

**Strategic overview of CGIAR Research programs  
Part II. Value chains and Seed systems**

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**Strategic overview of CGIAR Research programs  
Part II. Value chains and Seed systems**

**Independent Science and Partnership Council  
17 December, 2012**

**SYNTHESIS AND COMMENTARY**

**Executive Summary**

The think pieces on Value chains and Seed system, commissioned as part of the ISPC's review of the first "complete" portfolio of CRPs, deal with the interface between research and development. Determining the CGIAR's optimal role in these areas involves identification of where research can add value to the functioning and enhancement of these institutional systems for advancing the CGIAR's goals. Particularly in the case of Seed systems, it also involves consideration of how else – e.g. through capacity building, partner strategies and advice etc. - the CRPs can advance the adoption and spread of its seed-based technologies. The CRPs that engage in value chain research or seed systems share very similar conceptual issues and constraints with each other. The two think pieces provide very useful analysis of the issues where the CRPs can share their common lessons and plan collective strategies and actions, and where some CRPs have specific strengths from which other CRPs can benefit.

*The Value chain analysis* focuses on the following key aspects common to all CRPs that address value chains: market linkages and addition of value; governance and bargaining power; upgrading and performance of value chains; and methodologies in value chain analysis and research. The analysis found considerable knowledge gaps across CRPs, both in concepts and methodology. It found very uneven interpretation of what a value chain is and how the concept can be applied in research. Among the CRPs, CRPs 3.7 (Meat, milk and fish) has truly embedded the value chain approach throughout the program plan and CRP2 (Policies, institutions and markets), 3.4 (Roots, tubers and bananas), and 4 (Nutrition and health) in certain aspects. Together, they have considerable strengths from which other CRPs can benefit. There is need for explicit linkages between CRPs for sharing methodologies and best approaches in specific value chains. In conclusion, there is a lot of scope for sharpening the CRP agendas concerning value chain work. Value chain analysis and impacts should also be incorporated into the theories of change for CRPs.

*The Seed systems analysis* is built around the premise that the availability and access of farmers to seed is an essential, yet often a constrained step in the CRP's impact pathway for crop improvement. The CRPs' activities, assessed for the likely effectiveness for enhancing the passage of seed to farmers, are often found to be vague and un-prioritized and their likely effects questionable. The paper argues that seed system development is very country-specific and therefore cross-country analyses and platforms may not help deal with the idiosyncrasies of national policies, laws and capacities. The paper emphasizes the need to prioritize

activities that enhance seed delivery as the primary goal and it encourages monitoring of variety uptake. The activities needed are not necessarily research and are best done through partnerships, the CGIAR being a collaborator. The CRPs are recommended to urgently prioritize activities that enhance organization and implementation of variety release, production of breeder seed by NARI and handover of source seed from public seed research to commercial seed producers. The CRPs should also explore efficient seed delivery systems for crops that can generate clear benefits to farmers but for which there are no current production and delivery mechanisms.

## **Introduction**

In 2011-2012, the Independent Science and Partnership Council (ISPC) assessed nearly all the CGIAR Research Program proposals<sup>1</sup> for their investment worthiness; several of them also in revised form. It became obvious that the research outlined for the early years of most CRPs represented, to a considerable extent, on-going research bound by contractual agreements brought together under the CRP umbrella. Furthermore, as the CRPs were developed and approved sequentially, there was limited opportunity for them to integrate or harmonize program content where they deal with same issues, concepts or contexts. The CRPs therefore need to go through a transition towards a more coherent and better integrated portfolio of CGIAR programs. This ISPC's strategic overview of key challenges common to most CRPs is intended to help facilitate that process.

Given work already carried out by the Consortium and the CRPs themselves, the ISPC's strategic, cross-cutting review of the CRPs focused on three specific themes. For each theme the ISPC commissioned a strategic think piece based on an analysis of relevant content from each CRP proposal, current literature on the topic, and expert knowledge of the author(s). The theme of Theories of change and impact pathways cuts across all CRPs centering on the thoroughness and realism by which CRPs show the linkages from their proposed set of activities to intermediate development outcomes and the System Level Outcomes (SLOs; the central CGIAR goals). Part I of the Strategic Overview of CGIAR Research Programs contains the think piece on Theories of change and impact pathways.<sup>2</sup>

This document contains the commissioned think pieces on Value chains (Annex 1, p. 9) and Seed systems (Annex 2 p. 31) which are attached to this ISPC synthesis and commentary.

## **Scope of the studies**

The themes seed systems and value chains both represent a critical interface along the impact pathways between research and its uptake and application through development actions. The analysis of these themes allows identification of strategic system-level issues regarding the constraints for reaching beneficial outcomes from research, and the optimal role for CRPs regarding research boundaries and CRP involvement in scaling-up and development activities. These themes cut horizontally across most of the CRPs. In several CRPs, they account for a considerable amount of activity, particularly among those dealing with commodities.

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<sup>1</sup> GRiSP was approved in 2010 prior following recommendation by the Science Council, ISPC's predecessor.

<sup>2</sup> URL

The consultants commissioned to write these think pieces were asked to prepare an analysis of the nature of the issues related to the theme and how these issues were presented and proposed to be addressed by the CRPs. Specifically, analysis was requested of the strategic context for CRP research and on the research to address constraints and enhance success along the impact pathways. The think pieces were expected to explore the role of partners and other actors along the impact pathways, and the comparative advantage for the CGIAR in the activities that the CRPs proposed. The consultants were asked to look at similarities and differences in the approaches and opportunities for linkage and synergy across CRPs, and to make suggestions on optimal strategies, and learning between the CRPs.

## **I. Value chains**

In several of the CRPs, the benefits, particularly from commodity systems, are expected to come through value added to specific products and more generically through income generation. CRP research has often been designed in a value chain context and several CRPs explicitly address constraints to functioning value chains. A scan across the CRPs confirms the choice of this theme for an analytical study as all CRPs mention value chains in their work. The ISPC interprets value chain approaches to cover issues related to both input and output markets and to include research on properties of the commodity and production systems that are determined by the value chain context, such as quality and food safety.

In the think piece, the author quotes the definition of value chains stated in CRP1.1. on Dryland systems (citing the Sub-Saharan Challenge Program): *..all aspects from the availability of rural credit and the purchasing of seed and other inputs to land preparation, agronomic management, quality control to meet market standards, post-harvest technology, packing and transport, food processing and interactions with output markets. The value chain is placed in an infrastructural, institutional, socio-economic and policy environment.* This definition was considered to be in line with definitions found in the academic literature.

The Value chain document makes a useful distinction between local and regional value chains, which are the most relevant for developing country small-scale farmers, but it includes also reference to global value chains. The paper highlights certain theoretical principles on, for instance, market linkages and market orientation; power relationships and bargaining position; distribution of value added or margins; arrangements between actors both vertically (along the value chain) and horizontally (among actors in one link); and information asymmetry in the value chain. It also acknowledges the limitation and variability of literature on this subject and the variability and vagueness of interpretation of the value chain concept therefore follows. The author has focused on the different interpretations in the CRP proposals and cross-linkages between the CRPs, and on four basic aspects of importance for enhancing value chains through research.

### ***1. Value chain approaches in CRPs***

All CRPs propose some research on value chains, or refer to a value chain approach or context. There are big differences, however, in how the concept and approach has been understood in different CRPs. CRP3.7 (Meat, milk and fish) has truly embedded the value chain approach throughout its proposal, including the value added, and market access and linkages as the key issues involving both backward linkages all the way to input and service markets and forward linkages to product markets. It has the most complete approach in the areas evaluated. Furthermore, CRP3.7 has a clear budget allocated to value chain research (~20%), and its approach is considered appropriate by the author. Two other CRPs also

present a broad value chain approach: CRP2 (Policies, institutions and markets), particularly theme 3 on “linking small producers to markets”, and CRP3.4 (Roots, tubers and bananas), particularly theme 6 on “promoting post-harvest technologies, value chains and market opportunities”, supported by strong referencing of important value chain literature. CRP4 (Nutrition and health) deals particularly with food safety and risk issues. The other CRPs pay little attention to specifying value chains, an exception being the carbon value chain mentioned in CRP7 (Climate change). In the system CRPs it is less clear what the interpretation of value chains entails and the approaches proposed are rather limited.

The author concludes that an overall understanding of what a value chain is and how the concept can be applied in research is not adequately covered in the majority of CRPs, with the exceptions noted above. Most CRPs appear to view value chains as a summary of single stages rather than a chain with bidirectional interactions and causalities.

The author identified two kinds of linkages between the CRPs. Bilateral linkages are related to a product or a value chain, such as fish value chains linking CRP1.3 (Aquatic agriculture systems) and CRP3.7; and nutrition aspects in value chains linking CRP4 and CRP3.7. There are several examples in the think piece and all include either CRP3.7 or CRP4. Other linkages are about methodological issues. CRP2 is given, and assumes a strong role as a source of information. CRPs 3.7 and 3.4 also contribute to methodological issues. Importantly, the think piece highlights possibilities for data collection and use where CRPs can gain from one another. These opportunities for learning and synergy would be enhanced by system level planning or a community of practice around common issues.

## ***2. Market linkages and adding value***

All CRPs mention market linkages and market orientation in their proposals. Several also include something on market information systems. The author emphasizes the importance of supply markets as well as relationships between producers and suppliers. CRPs 3.7, 2 and 3.4 elaborate their plans on market research and market information systems, but also on consumer willingness to pay. Market diversification is explicitly discussed in CRPs 3.1, 3.4 and 3.5. Value chain analysis related to food safety is included only in CRP4. CRP4 also addresses risk assessment. These types of issues—market research and information, market diversification, food safety, value chain risks—are important for many CRPs.

