a single PABRA-wide Work-plan.
7. The PABRA Steering Committee meeting discusses the previous year's annual report and is presented with the consolidated PABRA Work-plan and budget for the coming year, on which it comments before approval.
8. Disbursement through CIAT of subproject grants to each National Research Program in accordance with the approved PABRA Work-plan.

This process is indicative of a well-functioning, large-scale network founded on pan-African partnerships, where responsibilities are shared and where decision-making and priority setting are jointly managed by CIAT and PABRA members in an open and collaborative way. Fund disbursement by CIAT represents the only efficient means of allocating funds – the major donors would be unlikely (and probably unable) to assume this responsibility because it would represent an administrative burden and the transaction costs would be excessively high.

In terms of value-for-money, the 2014–2019 budget (Annex 3) indicates that the funds from PABRA’s two major donors (DFATD and SDC), totaling about USD 20,000,000 catalyze an approximately equal sum from the NARS partners in PABRA and attract a further USD 50,000,000 in kind from the NARS and private sector. Thus the contribution from DFATD and SDC represents ‘seed money’, which generates considerable additional funds. It was estimated that over 17 years a USD 16 million investment generated USD 200 million in benefits.

CIAT also makes a very substantial contribution to capacity development, the value of which is difficult to estimate but is likely to be substantial. Over ten years CIAT contributed to the training of 4,000 national research partners, over 100 postgraduates and 23,000 farmers. Efficiency is enhanced in other areas also. For example, it is extremely inefficient attempting to organize farmers on an individual basis for marketing produce. Thus reliance is placed on marketing platforms that comprise groups of farmers, who can, together, take advantage of working in groups. Innovation platforms, supported by CIAT/PABRA perform a similar function, and make for greater efficiency and complementarity. Only through a more focused review could observations be made on platform efficiency and effectiveness, and the precise role of CIAT.

PABRA is such a vast network of partnerships that it is difficult to imagine that it could be lacking partners. Nevertheless, the partnership structure is, to some extent, in flux and donors to national programs and NGOs, among others, come and go. The major partners, however, in terms of NARS and regional/sub-regional agencies remain constant. The one area where partnerships might be improved is in greater involvement of the private sector, which is emerging as a strong force in many PABRA countries, in bean research and development, and particularly in seed production and marketing. Aside from this shortcoming, the partnerships function well and there appears to be a high level of satisfaction among partners with CIAT/PABRA, including the major donors. There is no evidence of complacency, however, and CIAT/PABRA staff strive to attract new partners, particularly for the new activities in the bean value chain.

CIAT/PABRA management has had to evolve along with evolution of bean programs in Africa and has therefore necessarily been adaptive. WECABREN, for example, was the last regional network to join PABRA and represents a very different management challenge in terms of language, environment, bean varieties (largely green beans), markets etc. to those challenges represented by ECABREN and SABRN. Management has consequently had to be adaptive to accommodate WECABREN. There are no obvious serious cases of management inefficiency, but there is probably an unsustainable level of management overload, or resource inadequacy, as indicated by the interim appointment of the coordinator for ECABREN and a regional resource person, rather than a regional coordinator, for WECABREN. Another area that could benefit from more resources is communication. CIAT/PABRA work has expanded into new areas and there is a growing need for communicating all the associated information. This puts a strain on the current resources available.

## **Impact**

CIAT/PABRA impacts are reported each year in the PABRA Annual Narrative Reports. Four impact indicators at the output level were specified:

1. At least 40% of households using improved bean varieties in 10 PABRA countries become more food secure and 10% show increase in their dietary diversity.
2. At least a 30% increase in income for 5 million households using improved bean varieties in 10 PABRA network countries.
3. More resilient production systems (incidence of crop failure, pest and disease infestation, changes in soil fertility) found in at least 15% of households using technologies to manage environmental stresses in 8 PABRA countries.
4. At least a 40% increase in the income from beans under the control of women and at least 40% of the income from beans is under the control of, and benefits, women and their households.

