Independent Science for Development Council

CGIAR

Appendix 2.
Independent Science for Development Council. 2022. Identifying and Using CGIAR's Comparative Advantage. Rome: CGIAR Independent Advisory and Evaluation Service

Comparative Advantage Analysis
Illustrative Example
Genebank Platform[i]

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Summary

The CGIAR Genebank Platform (GP) is an established system-wide initiative. The Platform does not directly address development objectives, but it provides services to in- and out-of-system demand partners, most of whom transform genebank-supplied germplasm into varieties that help meet development objectives. Other types of partners—such as innovation partners that use the germplasm to develop varieties—are sufficiently separate from the GP. Because of this separation, the Comparative Advantage (CA) approach does not apply: the GP has a clear deliverable where it has absolute and CA. While some functions of the genebanks might be separated from the GP, this separation would not yield cost savings or efficiency gains because the functions are sufficiently interlinked and necessary for the GP to provide its deliverables. Functions such as curation, genetic health assurance, storage, and sample preparation and delivery are all necessary for the functioning of genebanks. Thus, application of the CA approach to the GP does not lead to insights regarding the delivery of products to various demands and other partners.

Background: the CGIAR Genebank Platform

The *ex situ* crop collections held in the genebanks of 11 CGIAR Centers are among the largest and most diverse in the world, and are of major importance for global agriculture and food security. Since 1994, these collections have been held in trust under the auspices of FAO for benefit of the international community. These genebanks provide a public good—which would be undersupplied by the private sector—and are truly reflective of what is known as a platform technology.

The CGIAR research support program for managing and sustaining crop collections, the Genebanks CGIAR Research Program (CRP), spanned five years (2012-2016) and focused on the management and sustainable funding of the crop collections held in CGIAR Center genebanks. The CRP was a partnership between the CGIAR Consortium and the Global Crop Diversity Trust. It represented a unique institutional arrangement for CGIAR, because the "Program Manager"—the Crop Trust—was a non-CGIAR entity, which together with the CGIAR Consortium held responsibility for the dual governance of the CRP.

The GP expanded on the achievements of the Genebank CRP in areas of genebank operations and performance. It incorporated an additional module on policy, which was designed to help ensure that CGIAR addresses an area that is essential for its own operations, reputation, and visibility—as well as for international engagement and leadership. It was deemed important that CGIAR genebanks engage more actively in international fora and become better known by the international community as a provider of genebank services.

The GP supports the core activities of CGIAR genebanks to conserve collections of plant genetic resources for food and agriculture. Through this platform, CGIAR fulfills its legal obligations to the International Treaty on Plant Genetic Resources for Food and Agriculture, which came into force in 2004 and legislates for access of agriculturally important plant genetic resources under a multilateral system of access and benefit sharing. Article 15 of the Treaty provides the legal framework under which the *ex situ* collections of plant genetic resources are held by CGIAR Centers and other international institutions. Broadly, the Treaty aims to conserve and make available the 35 crop and tree collections under GP management; the work also directly contributes to indicator 2.5.1 of SDG Target 2.5.

The GP is a global initiative, whose deliverable is an upstream service in the form of requested germplasm distributed according to the Treaty. CGIAR genebanks manage large and diverse crop collections and, together with their Genetic Health Units, provide a unique service in sending samples anywhere in the world. Individual genebanks serve a broad range of requesters from developing and developed countries who seek materials for various uses.

The information for this application came from published sources, as well as interviews with genebank managers and Charlotte Lusty, the former head of the Genebank platform. These interviews indicated that the sole deliverable of the Platform is genetic material.

Step 1: Describing desired deliverables

Development outcome
Increase agricultural productivity and improve food security through the access to and diffusion of improved varieties

Deliverable
Clean, documented genebank materials (germplasm)

CGIAR genebanks have many users, who may be thought of as "demand partners" but are not partners in the traditional sense. They receive services from the genebanks, rather than acting in a partnering relationship: the flow of deliverables is one-way. The genebanks do not dedicate time to working with any partners toward achieving development outcomes. The role of the GP is to respond to requests—it does not directly conduct development work. "Innovation partners" and "demand and scaling partners" receive improved germplasm from entities such as CGIAR or National Agricultural Research and Extension Systems (NARES) breeders/demand partners, but do not interact with the genebank beyond making requests for germplasm.

Each genebank has an associated Germplasm Health Unit (GHU) that tests samples for seed-borne pests and pathogens. Just over half of these samples are tested prior to their conservation in CGIAR genebanks. GHUs also facilitate germplasm exchanges with demand partners in diverse countries; they insure that quality targets specified by the Treaty are met. The GHUs operate as an integrated part of each genebank.