## ***3. Governance and bargaining power***

The plans are generally presented in an institutional and business context. In most CRPs, the discussion on value chain governance issues (such as relationships between actors and coordination along the chain) is limited and the author judges it to be generally at a high level of abstraction (again with exceptions). Attention to how value chains should be organized and research hypotheses for governance analysis are limited. The proposals that have a broad perspective on governance place attention on multiple governance-related issues. Such issues include different marketing systems, market functions to benefit the poor, arrangements between actors along the value chain (vertical relationships) and amongst smallholders (horizontal relationships), and social capital.

## ***4. Upgrading***

The four aspects of upgrading in the value chain context highlighted in the think piece include: upgrading of products; upgrading of processes; functional upgrading (in-sourcing production or distribution functions); and inter-sectoral upgrading (product differentiation). The innovation platform concept is mentioned in most CRPs and thus seems to be a generic

CGIAR approach. It is often seen as a means for broadening partnerships. However, not much is said about reshuffling of roles and activities within the value chain or collaboration between different product chains. Focus tends to be placed on a single linkage in the chain (smallholder farmer) rather than on the whole chain or its governance and no performance measurement frameworks for value chain upgrading are provided. This is an area where all CRPs could benefit from a strengthening of their approaches.

### **5. Methodologies**

The think piece discusses methodologies related to value chain analysis and functioning, upgrading and performance of value chains, including impact assessment. CRPs 3.7 and 2 present the most comprehensive plans regarding methodology although most CRPs mention various methods and instruments (surveys and impact assessment methods). The ISPC considers it important to monitor value chain performance and the influence of CRP research at the different stages. The approaches in research planning in many cases need more specificity and a broader perspective of what value chains are and how they can be improved. The author notes, however, that this is an area where the literature isn't very rich either. More attention needs to be paid to risk assessment methodologies, including food safety as a specific area, and supply and demand risks in general. These considerations need to enter in the Theory of change to be developed for value chain research.

### **Recommendations**

The analysis has highlighted the uneven interpretation of value chain concepts and dimensions across the CRPs, together with some of the uncertainty still apparent in the published literature. The ISPC considers that this analysis of large variability among CRPs, and the large knowledge gap observed demonstrates that there are obvious opportunities for collaboration and learning between the CRPs. CRPs 3.7, 2 and 3.4 are in the best position to lead the development of methods and approaches to value chain work in the system. The ISPC encourages these CRPs to work together to identify the specific capacities in each CRP and proposes CRP3.7 to lead in establishing close collaboration with relevant researchers and managers in the other CRPs to facilitate effective strengthening of the analytical skills across the portfolio of programs. CRP2 has strengths in addressing methodological and institutional issues, related to, for instance, value chain analysis, upgrading, and monitoring value chain performance. There is clearly a need for the general capacity in the system to be improved. The knowledge gaps identified in the analysis in most CRPs should be addressed to help them develop better justified and elaborated plans for value chain research. The think piece also underlines the importance of gender analysis in the context of value chains and the role of gender in linkages along the value chain. The role of women and children is a specific issue.

The ISPC strongly supports the recommendation in the think piece that value chain analysis and results should be incorporated into the Theories of change (TOCs) of the CRPs that support research design and monitoring. (The improvements needed for TOCs in general are addressed in the cross-CRP analysis of Theories of change and impact pathways). The reason for this is that value chains are typically expected to facilitate change in agricultural development leading to positive impacts, particularly on poverty. In the CRPs it would help to clarify the interpretation of the value chain concept and expected contributions from the research both directly and at the SLO level. A wider concept of value chains would help identify some key mechanisms to delivering change. This is clearly one area where more thinking and analysis of the causality will be needed to help specify research activities and facilitate monitoring. In the ISPC's view it would also be beneficial for all CRPs planning to

adopt a value chain approach to use the same definition and to explore together how lessons learnt during implementation of the proposals can be shared.

The think piece sees comparative advantage for the CGIAR in value chain research because the portfolio covers a large number of value chains and systems. As stressed in the analysis, value chain assessments could inform technology development and implementation and complement technology projects and impact assessment. A synthesis of cross-CRP experiences would have particular value. In the ISPC's view, an explicit mechanism for effective coordination and monitoring might be needed to stimulate transfer of knowledge and experiences across CRPs so as to ensure that the value chain approaches enhance impact potential of the CRPs.

## **II. Seed systems**

The access of farmers to improved seed is crucial for the CGIAR crop improvement programs to deliver results. However, availability and access to seed are often constraints in the impact pathway for crop improvement. The issues relate to the organization of seed production and delivery, policies and regulation of seed passage and trade, and how the different formal and informal institutions function for seed delivery. The think piece raises several common issues that apply across the CRPs.

The basic premise in the think piece on Seed systems is that seed is the foundation for much of agriculture and that for the CGIAR, seed delivery is an issue of survival. The paper is structured around two areas: (1) the different aspects of seed systems, such as seed delivery, policy, regulatory systems, source seed management and information; and (2) seed activities in the CRPs.

The author comments on the language of CRP proposals, which appears aspirational and thus vague making it difficult to understand what is actually suggested to be done. The ISPC agrees that CRP proposals and descriptions should be explicit and informative using a TOC process to develop a realistic agenda, which the author argues should focus on delivery of varieties. This would involve addressing the barriers to delivery at the appropriate level (often national rather than regional) and defining a suitable role for the CGIAR in this area where the CGIAR needs to define a clear mandate.

Most of the different activities that fall under "seed systems" are not in the realm of research. This theme was chosen by the ISPC precisely because it is at the border area of research and development. It is in the interest of the CRPs to understand the number of obstacles preventing effective seed delivery to identify what is needed and how the CGIAR can be influential without necessarily implementing the activities. The author argues that the multiple activities under seed provision largely represent scaling-up, which is not a responsibility of the CGIAR, but of its partners. Weaknesses in carrying out this responsibility will, however, seriously jeopardize potential impact and this requires attention by the CGIAR. Thus partnerships, and the ability of partners to fulfill their role, are important issues. Regarding the NARIs, the lack of capacity and resources are often a constraint that will influence the role they can play.

### ***1. Key activities around seed systems***

The think piece discusses several activities related to how seed production and delivery are organized, and the enabling environment of policies and regulations. The analysis regarding what chance the CGIAR has for being effectively involved in the activities is very thought provoking. The areas of seed policy and regulation are national-level concerns and the author does not see CGIAR's involvement in particular policy development a high priority, or its past record on practical policy change very convincing. Indirect influence on policy-makers through partners may be more preferable. In regulation (which consists of a number of activities), there is often a discrepancy between policy and reality, making it complicated to influence change. Possibilities for regional regulatory harmonization are an issue of interest for the CGIAR. Multiplication at different levels is also an important issue for the CGIAR, but is very dependent on crop, country and capacity, in particular. The author identifies resourcing and management as weak in many countries, particularly with regard to the transfer of public responsibility to the private seed sector. An example of a good process to advocate seed is the distribution or sale of introductory small packages of seed which would help emerging private sector seed producers. The author considers it important that a strategy involving multiple means to distribute (and introduce) varieties to farmers' fields are tested and adjusted (with the support of governments and donors) until such time when commercial incentives are available.

### ***2. Assessment of CRP areas of attention in seed systems***

The conclusion in the think piece is that seed activities are not well prioritized in the CRPs despite the often large budget allocated to them (up to 16%). In addition the activities are vaguely described (for instance, addressing "weak seed laws", or "a platform for enhanced knowledge sharing") and thus do not reveal a priority. The general International Public Good expectation may cause tension between prioritizing research that has generic, somewhat academic relevance and dealing with the country level, where very particular interventions, often not research-based, are quite urgently needed. Precisely here, the vagueness of what will be done prevents the judgment of whether such actions will have any useful practical effect.

The author argues that most of the bottleneck issues need to be solved at country level due to the differences between countries on policies, laws, regulatory frameworks, business environments and public sector capacities. This may not require cutting-edge research. Regarding issues of policy and regulation, the author sees clear scope for the CRPs to work collectively through their partners. For instance, agreed protocols are not implemented due to lack of funding or capacity, but the CGIAR can collectively enhance the implementation. A role is seen for lobbying rather than research. CRPs need collective thinking to address the institutional weaknesses among partners to take the responsibility for source seed production. Seed multiplication beyond that stage is a complex issue and needs to be addressed in the national context. Therefore the CRPs need to engage collectively in the development of an optimal strategy with their national partners. The author notices that the main attention in the CRPs is on the non-conventional "community seed production". The author questions the durability of these systems and the size of markets that these systems can address, unless sustainable business plans are developed and followed. This, however is not addressed in the CRPs and therefore learning from the past experiences is recommended. There is also a call to study farmer seed systems, raised in many CRPs, for their ability to enhance variety delivery.

A particular challenge is seed delivery for crops not attractive for commercial seed markets, which therefore may need special public investment to support delivery in the immediate future. The author calls these “orphan crops” and states that in some countries they may include most crops other than hybrid maize. With these crops, methods to introduce them to farmers and in the longer-term, more sustainable agents (private sector) are particularly important, such as small-packaging of introductory samples. The author advises against *ad hoc* investments without a clear strategy of how to advance delivery of varieties with these crops. Broad-based, sustainable seed production should be in the interest of both countries and donors. The author emphasizes the importance of the demand side, which should be stimulated through active provision of information. As price also affects demand, the think piece encourages monitoring of variety uptake and performance.