Impact assessment household surveys were initiated in 2012, initially in Rwanda and Uganda<sup>1</sup> but subsequently including Ethiopia, the southern highlands of Tanzania, Zambia and Malawi. Households were selected randomly and analyses were based on representative samples to allow extrapolation. Interviews were conducted in 750

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<sup>1</sup> BRIEF NO. 46 OF THE STANDING PANEL ON IMPACT ASSESSMENT OF THE ISPC (CGIAR) DETAILS IMPACTS OF BEAN RESEARCH IN RWANDA AND UGANDA.

households in southern Tanzania, 600 in Ethiopia, 402 in Zambia and 600 in Malawi. The impact of bean research and technology dissemination work on household income and food security was calculated econometrically for Rwanda and Uganda in 2013 and the preliminary results for Ethiopia and southern Tanzania are available. These data represent a useful management tool, enabling CIAT to identify more precisely where interventions need to be made, and represent a baseline for subsequent impact studies.

Impacts of adopting improved bean varieties have been registered for food security in terms of household dietary diversity and reduced food insecurity, climbing beans having contributed significantly to successes in Rwanda (HDDS up by 43% and food insecurity reduced by 16% over the five-year phase). Growing improved bean varieties, and PABRA members have released over 450 since 1996, also impacted household income and poverty, national revenue figures for bean and bean productivity on-farm. Many of the PABRA output targets specify anticipated impact on women and women farmers in particular. Since 2008 there has been a cumulative increase in bean trade in the PABRA countries of 36% and a parallel increase in access to bean markets. This has no doubt been influenced by CIAT/PABRA activities and has created possibilities for even greater impact in the future. Numerous other quantifiable impacts of CIAT/PABRA technical work have been documented, but there have also been impacts on policy. PABRA, through CIAT, has influenced policy in three countries at least, Zambia (in terms of approval of beans in a national food security package), Rwanda (the government now invests heavily in bean production, particularly climbing beans) and Malawi (where privately produced certified bean seed production has been promoted).

There have no doubt been spillover effects from the adoption of improved bean varieties, many of which have come from the CIAT breeding program and genebank in many countries in terms of improvement in socioeconomic circumstances, but arguably the greatest spillover effects come from the catalytic effects and increased leverage that result from investments made by a range of donors who fund PABRA and NARS activities. CIAT is able to attract funds that can be channelled through PABRA – funds given by the Rockefeller Foundation are just one instance of this.

The CIAT/PABRA partnership has resulted in a range of impacts throughout the network, reaching the farm level, in terms of increased bean yields, increases in yield per unit area, reduction in anaemia, improved nutrition, and many more. The level of impact has not been uniform throughout the 30 countries, some of which are relatively new to PABRA and their bean programs are not always well founded. Registering an impact in those cases will take longer and expectations should be realistic. Such cases do however represent both a challenge and an opportunity for CIAT/PABRA. Having secured donor agreement, PABRA will concentrate efforts in Burundi and Zimbabwe in the coming five-year framework. The monitoring and evaluation activities of PABRA will continue to play a key role in tracing, documenting and quantifying impacts and will be, particularly through the database, be useful for management.

## **Sustainability**

The key question concerning sustainability is ‘Could PABRA continue to function effectively without CIAT involvement?’ PABRA has certainly not achieved all its goals, although it has achieved a lot. There are many countries in the PABRA network that require the support of CIAT and PABRA in order for beans to have an impact there. Some strong countries might not require much from PABRA in terms of funding, but all countries, no matter what their circumstances, benefit from being inside the network. CIAT is an integral part of the setup and it is impossible to imagine that activities could continue unaffected were CIAT not to be there. CIAT presence, as an internationally respected partner and expert organization in bean breeding, is a very necessary part of the PABRA network. With developments in bean science, including applications of molecular biology to breeding, CIAT will have a role to play well into the future, although it will have to continue to adapt to changing circumstances, as it has done in the past. Not only does CIAT have the technical capacity and the respect that goes with it, but also it is a key element in organization and management of PABRA and makes PABRA more attractive to donors than it might otherwise be. The only problem is that some additional, possibly substantial, investment in PABRA is being missed because CIAT is registered in Colombia and not in Africa. This means that some potential donors (the Organization of African Unity, for example) are unable to fund PABRA through CIAT.