Step 2: Identifying (potential) partners

Table 1: Potential partners

Deliverable	**Current organizations**	**Potential organizations**	**Why not others?**
Clean, documented genetic materials	National agricultural research organizations Advanced research institutions/universities Individual farmers Private sector	National and regional genebanks Advanced research institutions (ARIs)/universities	See below

It is important to specify the roles of these current and potential organizations. The "current organizations" are recipients of germplasm. As noted, the Platform has no further downstream interactions with these entities. The "potential organizations" also maintain genebanks, and provide genebank materials to their own demand partners, sometimes in coordination with the GP. Considering the various globally important mandates in the Treaty, these potential partners cannot deliver the same services that the GP does.

Why not other potential partners?

National and regional genebanks. Many ministries of agriculture support their own genebanks, which preserve and provide parent material to domestic and international requesters. These entities do not generally have an obligation to respond to requests; many do not meet international standards of quality and documentation; and individual countries sometimes lack the proper policy framework to provide genetic materials with the same facility as GP members. For example, the national institute of agriculture in Ecuador (INIAP) has a modern genebank facility containing large numbers of national accessions. Its primary concern is conservation, but it also provides samples to some requesters. Since funding is not made available for these services, INIAP is slow to (and sometimes does not) respond to requests, especially from foreign entities.

ARIs/Universities. These face similar limitations as do national and regional genebanks. While they do store genetic materials, their main operating objectives are conservation and support for university research. Funds are not regularly provided to respond to requests from the public. For example, the United States Department of Agriculture (USDA)'s Agriculture Research Service (ARS) and cooperating state land-grant universities support the conservation of plant genetic resources via a series of genebanks that maintain and distribute seed and living material of crop plants and their related species.

Is CGIAR the only institution able to produce this deliverable (in this context)? The GP is the only institution with the institutional (Treaty), physical, and human capitals (including the GHUs) and incentive structure required to provide this deliverable. In fact, it is the only global source of genebank materials that is mandated to provide these materials to all eligible users (demand partners).

Table 2: Sources of Comparative Advantage for Genebank Platform's deliverable

Deliverable	Human capital	Physical capital	Social capital	Incentives
Clean, documented genetic materials	Scientists Technicians Management Other staff	Cold storage GHU equipment Office space	Goodwill of scientists and managers of alternative sources of genetic material Reputation of the genebanks	International Treaty Clear communication of mandate

Discussion

The GP is truly a platform technology, whose only deliverable is high-quality, documented genetic materials. This deliverable is an international public good which is under-produced by the private sector: most of the large genebanks in the world are publicly supported. The genebanks in the GP are non-divisible technologies; to meet the mandates of the Treaty, genebank functions—while conceptually separable from each other—must be coordinated and managed by a single entity, which must be carefully designed to meet specifications within the guidelines of the Treaty. The Treaty creates an enabling environment which guarantees the CA of the GP in this realm.

One consideration for future discussion is the possibility of exploiting potential economies of scope in delivering the deliverable. The current model requires the demand partner to specify their needs; the GP complies. However, increased interactions with demand partners would allow GP scientists to become aware of the process of genetic innovation for development and the need for germplasm at various stages of the innovation pipeline. These interactions might enable finer tailoring of deliverables to meet the specific needs of demanders and save costs of development down the line. Such "boutique" requests would expand the scope of the deliverables, and the genebanks likely have a clear CA in filling this expanded scope. This service might be separated, but the degree of coordination with the genebanks themselves would likely dictate a close collaboration.

An additional consideration looking forward is aggressive outreach to reach more potential demand partners. Such outreach would expand the network externalities associated with the Platform. Outreach might be provided by a yet-to-be-identified innovation partner with CA in this realm.

Overall, the CA framework was not suited for an analysis of GP partnerships. This conclusion comes from several considerations. First, the sole deliverable in the GP mission makes it impossible to compare across deliverables. Second, while the deliverable could be broken into component parts, the technology behind production of the deliverable suggests that such separation would not be economic. Third, while in the future there might be space to apply the CA framework (e.g., advertising genebank services), the information needs of a strict application of the approach are high—since the genebank has not done such things in the past, the different types of capital needed for these deliverables are extremely difficult to quantify ex ante.

Measuring CA accurately is a difficult task, especially for non-economists. CA as a concept is a welcome addition to CGIAR planning, but it is more useful as a means of stimulating dialogue than as a decision tool. Ultimately, the information needed for accurate quantification of CA is not available for large-scale operations such as genebanks.

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[i] *This appendix presents a retrospective application of the Comparative Advantage Analysis developed by ISDC. The views expressed are those of the author. They do not necessarily reflect those of ISDC or any organization.*