There is caution against getting too involved in developing seed systems or conducting analyses of seed-related issues across countries, when they tend to be very localized by nature. The paper emphasizes the need to prioritize activities with enhanced seed delivery as a primary goal. Relevant activities may deal with variety release regulations, and issues related to source seed.

### **Recommendations**

Given the importance of functioning seed systems to the CGIAR for generating impact from the wide crop improvement activities, the ISPC agrees that the focus in defining and prioritizing CGIAR investments should stress the importance of variety delivery. The activities should be screened through this lens, also recognizing that for most interventions, partners are better placed to implement them. Thus the CGIAR should develop its role as a collaborator, rather than a leader. The lack of detail on what the CRPs intend to do reflects a lack of prioritization. The ISPC thinks that this is urgently needed, as the non-functioning seed systems pose a serious constraint in the CGIAR impact pathways for crop improvement.

The four areas that are highlighted in the think piece as demanding urgent and practical strategies are: organization and implementation of variety release; production of breeder seed by NARI (including judgment whether this is possible); handover of source seed from public research to commercial seed producers; and exploring the most effective ways of delivering seed of crops for which there are demonstrated farmer benefits but currently no incentives in the commercial sector for production and delivery. In the ISPC’s view, the CGIAR needs to determine the extent to which the crops it deals with and are considered high priority crops for the overall goals (and the System Level Outcomes) but fall into these categories. The ISPC agrees that there are important opportunities for the CRPs to work together in considering strategies in countries, in which they all operate, to address the most challenging issues posing obstacles to variety delivery. They should also explicitly define those activities where the CGIAR has clear comparative advantage either in a leader or support role. A lead role may be more limited than is currently assumed in the CRP plans. Subsequently, for choosing their partners and the way to operate with them, the CRPs need to know the capacity of national actors, and the extent to which the actors, such as seed producers, receive support from donors or other programs.

## **ANNEX 1**

### **Assessment of value chain content of the 15 CGIAR Research Programs (CRP)**

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**22 September 2012**

#### **1. Introduction**

The assignment is to prepare an analytical think piece on value-chain-related content in CRP proposals, drawing on my expertise and current literature. The ISPC is particularly interested in the choice of researchable issues, synergy between CRPs where research issues overlap, and CGIAR's comparative advantage over other actors, given that it is a research organization.

The set-up of this document is as follows. First I will discuss my understanding of value chain research. Then I will give an overview of interpretations and application by the various CRPs. In the next sections the focus will be on how CRPs integrate key points of attention of this research field in their programs. Key points of attention are market linkages and value addition, governance of value chains and bargaining power, and upgrading of value chains. Further, I will discuss methodological approaches and (potential) synergies between CRPs. The report ends with conclusions and strategic considerations for CGIAR.

The piece is based on the full text of CRP3.7 and extracts of the other CRPs.

#### **2. What comprises value chain research?**

In one of our communications value chain approach was expressed in the following way (CRP1.1, p191) : "...all aspects from the availability of rural credit and the purchasing of seed and other inputs to land preparation, agronomic management, quality control to meet market standards, post-harvest technology, packing and transport, food processing and interactions with output markets. The value chain is placed in an infrastructural, institutional, socio-economic and policy environment."

This understanding seems to be in line with what we find in the literature. For example, Kaplinsky and Morris (2000) provide the following definition of value chain: "the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use." Schmitz (2005) defines a value chain as the sequence of activities required to make a product or provide a service to the final consumer. Gereffi et al (2005), in their definition, state that the global value chain is the different ways in which global production and distribution systems are integrated, focusing on the position of the lead firm in the chain, power relationships and subsequent governance structures in international/global value chains. All authors stress the importance of the institutional and business environment of value chains in their analyses.

Much of the literature on value chains is about global value chains incorporating multinational corporations. In this report we will focus on smallholder chains, which are in most cases local and regional.

To be able to define the right components for studying value chains, we have to go back to various theoretical perspectives that form the basis for the value chain approach. We can distinguish Supply Chain Management, focusing on management of (logistics processes) in chains, New Institutional Economics, focusing on organizational arrangements between actors in the chain, and Social Network Theory, focusing on embeddedness of companies in networks of stakeholders to their productive processes (see annex 1 for a more elaborated discussion). The value chain approach addresses principles of these theoretical streams including market linkages and market orientation, power relationships and bargaining position, distribution of value added or margins, arrangements between actors and information asymmetry in the value chain. The role of the institutional and business environment is key in most value chain studies.

However, the literature on value chains is very diverse and a clear theoretical framework and methodology for value chain analysis is still non-existent. This has led to many different ways of interpreting the value chain concept and a blurred understanding of its meaning. This also applies to the CRPs, which emphasize different value chain aspects and have different focal points in their analyses.

It should be stressed that the basic research entity in value chain research is the relationships between different actors (producers, traders, etc.) in the chain, vertical relationships (upstream or downstream in the chain) as well as horizontal relationships (between companies/smallholders in the same link of the chain). This is the interpretation that I follow in this report, in which I focus only on activities at the company level as far as these are directly connected to the production of value for a certain market. (The same holds for the horizontal relationships: I focus on relationships between smallholders, as far as these impact the production of value for a certain market).

### **3. Interpretation of value chain research in CRP reports**

The value chain approach is mentioned by almost all CRPs as an important element of their research. However, the approach used often encompasses processes and functions at company level, without considering their impact on other actors in the chain (e.g. productivity considerations, gender issues in value chains).

In the following I will discuss the value chain approaches as applied by the CRPs.

CRP3.7 really has embedded the value chain approach in its program. It has a broad and multidisciplinary view on value chains as defined on page 12 of the report (where value chain research encapsulates market access and market linkages and the addition and capturing of value added as key issues) and on page 7 (“...value chains encompass both backward linkages to input markets and services, including credit, institutional and governance arrangements, such as farmer co-ops, contract farming, and MSMEs; and forward linkages to product markets.”) As these descriptions show, value chains are seen as being embedded in an institutional and business environment. CRP3.7 indeed consequently applies the value chain approach in all its cases. For all projects it proposes target setting and in-depth value chain

assessment as prerequisite steps for technology development and implementation. On page 20 it states that value chain development provides the demand-driven context for technology development. And on page 15, the report states that value chains “...will provide a setting for integrating the technology generation and adaptation work...” Interestingly, CRP3.7 also looks, for example, at how diseases can prevent access to markets, thereby directly linking the domain of the CRP to value chain analysis.

The other CRP with a broad value chain approach is CRP2 on policies, institutions and markets. Program theme 3 focuses on “linking small producers to markets”. The report states that although research in CGIAR typically focuses on increasing farm productivity, this CRP focuses on developing willing buyers through improved private-sector business practices. The theme identifies key constraints and opportunities in value chains and evaluates options for upgrading value chains. Sub-theme 3.1 (innovations across the value chain) looks at how to make commodity markets function better for the poor through value chain innovations in five areas: reducing transaction costs, managing risk, building social capital, enabling collective action, and redressing missing markets. These areas typically address market linkages and governance of value chains.

CRPs 1.1, 1.2, 1.3 use the term value chain in many sentences, however without giving a clear view of what it is and what role it will play in the research program. In CRP1.1 typical value chain aspects, such as linkages to markets and distribution of benefits, are mentioned. However, key attention seems to go to the institutional and business environment of the value chain. And in CRP1.2, the main focus seems to be on the producer level and how institutions affect the value chain. In this regard the value chain approach used seems rather limited.

CRP3.1 stresses that new in their approach is the integration of socioeconomic analysis with biophysical research priority setting. A similar view is expressed by CRP3.3, wherein socioeconomic research and evidence-based ex ante assessment and priority setting are seen as the basis for targeting of R&D activities (similar to CRP3.7). CRP 3.5 also sees the value chain perspective as providing an innovation framework for integrating social and economic analysis with traditional strengths in crop improvement.

CRP3.4 (on roots, tubers and bananas) has a very broad and rather complete view on value chain analysis, especially through its theme 6: promoting post-harvest technologies, value chains and market opportunities. This view is underlined by the many references to important value chain literature.

The other CRPs all stress the importance of the value chain approach. Among them, CRP6 and CRP7 pay (at least in the extracts I have read) the least attention to the concept, although the latter CRP introduces the concept of the carbon value chain, including 1) aggregator organizations (producer groups, farmers’ organizations, natural resource management associations, etc.); 2) intermediary organizations; and 3) private sector players in the voluntary carbon market.

### 3.1 Conclusion

In general, an overall understanding of what a value chain is and how the concept can be applied in research or in pre-project assessments seems to be lacking in most CRPs (with exceptions, in particular CRP2, CRP3.7 and CRP3.4). Most CRPs look at a value chain as a summary of single stages, instead of considering how the linkages between the stages are

made up. Typical issues should, however, include how value is added and how products are transferred from linkage to linkage, what alternative channels are followed to reach the end-market, how arrangements and power positions of different stages are structured, what this means for the bargaining power of producers and how added value/margins are distributed along the value chain. Although application of the value chain approach in the CRPs forces the researchers to take a farm-to-fork perspective, a balanced conceptual framework is still missing.

#### **4. Market linkages and addition of value**

Market linkages are an important area for research in all CRPs. This subject draws the most attention in all CRPs and will be discussed in-depth in this report.