Capacity development supported by CIAT/PABRA contributes to sustainability of the network by ensuring that young researchers, in addition to numerous other categories of trainee, including farmers, join the PABRA network through their national research agencies qualified to carry through the evolving work-plans. Many, but not all, will

be bean breeders. There appears to be currently a call for research scientists qualified in disciplines other than plant breeding, including soil science, agronomy and crop protection. With the ICM approach gaining momentum, this should ensure that all key competencies for bean production, marketing etc. are catered for in the capacity development program.

If the current structure of CIAT/PABRA can be maintained and can attract sufficient 'seed money' from diverse donors it will be sustainable. All the major bean growing nations of Africa are already PABRA members (and no country has left the network). Now would be the time to consider expanding PABRA to include other legumes to take full advantage of the strengths of network. There have been suggestions that a pan-Africa legume alliance might be set up by augmenting the mandate of PABRA. This could share legume technologies, innovations and management practices.

### Quality of product

The principal product of CIAT in partnership with PABRA is adapted bean germplasm, numerous new varieties having been released within PABRA since 1996. The germplasm is in the form of breeding materials and advanced lines that with little or no further breeding can be grown under a range of conditions and for a range of markets. CIAT has worked with its bean germplasm in Africa for 30 years and is thus completely familiar with the challenges of bean production in the various physical and economic environments. Its products have been taken up in many countries and have had significant impacts in terms of improved production, better nutrition, and ultimately enhancing income generation and raising living standards. As conditions and requirements change so do the products. Examples of this include germplasm for changing climates, for nutritional enhancement, for pre-cooking and for the canning industry. CIAT is the custodian of the world's largest collection of bean germplasm and is thus able to draw on a unique sample of bean biodiversity for its breeding program, which is based in Colombia, to meet changing needs of bean growers in Africa. There are some Africa-based bean breeding programs, but they too are heavily reliant on CIAT germplasm. It is difficult to imagine that consistent and long-lived quality of product, in terms of adapted germplasm, could be met in the absence of CIAT. In terms of advancing technologies, MAS is a modern breeding technique that CIAT employs and which could not be relatively easily applied by several national programs. Its use in the breeding program will add value by allowing resistance genes, for example, to be pyramided into adapted germplasm.

CIAT also contributes to the quality of PABRA products in terms of organizational and managerial input. PABRA communications are managed by CIAT, including the new website and database. Given the level of capacity among some PABRA members in this area, it is not inconceivable that a product of similar quality might be produced by an agency other than CIAT. However, CIAT, as a partly independent entity, is able to take a detached overview when reporting on PABRA activities, which a member country might not be able to do so easily. Moreover, design and maintenance of up-to-date web pages and databases is demanding of resources, which might not be consistently available outside of CIAT.

## Conclusions

PABRA has benefitted enormously from its partnership with CIAT, and CIAT's support has kept up with changing circumstances in the member countries of the network. The PABRA network, in essence a multifaceted partnership, contains some strong countries whose bean production is being commercialized or is at the point of being so. It also includes countries that are aiming to supply domestic, regional, sub-regional and international markets. Other, newer, members are only just beginning to get bean research organized in their countries. If CIAT were not available as a partner in PABRA it is likely that only few countries could continue to develop their bean breeding, bean production and related activities. Most would suffer from reduced funding and inadequate technical and managerial support, and sustainability would be jeopardized in many cases. CIAT is a mainstay of the PABRA network and will continue to be so into the future.





## The future of the CIAT/PABRA partnership

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CIAT's contributions to PABRA have evolved as the network has evolved, rising to the challenge of developing all aspects of the bean value chain in Africa (e.g. the bean corridors approach) and the increased emphasis currently placed on beans as a source of nutritional elements (beans fortified with iron and zinc). CIAT will continue to be the major supplier of adapted bean germplasm to Africa for release and for further research and breeding. PABRA currently includes all major bean-growing nations in Africa and so it is unlikely that there will be any expansion in PABRA in terms of new members, but PABRA activities will surely increase in scope, in which CIAT is set to play an active role. Several issues were raised during the course of this review that CIAT might take notice of, including:

1. Investigating the possibilities for adapting PABRA to become a tropical legume network rather than solely a bean network (the so-termed Pan-Africa Legume Alliance). There are several reasons why this might be considered. a) PABRA is well established and well organized and could cover legumes additional to beans that are covered in CRP 3.5. b) Many farmers in the three PABRA regions grow legumes other than just beans. c) National bean researchers often work with several legumes. d) The constraints to legume production are often similar to those for beans. e) There are marketing similarities among all legumes. f) Seed producers will benefit from having more than just beans in their portfolio.
2. CIAT's technical backstopping can be enhanced by providing more soils and agronomy advice. National programs appear to be weak in these disciplines in many instances, and with expansion of beans (and possibly other legumes) into non-traditional areas, particularly those where production is limited by poor soils and unreliable rainfall, adapted germplasm should be provided in a comprehensive crop management package.
3. Issues of IP will probably need to be discussed in greater detail as beans for commercial markets, based on IPG (germplasm from the CIAT genebank), become more developed and seed systems become more sophisticated. CIAT follows the germplasm up to a point, after which it becomes a national decision as to how it is managed. CIAT has developed a molecular fingerprinting protocol that will enable accurate tracing of germplasm.
4. CIAT/PABRA has relied on long-term donors (SDC and DFATD, formerly CIDA). It is also supported by BMGF, McKnight Foundation, Kirkhouse Trust and others. Diversified funding might be sought in the future, beyond the next framework that ends in 2019.
5. Commercial buy-in, as happens in South Africa, could be encouraged. To date the private sector has not been heavily involved in PABRA in terms of funding, although representatives from the private sector have been partners.
6. As the work on beans expands in the PABRA network, the demands on communication, for which CIAT takes charge, will also grow. The communication staff should be able to make full use of the information and data contained in the PABRA database for advocacy purposes and for attracting continued donor support. To do this might require reinforcing CIAT's capacity in communication.
7. CIAT is well positioned in Africa to make a greater contribution to nutrition despite being essentially a breeding organization. It might be worthwhile to develop the current strategy to take better account of, and better link, not only nutrition, but also markets and gender considerations, given that nutrition is a national priority in many countries and is considered very important by many donors. Nutrition is much more than iron and zinc fortified beans – beans represent a major source of protein in Africa. As with marketing commodities, nutrition is about responding to people's needs, where beans represent one component in the equation. CIAT can help in integrating nutrition into the bean value-chain.
8. There might be an attempt made to convene all three networks, as was done in Kigali for the Steering Committee meeting, on a regular basis to promote communication among all PABRA partners and reinforce a sense of community.

## Acknowledgements

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This review was based on interviews and discussions with numerous people on the condition of anonymity. I am indebted to all those who patiently answered my questions and volunteered information that appears in this report. Particular thanks go to Jean-Claude and Robin for the time they devoted to this review.

Photo credits: B. Waswa/CIAT and N. Palmer/CIAT.

## Annex 1: Terms of reference for the Center Commissioned External Review (CCER) of PABRA

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### Background

The Pan Africa Bean Research Alliance (PABRA) is a consortium of African-owned regional bean networks. PABRA's focus is to improve bean productivity, utilization and commercialization for the nutritional and food security, and economic benefit of the rural and urban poor through generation and deployment of appropriate bean based technologies. Since its inception, it has delivered research products that have had major developmental impacts on PABRA member countries. These are based on long-term vision and efforts focusing on institutional capacity building of PABRA members. In addition, hundreds of African bean scientists have carried out collaborative research associated with their postgraduate training within the framework of PABRA and more than 4,000 stakeholders have received training on topics as diverse as breeding, seed systems, integrated disease and pest management, nutrition, gender analysis and agro-enterprise development.

PABRA now comprises three regional networks operating in 30 countries in Eastern and Central Africa Bean Research Network (ECABREN), Southern Africa Bean Research Network (SABRN), and the West and Central Africa Bean Research Network (WECABREN). PABRA members include national bean research teams, sub-regional organizations, non-governmental organizations (NGOs), community-based organizations (CBOs), universities, farmers, private sector (seed producers, grain traders and processors etc.) and the International Center for the Tropical Agriculture. Partnerships are maintained through joint fundraising, planning, implementation, experience sharing, and reporting of collaborative activities. Begun as a CIAT project in 1985, PABRA was established in 1996. Since then it has evolved to the current framework and operating model under CIAT leadership. In parallel, CIAT and CGIAR have also gone through tremendous changes including its strategy, funding model, leadership and staffing.