CRP3.7 pays ample attention to market linkages of producers, input as well as output markets, and increase of value added. It focuses on small-scale traditional production and marketing systems and informal markets. The typical value chain and market channel the CRP wants to address is not clear, however. CRP3.7 states on page 6 that spill-overs to the better-off group of smallholders will not be viewed as an added indirect and positive outcome. Then, on page 7 it states that there is a “lot of leakage” across markets and producer and consumer groups. However, leakages can bring extra income to the smallholder-poor and by-products will still flow to lower-value markets. Further, it stresses its goal to “grow” the value chains towards more intensive and productive chains. This is also stressed in the description of the selected value chains. For example, in the case of the fish chains in Uganda and Egypt, CRP3.7 wants to focus on supporting smallholders to reach a next stage of development. This includes moving from local and traditional markets to more developed retail markets (page 105).

CRP 2, theme 3 addresses the linking of small producers to markets, paying attention for example to how smallholders can gain access to retail structures, including modern retail. It explicitly links the subject to farmers' information needs and the mechanisms to satisfy them. A marketing infrastructure is in this respect very important and it stresses the importance of a sufficient level of information and communication technology in rural areas. Moreover, the importance of market orientation is underlined by this CRP: it states that, although until recently research in CGIAR typically focused on increasing farm productivity, “this CRP focuses on developing willing buyers through improved private-sector business practices. As a consequence, the decision-making nexus and power shift toward the buyer’s end of the chain”.

CRP1.1 (SRT3) focuses on livelihood strategies that may include diversification into more market-oriented systems or other income sources. Attention to market linkages, new value-adding activities and knowledge sharing is important. It stresses that some agricultural systems in dry areas are in transition from primarily subsistence to more market-oriented forms and that investment in infrastructure and improved access to markets can drive rural growth. The CRP includes research at different scales: from community-based research groups to regional value chains and networks.

CRP 1.2 states that within value chains, markets are a critically important institution whose functioning is influenced and shaped by a number of other institutions. In fact a value chain consists of multiple markets for different products, services, and resources. Its trade-off analysis will primarily focus on the farm level, but may include trade-offs within the value chain, when increased market efficiency is achieved by reducing transactions (and eliminating

their actors) within the chain, which positively affect transportation costs, transaction costs, inefficient bulking through too many transactions along the chain, large differentials between the farm gate sales to middlemen, weak market intelligence amongst producers and price volatility. A possible criticism of this CRP is that it does not discuss the changing position of (poor) middlemen and other intermediary actors in the chain.

CRP1.3 focuses in theme 2 on equitable access to markets. It stresses that outcomes of the CRP must include the adoption of technologies and practices that add value to products, the creation or strengthening of producer, trader and marketing organizations and the creation and utilization of new market information systems.

CRP3.1 also addresses market orientation of smallholders and market participation patterns and searches for efficient strategies for linking farmers with markets. It also stresses the importance of institutional innovations for delivery of market information. Moreover, diversification and market innovations for reducing imperfections and volatility in wheat markets and developing efficient, quality differentiated, and equitable value chains are mentioned as important fields of attention. An interesting feature is the aim to differentiate quality threats according to quality attributes preferred by importers, processors and exporters. This really reflects market orientation.

CRP3.2 also stresses the importance of more efficient markets and market access and propagates market analysis. One proposed outcome relates to input suppliers. Seed companies and other input suppliers are better able to target their products to particular agro-ecological niches, thereby making the maize value chain more efficient.

CRP3.3 states that limited market information prevents market-oriented production. It aims at the development of marketing and marketing information systems, related to demand for (specialty) rice and rice products. Related to this, critical feedback from all users in relation to product development is an important theme mentioned by this CRP. Theme 4 includes the aim of extracting more value from rice harvests through improved quality, processing, market systems, and new products.

CRP3.4 recognizes that in many parts of the world, RTB crops are moving from subsistence to commercial systems. The development of value chains driven by the private sector for added-value products – fresh and processed – for national and export markets is well advanced in some regions. “... focusing more on demand and working backwards to link to supply has proved to be a more sustainable way to [stimulate] smallholder productivity growth”. This approach stresses the importance of diverse markets and products, including the development of market niches. Customer willingness to pay premium prices for specialty products is an important research issue in this regard. Finally, this CRP pays ample attention to evaluation of value-adding technologies.

CRP3.5 states that access to only local markets restricts demand and incentives to increase production. Grain and other smallholders have limited access to markets (input and output) and often sell immediately after harvest, when prices are lowest. Farmers have little access to information on prices and supply and demand conditions. In this respect, linking farmers with markets creates awareness about product quality. The CRP wants to develop market-led innovation platforms. Farmer associations, cooperatives and private businesses will increase the value of grain legumes through sorting, grading, processing, packaging, and promotion. Priorities also include fostering value-added processing that simplifies preparation and boosts

consumption, such as ready-to-eat snack foods, thereby transforming commodity value chains.

The other CRPs pay (in the extracts) less attention to market linkages. CRP3.6 states that it wants to link farmers to industrial users; CRP 4 will perform market and consumer research and pay attention to information asymmetries regarding nutrition among different value chain actors, including consumers; CRP 5 does not pay a lot of attention to market linkages and value chains, but stresses the importance of investigating land, labour, finance, and product markets; CRP6 projects will include market information systems and information hubs in order to increase market access of smallholders.

#### 4.1 Conclusion

Most CRPs pay ample attention to market linkages and market orientation; and market information systems are mentioned by a number of CRPs as an important field of attention. Most CRPs plan to perform market research, and in several market information systems will be developed. It is important that the research includes not only demand markets but also supply markets (addressing farmers) and related sourcing relationships. Notable is the scarcity of attention paid to service providers in the various CRPs.

An important issue related to value adding is consumer willingness to pay. CRP2, CRP3.4 and CRP3.7 are the only three that pay attention to this subject. Another important theme in value chain research, market diversification, is explicitly or implicitly mentioned by a number of CRPs: explicitly by CRP3.1, 3.4 and CRP3.5 and more implicitly by, for example, CRP 2 and CRP3.7. In general, however, there seems to be little clarity on how to link value addition to market diversification and consumer demand in these markets.

Although standards and certification related to food safety is an important issue mentioned various times (e.g. CRP2), I have not seen in-depth attention given to value chain analysis of food safety considerations. Only component 3 of CRP 4 (improving nutrition and health) focuses explicitly on food safety issues and pays attention to risk assessment (focusing on mycotoxins and biological hazards through zoonosis and water transmission).

### **5. Governance and bargaining power**

Governance focuses in most CRPs on distribution of margins/value added over the chain, in particular on the position of smallholders therein, and on the institutional and business environment of the value chain.

In CRP1.1 the focus is primarily on livelihood strategies rather than productivity per se. These strategies may include diversification into more market-oriented systems or other income sources. In this respect it also stresses that social and institutional support networks and systems will be needed. CRP1.1 strongly places the value chain in an infrastructural, institutional, socio-economic and policy environment. In key research questions it mentions institutional arrangements and access of poor farmers to high-value chains. However, attention to arrangements between actors in the value chain, such as contracts or informal arrangements, seems to be missing.

CRP1.2 also addresses ensuring equitable distribution of benefits, which may require specially tailored institutional innovations in agricultural value chains. With the innovation system approach, CRP1.2 focuses on technological, social and institutional change.

CRP1.3 asks in its research questions whether gains in productivity or export price can be transmitted backwards along value chains to producers, and how smallholders can improve bargaining power to achieve better prices for their produce. Planned outcomes of CRP1.3 include the creation or strengthening of producer, trader and marketing organizations.

CRP3.7 includes governance in its analysis, focusing on distribution of value added such that “the poor can capture a significant share of the benefits”. Further, it includes the different aspects of value chain governance in its projects: differences between formal and informal marketing systems, bargaining power, horizontal relationships between smallholders and the role of institutions. Also, CRP3.7 pays ample attention to the enabling environment in its analysis and selection of value chains. It underlines the importance of taking the institutional setting into account in development projects.

CRP 2 addresses the importance of organizations and institutional mechanisms to improve horizontal and vertical coordination. Sub-theme 3.1 (innovations across the value chain) looks into how to make commodity markets function better for the poor through value chain innovations in five areas: reducing transaction costs, managing risk, building social capital, enabling collective action, and redressing missing markets. CRP2 includes hereby a number of governance-related fields of attention.

CRP3.4 defines as one of its outputs: approaches for equitable inclusion of the rural poor in value chains, including collective marketing, chain governance, PPP mechanisms, and stakeholder platforms. Moreover, CRP3.4 explicitly pays attention to vertical arrangements (contracts) between actors in value chains by including in the investigation private sector partnerships such as “contract processing” as a means of reducing costs of coordinating many low-technology-dependent, small-scale processors and vertically integrating them into profitable RTB value chains. Further, CRP3.4 mentions the importance of social capital in relation to horizontal relationships between smallholders. Together with CRP3.7, CRP3.4 seems to have the most encompassing view on governance of value chains.

CRP3.5 stresses the importance of collaboration between smallholders: “institutional frameworks including farmer associations and cooperatives can: 1. help farmers [gain] better access and capacities to engage with value chain stakeholders; 2. [help farmers] negotiate fair prices for their harvests; 3. give [farmers] access to new technologies and inputs,....”. It also has a chain-wide approach to governance issues, focusing on the “....nature of institutional linkages among different economic actors in the sanitation value chains”, including paying attention to transaction characteristics and types of arrangements such as informal and formal contracts.

The other CRPs pay less attention to value chain governance issues. Interestingly, the focal point of CRP3.1 and CRP3.2 is public-private partnerships as institutional innovation. CRP6 mentions attention to franchising strategies and outgrower schemes. CRP7 addresses interaction with CRP2 focusing on Organization of value-chain partnerships (such as contract farming) for holistic adaptation.