### Objective

Within PABRA's main mission and strategy, the Center Commissioned External Review will assess CIAT's leadership role in the current partnership arrangement and its capacity to meet current and evolving PABRA needs. The scope of the review includes an assessment of the institutional arrangement, decision making mechanisms and clarity on processes and roles.

The review will address the following areas:

1. Review CIAT's leadership role in guiding and facilitating the PABRA partnership including
  - a. Strategic vision
  - b. Innovation
  - c. Shared responsibilities.
2. Review CIAT's coordination effectiveness in implementing operations of the network such as
  - a. Organization and management
  - b. Technical backstopping
  - c. Complementarities among PABRA members: CIAT and national partners
  - d. Achieving value for money etc.
3. Review the current processes of priority setting, influence, decision making and management of PABRA structures at the following levels:
  - a. Pan-Africa
  - b. Regional
  - c. National
  - d. CIAT
4. Review the fund raising strategies and how it can be further enhanced in collaboration with national and regional partners considering:
  - a. Different models; CIAT and NARs led; indirect contributors (government and NGOs, private sectors, leveraging among donors)

## Product

1. A report approximately 15-20 pages long (maximum), containing a brief summary of findings, comments on strengths and weakness, and a set of recommendations going into the future will be sent to Maya Rajasekharan
2. Present and discuss findings with the CIAT Management Team (virtually)
3. Sharing outcome with PABRA Steering Committee

## Duration and time schedule

The lead reviewer (Mr. Jonathan Robinson) will spend approximately 10-15 working days in CIAT Africa in the month of Feb or March, 2015 visiting partners in selected countries, attending selected PABRA meetings (e.g., ECABREN and SABRN SC) interviewing relevant members face to face and via Skype.

Focal point at CIAT: Maya Rajasekharan ([m.rajasekharan@cgiar.org](mailto:m.rajasekharan@cgiar.org)), Head of Program Coordination, Office of the DG.

## Annex 2: Evaluation matrix for CIAT/PABRA center commissioned external review<sup>2</sup>.

Criterion	Evaluation question	Expected evaluation product	Expected approach and information sources
Relevance – past, present and future	<p>To what extent has CIAT/PABRA provided for representatives of various African countries to think collectively about solutions to complex problems and to learn from one another?</p> <p>What has been the extent of demand for CIAT/PABRA products from intended and other, potential beneficiaries?</p> <p>To what extent has CIAT/PABRA provided essential services to bean scientists across the three networks?</p> <p>Has CIAT/PABRA built on its comparative advantages in international partnerships in delivering its products/messages?</p> <p>Does CIAT/PABRA have competitors in terms of research capacity/programs, including those in the private sector?</p> <p>Has CIAT/PABRA built on up-to-date scientific thinking and research results?</p> <p>Have CIAT/PABRA activities remained valid through changing circumstances and evolution of bean science and technology?</p> <p>Does CIAT/PABRA have clear impact pathways for</p>	<p>Concise synthesis of CIAT/PABRA activities in comparison with evolving needs of clients and developments in bean science.</p> <p>Synopsis of bean production in the 30 member countries, identifying divergent needs and activities.</p> <p>Time series data and analysis on bean production across the 30 member countries.</p> <p>Assessment of the extent to which CIAT/PABRA services have been offered and taken up by prospective clients.</p>	<p>Relevant data from CIAT/PABRA monitoring and evaluation activities.</p> <p>Semi-structured interviews with CIAT/PABRA staff.</p> <p>Discussions with country representatives.</p> <p>Discussions with donors and other stakeholders.</p>

<sup>2</sup> MUCH OF THE INFORMATION SOUGHT FOR THIS REVIEW WAS OBTAINED DURING ATTENDANCE AT THE PABRA STEERING COMMITTEE MEETINGS HELD IN KIGALI BETWEEN 01.02.15 AND 07.02.15, MEETINGS WITH REPRESENTATIVES OF AGRICULTURAL RESEARCH ORGANISATIONS IN RWANDA, UGANDA AND KENYA, AND MEETINGS WITH CIAT STAFF IN NAIROBI.