## 5.1 Conclusion

In most CRPs, attention to chain governance issues is limited and focused particularly on the (potential or constraining) role and impact of the institutional and business environment, the distribution of value added, and the bargaining power of smallholders. Discussion on governance issues also seems to stay at a high abstraction level without providing insight into the details of governance structures in value chains. Exceptions are CRPs 3.4, 3.5 and 3.7, which adopt a broad perspective on governance issues, also addressing for example social capital and horizontal collaboration between smallholders, and vertical arrangements such as contracts. However, in general attention to the way value chains are and should be organized is rather limited in all CRPs and a framework for governance analysis with research hypotheses is not present.

## **6. Upgrading**

Most approaches to upgrading found in literature focus on upgrading of value-added production. This can take various forms (e.g. Humphrey and Schmitz, 2002):

- upgrading of products (and packaging)
- upgrading of processes
- functional upgrading (in-sourcing production or distribution functions)
- inter-sectoral upgrading (product differentiation).

Upgrading may further focus on improving market access and improving arrangements (e.g. contracts) between actors in the chain. Upgrading takes place through partnerships between private and between public and private parties (see annex 2 for elaboration).

CRP3.7 underlines the importance of multi-disciplinary research (e.g. page 15) and the establishment of partnerships around the value chain under study through so-called innovation platforms. The establishment of innovation platforms to achieve change seems to be an overall CGIAR approach, mentioned by most CRPs. CRP3.7 also stresses the importance of partnerships with the private sector, for “tapping into their research and business expertise”.

CRP1.1 pursues the innovation system approach in SRT1, stressing that agricultural innovation is not just about adopting new technologies; it requires a balance amongst new technological practices, and alternative ways of organizing, for example markets, labour, land tenure and distribution of benefits. SRT3 stresses that partnership and knowledge sharing are essential to reach goals.

CRP1.2’s IAR4D (Integrated Agricultural Research for Development) implies also the innovation system approach for development. Its research approach is action oriented and bottom-up with subjects such as access of poor households to technology and markets, through farmer associations and through value-adding processing. It aims at broadening partnerships to cover all value chain components and at identifying and establishing new value chains and value-addition partnerships. It wants to give specific attention to policies and institutions affecting collective action.

CRP1.3 also stresses the importance of action research. Outcomes of this CRP will include the adoption of technologies and practices that add value to products; private and public investments in value chains; the creation or strengthening of producer, trader and marketing

organizations; the creation and utilization of new market information systems; and the provision of value-added products to consumers.

The other CRPs all underline the importance of partnerships and, in many cases, the establishment of multi-stakeholder and learning platforms in development projects. For example, CRP 4 identifies four project partnership categories: 1. enablers (policy), 2. development implementers, 3. value chain actors, 4. research partners.

## 6.1 Conclusion

Although the CRPs, as is embedded in their domain, pay attention to improving/upgrading products and processes, and some CRPs also pay attention to development of new products (e.g. for new markets), little is said about reshuffling roles/activities in the value chain (functional upgrading, e.g. producers that start packaging their products) or collaboration between different product chains. Most CRPs underline the importance of partnerships in achieving upgrading in value chains, but there seems to be little attention paid to upgrading of organizational (governance) arrangements in the value chain. A major point of criticism is that upgrading focuses on a single linkage in the chain, in particular on the smallholder farmer, instead of on upgrading of a whole value chain (from farmer to consumer). Another criticism is that there seems to be no performance measurement framework for value chain upgrading, including performance of product and process upgrading, value chain organizational (governance) change processes and (changing) access to markets.

## **7. Methodologies**

CRP3.7 mentions value chain development methods (page 18) and addresses synergies between methodology and toolbox development (page 19). Further in the text we find attention to decision support tools, for feed transportation for example. As was addressed before, CRP3.7's approach to research is that "the targeting and value chain assessments will be implemented first, with that learning then being used to drive and refine the choices for priority technology development" (page 20). Value chain assessments include identification of opportunities and key constraints.

CRP 1.2 mentions system surveys and will focus a lot on impact analysis (market impact parameters; compliance with industry standards; credits; buyers...).

CRP2's theme 3 will create an overarching theoretical framework for value chain assessment/analysis. Sub-theme 3.2 (impact of upgrading value chains) will identify appropriate indicators and methods for monitoring the performance of projects, evaluating their effectiveness, and assessing their impact on the poor and other target groups, including women. Methods of CRP2 include sampling techniques of mobile market agents, such as traders, margin calculations, whole chain performance, and power relationships. However, "few tools have been developed to design and implement economics- and management-based change within value chains". This underlines the lack of unifying methodology and performance metrics for value chains.

Other CRPs that mention value chain analysis tools are CRP3.2, CRP3.3 (including for example assessment of consumer needs and marketing analysis and LCA), and CRP 3.4. (organizational models and life cycle assessments, as well as policy and economic analyses).

## 7.1 Conclusion

In general, although various methodologies and instruments (such as LCA) are mentioned by various CRPs, a balanced methodological framework and toolbox for value chain research and upgrading of value chains is also missing (see earlier remark). Striking is the lack of value chain performance measures. Impact measurements focus on indicators on company level, more specifically on productivity-related and consumer-level indicators. Indicators on value chains, such as market information exchange, market diversification measures, development of margin distribution and prices, product assortment, etc., are missing. However, as far as I can see, balanced frameworks on value chain performance are also not present in the literature, which poses a challenge to the CGIAR CRPs.

Also notable is the lack of attention paid to risk assessment methodologies, not only related to food safety issues, but also to supply and demand risks in general.

## **8. Cross-links between CRPs**

In general we can distinguish two types of cross-links between CRPs.

One is on the product or value chain level. For example, CRP1.1 connects to the product value chains in dry areas addressed in CRP3.7; CRP3.7 may connect to CRP1.2 regarding information requirements for feed inputs, and also, for example, to CRP4 for joint exploration of feeds and post-harvest aspects such as food safety and zoonotic risks; CRP 4 connects to CRP 1.2 regarding nutrition-sensitive value chains; CRP1.3 with CRP3.7 regarding fish value chains; CRP3.2 with CRP 4 to identify points at which nutrients are lost and gained in the value chain and possible interventions; and CRP4 with CRP3.7 about the inclusion of nutrition and health activities its focus value chains.

The other is on the methodological level. CRP 2 seems to play a key role in this regard and is mentioned by several of the other CRPs, including CRP3.1, CRP3.4 and CRP4, as a potential source of information on value chain methodologies. This supporting role seems also to be one of the aims of CRP2. Other CRPs with extended value chain capabilities are CRP3.7, with a balanced value chain assessment methodology, and CRP 3.4 with a quite complete analysis portfolio of value chains. CRP3.7 can furthermore collaborate in LCA studies with CRP 5 and 7. Moreover, data collected by one of the CRPs can be used by other CRPs, such as the use of CRP1 data by CRP7.

## **9. Conclusion and outlook**

The value chain approach is mentioned in all CRPs, however, most CRPs seem to have a knowledge gap in this respect. This holds for value chain concepts as well as for value chain methodology, including recognition of value chain upgrading options, and measurement of value chain (upgrading) performance. This is also expressed by the limited use of scientific literature by most CRPs. CRP3.7, CRP 2 and CRP3.4 are exceptions in this regard. Overall, knowledge and capabilities related to the value chain approach should improve. CRP2, probably in collaboration with CRP3.7 and CRP3.4, could take on the task of filling in this gap.

As value chain issues are related to the possibility to implement changes, value chain analysis and impacts should be incorporated in theories of change used by various CRPs. This could also support the intermediate measurement of value chain performance indicators, as an improved value chain may lead to positive impacts on poverty.

CRP3.7 defines criteria for value chain selection: growth and market opportunity; pro-poor potential; researchable supply constraints; enabling environment; existing momentum. It starts with targeting and value chain assessment before continuing with technology-related research and technology implementation. This approach could be of interest for other CRPs as well.

CRP3.7 also assigns a clear budget to the value chain theme. About 20% seems to make sense, as it largely concerns a supportive task/theme for technology development and implementation. The extracts of the other CRPs do not provide such information on the budget, however, an approach similar to that in CRP3.7 would seem to make sense.

Gender in value chain perspective, not mentioned before in this report, should focus on the role of gender in linkages (such as trade and marketing functions).

Finally, the comparative advantage of CGIAR in applying value chain research, could lay in the fact that it covers a wide range of value chains and systems. Moreover, the value chain approach seems to be on the way to being accepted as a framework for development studies and change projects. As demonstrated in CRP3.7, value chain assessments could precede technology development and implementation, and value chain research could also complement technology projects and impact assessment. By bringing knowledge and competences of various CGIAR institutes together and by creating learning environments for researchers, CGIAR could become a main player in developing country value chain research.

## Appendix 1

**Extracted from:** Trienekens, J.H., 2011. Agricultural Value Chains in Developing Countries; a Framework for Analysis. *International Food and Agribusiness Management Review*, 14 (2): 51-83

During the past decades there has been extensive theory building in the field of chains and networks, reflected in various analytical approaches. Scientific disciplines that add to the development of value chain research can be grouped into the following four streams with different perspectives on inter-company relationships.

### Supply Chain Management

This is a literature stream that investigates management of processes in chains. Supply chain management emerged in the logistics literature of the 1980s and initially focused on logistics planning and optimisation of inventories across the supply chain. Supply chain management is customer oriented, i.e. customer demand is leading in this approach. It aims to integrate business planning and balance supply and demand across the entire supply chain from initial producer to the ultimate customer/consumer (Bowersox and Closs, 1996; Cooper et al., 1997). Information and communication systems are considered the backbone of smoothly running supply chains.