	<p>its activities and outputs?                  How has CIAT performed in leading discussions on PABRA strategy?                  How has CIAT fostered innovation in partnership with PABRA?                  Will CIAT/PABRA activities remain relevant in the future unless work on beans is supplemented with work on other legumes?</p>		
Effectiveness	<p>To what extent were planned outputs and outcomes achieved?                  What factors had a major effect on CIAT/PABRA outputs and outcomes?                  How have CIAT/PABRA activities been monitored and evaluated and how successful has this been?                  How effective has CIAT/PABRA organization and management been?                  Is CIAT/PABRA's organizational structure and partnership network appropriate and could this represent a model the future and other activities?                  How effective has CIAT been as a back-stopper for PABRA activities?                  Has CIAT/PABRA taken full advantage of complementarities in its networking activities or has there been duplication of activities?</p>	<p>Analysis of documented expectations versus realized achievements.                  Documentation of progress in achieving expectations with changes in management, funding, developments in science, client requirements etc.</p>	<p>CIAT/PABRA documentation.                  CIAT/PABRA staff interviews.                  Discussions with country representatives.</p>
Efficiency	<p>Are adequate resources available and used according to plan and adjusted appropriately?                  Are all potential partnerships realized?                  Is there evidence for adaptive management in CIAT/PABRA?                  Are there any clear areas of inefficiency?                  Are costs commensurate with outputs – does CIAT/PABRA represent value-for-money?                  How well did partnerships and networks function, particularly in terms of shared responsibilities?                  How are priority setting and decision-making managed</p>	<p>Summary of resource inputs and outputs over ten years.                  Description of coverage of CIAT/PABRA partnerships and identification of gaps by location, organization type etc.</p>	<p>CIAT/PABRA monitoring and evaluation data.                  CIAT/PABRA staff interviews.                  Discussions with country representatives.</p>

	between CIAT and PABRA and all levels?		
Impact	<p>What have been the major impacts of the PABRA network (three component networks) on bean productivity in the 30 member countries of PABRA as a result of the CIAT/PABRA partnership?</p> <p>To what extent have there been spillover effects from CIAT/PABRA activities?</p> <p>To what extent has CIAT been influential within the PABRA community?</p> <p>Have all opportunities to register an impact been taken by PABRA?</p> <p>How has gender featured?</p>	<p>Synthesis of CIAT/PABRA activities and changes that have come about as a result of the partnership.</p> <p>Identification of unplanned outputs and outcomes (positive and negative) that have made a difference to partner operations.</p>	<p>CIAT/PABRA staff interviews.</p> <p>Document analysis.</p> <p>Analysis and interpretation of indicator data.</p> <p>Discussions with country representatives.</p>
Sustainability	<p>Can the CIAT/PABRA partnership be sustained (wholly or in part) or has it achieved its goals?</p> <p>Are prospects good for continued donor interest in CIAT/PABRA into the future?</p> <p>Will the CIAT/PABRA partnership be sustained if it continues to address beans solely and does not incorporate other legumes?</p> <p>Could PABRA be sustained if CIAT were to discontinue its partnership?</p> <p>How does capacity development contribute to sustainability of PABRA?</p>	<p>Extrapolation of past evidence into the future.</p> <p>Consideration of counterfactuals.</p>	<p>CIAT/PABRA staff interviews.</p> <p>Discussions with country representatives.</p>
Quality of product	<p>Is the product of the CIAT/PABRA partnership satisfactory for the 30 member countries?</p> <p>How could the products of the CIAT/PABRA partnership be improved and meet evolving needs?</p> <p>Would the quality of product diminish in the absence of CIAT?</p> <p>To what extent has CIAT bean germplasm contributed to the quality of the CIAT/PABRA products?</p>	<p>Assessment of the products, in terms of bean varieties and information, developed within the CIAT/PABRA partnership.</p>	<p>CIAT/PABRA staff interviews.</p> <p>Document analysis.</p> <p>Analysis and interpretation of indicator data.</p> <p>Discussions with country representatives.</p>