The term value chain was first brought up by Michael Porter (1985) alongside similar approaches like the French 'filier' approach and the commodity chain concept that originated from World Systems Theory (Raikes et al., 2000), reflecting the value adding character of business processes within the borders of the company. Both supply chain and value chain approaches focus on primary processes, i.e. transformation and transaction processes in and across vertically related companies. In developing country perspective, SCM focuses on process and quality improvement and optimisation of distribution processes. In the food sector, for example, a lot of research has been devoted to integrated quality management systems; such as the study by Francis and Simons (2008) on quality improvement programmes in the red meat chain between Argentina and UK.

### New Institutional Economics

New Institutional Economics (NIE), with branches such as Transaction Cost Economics (TCE) and Agency Theory, investigates the rationale for governance choices regarding in-company and intercompany organisational relationships. In TCE transactions between companies are the basic unit of analysis (Rindfleisch and Heide, 1997; Williamson, 1985, 1999). Companies select the governance form that minimises transaction costs, under conditions of bounded rationality and opportunistic behaviour of partners. Value chain actors safeguard against the risk of opportunism through joint investment, monitoring systems and specific organisational arrangements such as contracts. In Agency Theory one party (the principal) delegates work to another (the agent), who performs that work (Eisenhardt, 1989). Roughly Agency Theory defines governance solutions ranging between measurement of output of the supplying party/agent (transferring risk to the agent) and measurement of behaviour/processes of the agent (transferring risk to the principal). NIE is increasingly used to determine the best agreement/contract for producers in highly uncertain business environments with opportunistic behaviour of actors involved and weak (institutional) enforcement regimes (see e.g. Ruben et al., 2007).

### Social Network Theory

The third theoretical stream of relevance is Social Network Theory. The social network approach views companies as embedded in a complex of horizontal, vertical and business support relationships with other companies and other organisations supporting inputs and services (such as advisory services, credit facilitators and transportation companies). According to this theory, relationships are not only shaped by economic considerations; other concepts like trust, reputation and power also have key impacts on the structure and duration of inter-company relationships (Uzzi, 1997). Since the 1990s Social Capital Theory has become an important branch within the network approach. Network relations may enhance the 'social capital' of a company, by making it feasible to get easier access to information, technical know-how and financial support (Coleman, 1990; Burt, 1997) and by encouraging knowledge transfer between network partners (Humphrey and Schmitz, 2002), thereby reducing transaction costs and improving access to markets (e.g. Gulati, 1998). In the last decade a lot of literature has emerged in the field of regional clusters, where intra-cluster vertical and horizontal relationships may support efficiency and effectiveness of business networks (Giuliani et al., 2005). Network theorists argue that trust, reputation and dependencies dampen opportunistic behaviour, implying more complex inter-firm relationships than NIE would predict (Gereffi et al., 2005; Lu et al., 2008; Ruben et al., 2007).

### Global Value Chain (GVC)

GVC analysis originates from the Commodity Chain approach (Gereffi, 1994) and draws upon new institutional theory theory and supply chain management approaches. It investigates relationships between multi-national companies, the 'lead firms', and other participants in international value chains. In this theoretical stream power relationships and information asymmetry are key concepts in the analysis of global value chains. Therefore, the focus is on governance and upgrading opportunities in developing country value chains (Gereffi, 1999; Gereffi et al., 2005; Kaplinsky, 2001; Kaplinsky and Morris, 2002; Sturgeon, 2001; Gibbon, 2001; Gibbon and Bair, 2008).

Kaplinsky (2001) made an important contribution to this theoretical stream by viewing value chains as repositories of rent. According to Kaplinsky (2001), rent arises from unequal access to resources (entry barriers, Porter, 1990), scarcity of resources and from differential productivity of factors, including knowledge and skills. Economic rent is in principle dynamic in nature.

Nadvi (2004) extends the global value chain view to the poverty perspective by investigating the impact of engagement of local actors in GVCs on employment and income. He finds that employment and income are positively affected by inclusion of companies in global value chains, in particular when multi-national companies are involved. Although, at the same time, workers in GVCs become increasingly vulnerable to changing employment contracts and casualisation of work.

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## **Appendix 2**

**Extracted from:** Trienekens, J. and Van Dijk, M.P.. (2012). Upgrading value chains in developing countries. In M.P. Van Dijk, and J. Trienekens (Eds.), *Global value chains linking local producers from developing countries to international markets: Theoretical perspectives and empirical cases* (pp. 237-251). Amsterdam: University Press.

### **Upgrading in developing country value chains**

In defining value chain upgrading options we build on the work of Gereffi (1999), Kaplinsky (2000), Humphrey and Schmitz (2002), Nadvi (2004), Guliani (2005), Gibbon et al. (2008). For example, Gereffi (1999) defines upgrading as: “... a process of improving the ability of a firm or an economy to move to more profitable and/or technologically sophisticated capital and skill-intensive economic niches”. McDermott (2007:104) defines upgrading as: “the shift from lower-to higher-value economic activities by using local innovative capacities to make continuous improvements in processes, products and functions” .

Kaplinsky (2000) gives four directions for economic actors to upgrade: increasing the efficiency of internal operations, enhance inter-firm linkages, introducing new products and changing the mix of activities conducted within the firm. Building on Kaplinsky and others Pietrobelli and Saliola (2008) define the following upgrading options: entering higher unit value market niches, entering new sectors, undertaking new productive functions and in all cases enlarging the technological capabilities of the firms. In most cases upgrading of value chains is achieved through attention for multiple business aspects, such as combined attention for product and process upgrading or collaborative product upgrading in combination with contractual arrangements. For instance Roy & Thorat (2008), in their study of the Indian grape cooperative Mahagrape, conclude that upgrading capabilities were largely related to the combined attention for innovative marketing in export markets and concurrent provision of technical assistance, inputs and (market)information to the farmers.

In the following three sub-sections we will discuss upgrading through increase of value added in the chain, upgrading of market access possibilities and upgrading of governance structures. Thereafter the role of partnerships and actors of chains will be discussed.

### **Upgrading through increase of value added**

Most approaches to upgrading found in literature focus on upgrading of value added production. This can take various forms:

- upgrading of products (and packagings)
- upgrading of processes
- functional upgrading (insourcing production or distribution functions)
- inter-sectoral upgrading (product differentiation)

Upgrading of marketing or promotion activities is in most cases in the literature included in product upgrading.

Product and process upgrading are most common in DC value chains; functional and inter-sectoral upgrading occur less as most DC producers are still commodity suppliers for Western value chain partners. Giuliani et al. (2005, referring to (Humphrey and Schmitz, 2002) show

that although inclusion into global value chains may facilitate product and process upgrading, “...firms become tight into relationships that often prevent functional upgrading and leave them dependent on a small number of powerful customers” (see also Kaplinsky and Morris, 2002). For example, Schmitz (1999) showed for the shoe industry in Sinos Valley in Brazil that, although product and process upgrading led to improved product quality, response times and flexibility, limited attention to functional upgrading and horizontal collaboration between producers restricted the sector from further growth. In these value chains the in many cases Western, lead partner stimulates product and process upgrading, but not functional upgrading as this would mean that value adding activities move from Western countries to the DC producers.

Upgrading of value added in products is always related to (potential) demands in a market. As pointed out in chapter 3 these can be related to intrinsic (product quality, composition, packaging, etc.) and extrinsic product attributes, which are related to typical process characteristics. In the last decennia attention from Western consumers for these extrinsic characteristics has increased considerably, leading to companies to increase their attention for corporate social responsibility, ranging from attention to issues such as labor circumstances to issues such as animal welfare. This has boomed the introduction of CSR principles by Western industries and retailers and offering opportunities for value added niche market production by DC producers. Figure 5 depicts key dimensions where producers and value chains can focus on when upgrading extrinsic product attributes.

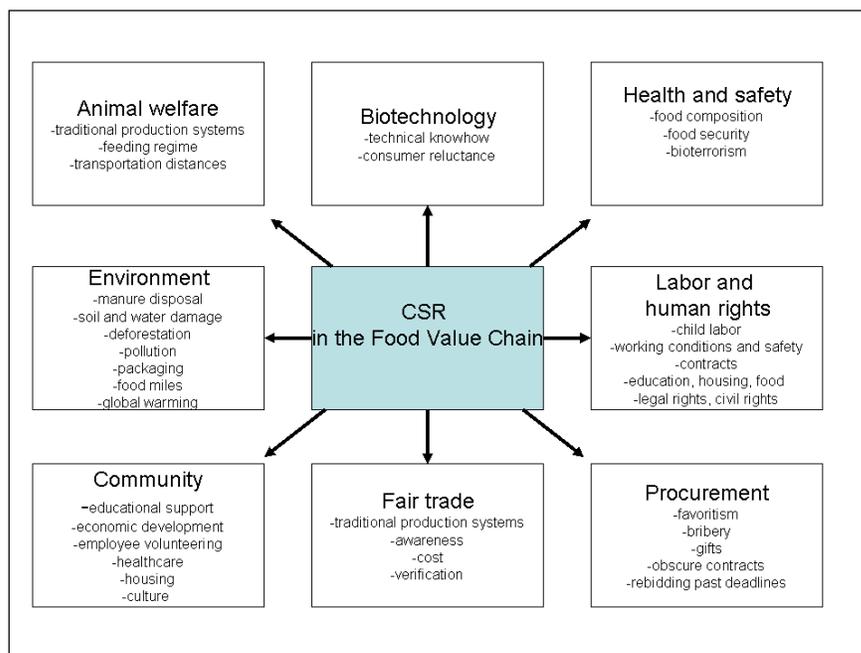


Figure 1: dimensions of corporate social responsibility in the food chain (adapted from Maloni & Brown, 2006)

Process upgrading focuses on the one hand on upgrading the product, on the other hand on optimization of production and distribution processes. The latter includes introduction of new technologies such as automated production and packaging lines, cooling installations and modern transportation technology as well as improved communication facilities in the supply chain such as internet connection, GPS systems

or the intense use of mobile phones in production and transportation planning. An interesting case example is given by, Francis and Simons (2008), who describe how the processes of the Argentina - UK red meat value chain are continuously improved via programs of waste identification, quantification and root cause elimination, to facilitate continuous learning within this value chain.