Project:	Donor	Year 1	Year 2	Year 3	Year 4	Year 5	Total

### Annex 3: The PABRA funding structure for 2015–2019.

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<b>PABRA FINANCING STRUCTURE (millions USD) 2015–2019</b>	<b>DFATD</b>	<b>SDC</b>	<b>Total</b>	
Framework funding	11,000,000	10,000,000	21,000,000	30% goes to framework strategic support, 17% to network coordination, 53% to NARS sub-projects
NARS projects catalyzed by the framework			20,000,000	These are projects that are theme/country specific. The funding is transparently disclosed during planning meetings.
In-kind investment by NARS/Private sector catalyzed by the framework			51,000,000	This includes infrastructural support, equipment, human resource etc.
<b>Total</b>			<b>92,000,000</b>	

<b>Contributions that support activities and functioning and facilitation of the network</b>							
Improving economic growth, food security, nutrition status, gender equity and natural resource base for better livelihoods of smallholder households in Sub-Saharan Africa	DFATD	2,200,000	2,200,000	2,200,000	2,200,000	2,200,000	11,000,000
Improving food security, nutrition, incomes, natural resource base and gender equity for better livelihoods of smallholder households in sub-Saharan Africa	SDC	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	10,000,000
<b>Projects supported through CIAT/PABRA which focus on particular themes or are limited to specific countries</b>							
Unlocking the potential of seed companies to reach smallholders with new bean varieties Tanzania	AGRA	175,000	175,000	175,000	175,000	175,000	875,000
H+ product development and dissemination (Rwanda and DRC)	BMGF	1,100,000	1,100,000	1,100,000	1,100,000		4,400,000
H+ Nutrition (Uganda)	CRP4	90,000	90,000				180,000
McKnight (Kenya)	MCK	169,000	136,000				305,000
RUFORUM		50,000	50,000	50,000	50,000	50,000	250,000
CCAFS (Uganda)	CRP	15,000	15,000	15,000	15,000	15,000	75,000
SCRPID (Uganda)	BBSRC	217,500	217,500				435,000
CIAT HQ (includes 50% support to Markets)		300,000	300,000	300,000	300,000	300,000	1,500,000
Tropical Legumes III (Ethiopia, Tanzania, Rwanda, Uganda and Kenya)	BMGF	1,400,000	1,400,000	1,400,000	1,400,000		5,600,000



CRP 3.5		350,000	350,000	350,000	350,000	350,000	1,750,000
Strengthening bean seed systems to respond to market demand in Burundi Kenya and Rwanda	SYNGENTA	60,000	480,000	480,000	480,000		1,500,000
FATE: Social and political conditions of asset building in the context of export-led agriculture compared to alternative income generating opportunities (Rwanda)	SDC	60,000	60,000	60,000	60,000	60,000	300,000
<b>PABRA partner country projects supported directly and focusing on specific themes or limited to specific countries</b>							
Enhancement food and nutritional security and incomes generation through post-harvest value addition as case of pre-cooked beans (Uganda and Kenya)	IDRC	1,200,000	1,200,000	200,000			2,600,000
Support to Higher Education, Science and Technology (HEST) Project (Uganda)	ADB	100,000	100,000	100,000	100,000		400,000
USAID- NIFA (Rwanda and Kenya)	USAID	40,000	40,000	40,000			120,000
<b>In-kind contributions by NARS governments for PABRA framework activities</b>							
In-kind Contributions by NARS		3,700,000	3,700,000	3,700,000	3,700,000	3,700,000	18,500,000
<b>In-kind contributions by NGOs and private sector (PABRA partners) and which contribute to the PABRA framework</b>							
In-kind contributions by NGOS/PRIVATE SECTOR in different countries		6,550,000	6,550,000	6,550,000	6,550,000	6,550,000	32,750,000
<b>Total</b>		19,776,500	20,163,500	18,720,000	18,480,000	15,400,000	92,540,000