As mentioned before, a key issue for developing country producers is functional upgrading, i.e. to perform value adding activities in developing countries instead of just being commodity producers of products to be upgraded in the country of the Western customer. Besides in production stages of the value chain, functional upgrading can also take place in intermediary functions, such as in the export sector, where exporters can achieve a role in collection, category management, packaging and sales of products (Dolan and Humphrey, 2000). The developments in the apparel sector as described by Gereffi (1999) are a typical example of how value adding activities have been moved from developed to developing countries leading to new and more fine-meshed industry structures globally. Similarly, Tokatli and Kizilgun (2004) discuss how in some cases DC (clothing) producers can achieve functional upgrading towards higher rent giving activities. They portray the transformation of a Turkish contractor, Erak Clothing, into an original brand-name manufacturer and retailer. The company created its own brand, Mavi Jeans, in 1991, which is now sold at more than 3000 sales points, and five directly owned flagship stores.

Although primary processing activities, such as assembly of cars and processing of fruit juices are increasingly moved to developing countries, specialized processing, branding and marketing are still located in developed countries. Lowering of tariffs through the new WTO agreements and market differentiation by developing country producers can support further development of value added production in DCs.

An important related condition for upgrading is the consistent ability to meet standards as defined by the market. In particular in the food value chain these standards have become conditional for market access for developing country producers. Muradian and Pelupessy (2005) discuss the need for new standards in the coffee sector that can offer producers opportunities for value added production, since the abolishment of the International Coffee agreement and national coffee boards. However, although adherence to one of the many new voluntary standards provides for at least a certain degree of market access, it does not necessarily mean upgrading. Contrary, Tander and van Tilburg (2007) describe how Indian Cashew Nut producers tried to upgrade their product by introducing Western retail standards in their production processes. In this case, however, the pro-active behaviour of these producers didn't pay off because Western super market chains in the end proved to be more interested in low costs than in good quality (at least for this product), leading to down grading of production to previous conditions. Therefore, careful investigation of market opportunities and solid contractual agreements are imperative to successfully combine upgrading with access to new markets.

### **Upgrading of market access possibilities**

The aim to improve market access may imply upgrading of horizontal as well as vertical relationships focusing on taking part in the right market channel. As discussed in chapter 3 collaboration with horizontal partners may include joint purchasing of production inputs, joint use of production facilities and joint marketing of products. Moreover, in its most

sophisticated form, horizontal collaboration might result in product differentiation (inter-sectoral upgrading). Many studies on developing country value chains focus on upgrading of horizontal relationships through the formation of producer associations or cooperatives (e.g. Roy and Thorat, 2008; Bijman, 2007; Rammohan and Sundaresan, 2003).

An interesting example of regional upgrading is given by Fisman and Khanna (2004) who describe how the establishment of business groups in underdeveloped regions in India may support the entire development of the region. Large business groups attract supporting industries that can stimulate economic development. They can spread the costs of infrastructure buildings over more assets than a single firm. These improvements at the same time make it more enjoyable for skilled workers to live in the area. Also rotation of skilled workers is commonly used by the groups. Group firms often have an extensive supplier network that also serves them in more remote locations. They have offices in cities where financial sector is well-developed. Groups usually have good government contacts to facilitate land-intensive projects. Establishment in less-developed regions is often supported by tax reductions.

Upgrading of vertical relationships should focus on being part of the right channel aiming at the right market. DC value chains are now increasingly trying to differentiate their market outlets which makes them less dependent on their current customers, often Western retailers or industries. However, chapter 3 has shown how difficult it is, in particular for small producers to move to another market channel. Alternatively developing country producers might look for channels to easier accessible markets, such as South African fresh producers accessing emerging economy markets in Asia, Brazilian pork aiming at the Russian market where quality and safety demands are less severe than in the EU or Mango producers from Burkina Faso that aim at the Niger home market instead of at the European market (Nadvi, 2004; Trienekens & Willems, 2007; Trienekens et al., 2009; Humphrey, 2006)).

### **Upgrading of governance structures**

Modern market-oriented chains have the tendency to become shorter as intermediaries between producers and chain downstream parties become superfluous because of the emergence of direct trading relationship between large producers (or producer groups) and downstream parties (e.g. Bair and Gereffi, 2003). This means the development towards more integrated governance structures in these chains, such as long term (formal) contracts or vertical integration. An example is the transformation of export-oriented producers to producer-exporters in some countries (e.g. table grape producers in South Africa) in order to lower transaction costs and exert full control over the supply chain. Inter-company governance relationships in these chains are often enforced by (transaction-specific) investments of processors or exporters (such as investments in cold stores, seeds, pesticides, credits) to decrease delivery uncertainty and increase quality and quality consistency of the product.

Quality standards and certification are in particular relevant for business relationships in food chains and are often included in contracts. Quality standards can be used in every governance relationship, from spot market to vertical integration (Trienekens and Zuurbier, 2008). However, in vertically integrated companies certification by an independent party is of less importance, although the use of standards may be required.

Contracts can be divided in the classical version of a comprehensive contract (where everything is fixed ex ante for the entire duration of the contract, covered by the law of contract) or a relational version (allowing for gaps not closed by contract law, embedded in a social system of relationships and subject to continuous re-negotiations). Because there is no such thing as a 'complete' contract - especially not in developing countries with weakly developed institutional structures - many companies tend to prefer relational contracts implying interpersonal relationships and trust.

Horizontal collaboration between actors is in many cases considered as an important enabler of value chain upgrading. Mesquita and Lazzarrini (2008), in their study of the impact of network relationships on market access find that strong network ties between companies help substitute for the lack of a strong institutional setting to support arrangements between companies and in value chains. SMEs can exploit complementary competencies, share knowledge, technologies and inputs and develop greater responsiveness to global demands, and attain greater export levels as a result.

Lu (2007, 2008), in his study into the relationship between social capital (Guanxi in China) and performance of vegetables chains, finds that producers with tighter social relationships with other economic actors in the value chain tend to be more successful. Moreover, he shows that relationships considered traditional in these communities are of great importance to get access to modern markets.

Other studies focus on the role of clusters in upgrading. Gibbon (2001, 349) finds that cluster-based upgrading demands an external push to be successful, such as a linkage to export networks. Giuliani et al (2005) study relationships between clustering and innovation focusing on Latin American cases. They find that product and process upgrading may be strongly supported by knowledge and technology in related industries (e.g. plants and seeds). Also public-private action through business-government-research institute collaboration can support innovation and upgrading processes in these clusters. However, Murphy (2007) shows in a study on the Tanzanian furniture industry in Mwanza that insufficient government support and lack of collaboration due to mistrust (stealing of ideas) prevent cluster development. This links to the issue of institutional changes necessary for value chain upgrading.

### **Role of partnerships and actors for change**

Upgrading in value chains can only be achieved through partnerships: private-private, public-private, public-public. Non-chain actors can facilitate upgrading processes either by providing technological, organizational, political and educational support or by changing the macro-cultural discourse in general. For instance, in his case study on the upgrading process of the Argentinian wine industry, McDermott (2007) describes how the government facilitated the farmers in training and R&D and launched new collaborative arrangements among public and private actors. Also in other studies the presence of a third, external, party is mentioned as a major enabler of change and upgrading. For example, Perez-Aleman and Sandilands (2008) in their analysis of the sustainable production program of Starbucks, show the power of NGOs that brought about significant changes in the purchasing policies of Starbucks and also point at the presence of an independent external certification organization in the upgrading process of the value chain. Riisgaard (2009) points at different "actors for change" in defining and upgrading labor standards in the East African cut flower industry: in Tanzania the lead is taken by the labor unions, while in Kenya NGOs are the key player in the upgrading process. He also underlines the important role of Western retailers setting up CSR standards for their DC suppliers.

However, evidence in the literature on the positive role of third parties in upgrading is far from conclusive. For example, Hanna and Walsch (2008) in their study on cooperation among small manufacturing firms conclude that networks developed with the help of brokers were less successful than networks operated by the companies themselves. They show that networks developed with the aid of brokers focused on reducing costs and enhancing business processes, whilst firms developing their own networks focused on the ability to coordinate skills and joint targeting of market opportunities. This case shows that it is not only the parties that collaborate that enlarge chances of success but also the focus of their joint upgrading efforts.

Actors for change may include value chain actors, e.g. retailer, industry, producer cooperative, or non-chain actors such as governmental organizations, NGOs or other parties in the business environment of the chain such as banking institutions or service providers. To give some examples:

Government legislation, regulations and policies may support value chain upgrading by

- providing market access through negotiating lower barriers for (international) trade
- supporting physical infrastructure development to achieve a smoother flow of products through the value chain (better roads and distribution facilities such as storage of products and better communication infrastructures)
- supporting knowledge infrastructure development by setting up good functioning education systems and providing training facilities
- giving access for value chain actors to production technology through import subsidies, and providing access to credits.
- providing a stable economic and political climate (e.g. McDermott, 2007).

Business practices and business policies may support value chain upgrading by

- setting standards (quality, labour, environmental, trade, etc.)
- streamlining the value chain through better communication and planning
- setting up of vertical governance mechanisms that facilitate a smooth flow of products and better distribution of value added
- setting up horizontal governance mechanism to improve the power balance in the value chain and enhance the bargaining position of small producers
- support technology development (e.g. Ruben et al., 2007; Gibbon, 2001)

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## A Review of Seed-Related Activities in the CGIAR Research Programs (CRPs)

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### 1. Introduction

The CGIAR has recently completed a re-organization of funding mechanisms which features the establishment of a CGIAR Fund and a set of 15 CGIAR Research Programs (CRPs). Each of the CRPs provides an organizational framework for research on particular commodities, ecologies or disciplines to be shared across several of the CGIAR centers. The choice of subjects for the 15 CRPs was not straightforward and necessarily involved compromises and trade-offs regarding the best way to organize a global system of agricultural research. Although the CRPs support increased collaboration among centers in high priority themes, there are a number of other themes that, while not justifying a separate CRP, still require improved coordination among programs and centers. One such theme is seed systems, and this paper is an exploration of ways in which such coordination might be approached.

The paper is based primarily on relevant extracts from individual CRP proposals provided to the author by the Secretariat of the Independent Science and Partnership Council (ISPC). Full texts of some of the proposals have also been consulted, but the paper does not claim a word-by-word review of the several thousand pages of proposals, thus there may be some important factors missing from this analysis. (The CRPs will be referred to by their numbers rather than full names.) The paper also draws on literature on seed system development as well as the author's experience in research on seed systems.

The paper concentrates on what can be called seed provision – everything that happens *after* plant breeding research or the identification of new varieties to allow farmers to take advantage of useful plant varieties. This includes the initial multiplication of early generation material, seed production on a larger scale, methods of delivering seed and relevant information, and the enabling environment (policies and regulations) that may govern these processes. Our subject includes the seed of grains and food legumes, the planting materials of root and tuber crops, and the seed or seedlings of tree and agro-forestry species. Much of the discussion is also relevant to vegetable seed but no specific references are made to those species.

Section 2 of the paper outlines assumptions about the CRPs that condition the way this review is written. Section 3 attempts to identify the major roles of the CGIAR in seed provision. Sections 4 and 5 review the principal options for seed production and the major aspects of the enabling environment for seed provision, respectively. Section 6 summarizes and comments on the principal seed-related activities described in the CRPs. Section 7 provides conclusions regarding priorities for seed-related activities within the CRPs.

### 2. Assumptions about CRPs

This paper is based on a review of CRP documents. The CRP process helps to better organize, rationalize and coordinate activities within the CGIAR centers. The CRPs may lead the way to

significant shifts in CGIAR priorities or activities over time, but they do not pretend to reinvent the CGIAR from scratch in 2012. Thus much of what is written in the CRPs reflects current (and recent past) interests and capacities in the individual centers, but profits from at least an expanded recognition of common interests across the centers. Thus the author assumes that this review concerns priorities for CGIAR seed activities, based on the most comprehensive expression of CGIAR plans expressed in the CRPs.

Because of their comprehensive nature, the CRPs offer a good opportunity to efficiently review CGIAR plans in an area such as seed systems, but the CRPs are not perfectly adapted to this task. One significant problem is their language. Because they cover a very wide range of activities they cannot go into detail in any one area. In addition, as planning documents much of the language is aspirational and an important objective is to fashion coats with as many pockets as possible where donor funds can be placed. The reader often has difficulty understanding what stands behind activities only described in such vague terms as holistic, integrated, innovative, or novel. This limits any detailed comparisons between or within CRPs.

Another challenge is that the CRPs are presented largely (and understandably) in the language of research, even though the subject of seed provision goes well beyond what is conventionally understood as research. Much of seed provision falls within what might be called scaling-up, a task assumed to be largely in the hands of CGIAR partners. It will be argued here that this scaling-up process is not often competently managed at present, seriously jeopardizing potential impact. The CRPs have surely made the CGIAR one of the most systematically and comprehensively described research systems in the world. Attention now needs to turn to actual performance.

A related challenge is the nature of partnerships. One of the key partners for seed provision is the NARIs. It has long been recognized that there is much variation in NARI capacities, and this has structured the types of technical inputs and interchanges with CGIAR centers. But even some of the most advanced NARIs may not be adequate partners in ensuring seed provision for the most vulnerable farming populations or for “orphan crops”. Other partners in seed provision include both conventional and non-traditional seed producers as well as national policy and regulatory bodies. How much input and influence the CGIAR has with these types of entities remains to be seen, but practical outcomes will demand going beyond pronouncements about learning alliances or multi-stakeholder platforms.

Each CRP has its own administrative framework and this review does not intend to add another layer to this for seed provision. The purpose of the review is to identify priorities for action, often across CRPs. The reviewer is not familiar with options and mechanisms for cross-CRP action or with possible incentives to elicit such action, so there are no specifics offered regarding modalities of coordination.

### **3. The CGIAR and Seed**

As the many papers and books on the subject point out, seed is the foundation for most agriculture. As such, it understandably attracts many sweeping statements, generates considerable fervor, and provides catchy titles and slogans, whether motivated by the development of the commercial seed sector or the promotion of farmers’ traditional seed management.<sup>3</sup> Thus the subject of seed systems invites an emotional following and a comprehensive, multi-faceted approach. This paper suggests that it will be wise to resist such an invitation, at least in setting priorities for near-term CRP activity and coordination. There are two reasons for such caution. First, a number of the activities required to support seed systems in developing countries do not clearly fall within the CGIAR’s mandate.

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<sup>3</sup> The American Seed Trade Association’s motto is “First – the seed”; many organizations use the slogan, “Good seed doesn’t cost, it pays”; and there have been various agricultural projects and initiatives entitled “Seeds of...” (Change, Freedom, Hope, etc).

Second, although there are several justifications for a strong seed system, the one that deserves immediate attention from the CGIAR is the delivery of new varieties.

One reason for a slightly uneasy relation between the CGIAR and seed system development is that seed is a delivery mechanism for research products. National seed provision landscapes differ significantly one from the other, due to variations in national agricultural economies, politics, and ecologies. Thus much of seed system development is a very country-specific matter aimed at scaling up developed technologies. There is clear justification in CGIAR policy that allows for its traditional catalytic, IPG stance to be complemented by a range of partnerships, and seed delivery surely qualifies as a key example. But there are issues that need to be addressed regarding the mandate, and comparative advantage, of CGIAR involvement in the details of seed production, delivery, or regulation. Conversely, there are seed-related activities that the centers might pursue that are clearly IPG research products but which have less practical impact than more hands-on involvement at the local level.

The second reason to be cautious about the breadth of CGIAR involvement in seed systems is the need to focus on product delivery. A strong national seed system provides several advantages, including improving the efficiency of farm management and ensuring high quality output, but the key factor in this analysis is providing access to new varieties. It would appear that there is a dearth of evidence on CGIAR variety uptake.<sup>4</sup> Some centers are more conscientious than others on this, and there are some relevant location-specific studies and an increasing emphasis on measuring impact (which comes after adoption), but no recognizable urgency to follow or understand the uptake of varieties. This is presumably the reason why the BMGF stepped in to sponsor studies in Africa (DIIVA) and Asia (TRIVSA) to try to correct this deficiency of information.

Variety use is often admittedly a challenge to keep track of, but germplasm is arguably the most important product of the CGIAR system. In this era of a market-oriented CGIAR it is instructive to imagine a seed company saying: “In most cases we have no clear idea of the extent to which farmers use our varieties (or those of our competitors), or why, or if they even know how to identify them, and we put little effort into pursuing that kind of information in order to refine our priorities and better reach the market. But we are investing heavily in a few selected instances where we hope to show the economic or social impact of the use of one of our varieties as part of a public relations campaign.” How long would such a company survive?

So CRPs may feature fine words about value chains, market linkages, seed systems, and so forth, but the assumption here is that the bottom line is delivering varieties.

#### **4. The Options for Seed Delivery**

There are a limited number of options for delivering the seed (or planting material) of a crop variety to a significant number of farmers.

##### *4.1 Farmer-to-farmer*

Once some farmers have planted a variety there may be possibilities of farmer-to-farmer diffusion; the majority of the diffusion of the initial rice and wheat varieties of the Green Revolution took place in this way, for instance. But several caveats are in order. First, that diffusion process was aided by considerable public seed production. Second, the new varieties were very distinct, and farmers could easily recognize what they wanted. The rapid, seemingly unaided, spread of certain varieties still occurs, but usually in limited domains (Jones et al,2001; Marfo et al, 2008) and it is only in certain

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<sup>4</sup> The reviewer would be happy to be corrected, on this perception. A recent review on grain legumes (Tripp, 2011) and subsequent fieldwork, combined with an admittedly haphazard review of information for major grains, has turned up relatively little evidence of CGIAR centers investing what they should (and encouraging NARI partners to invest what they should) in monitoring and evaluating the movement of new varieties at any appreciable scale.

cases that varietal qualities and purity can be maintained in this way. Nevertheless, any seed strategy wants to take advantage of local seed diffusion possibilities.

#### *4.2 Public seed production*

It was not too long ago that public seed production was assumed to be a major player, even by analysts promoting a move to the private seed sector (Douglas, 1980). Structural adjustment and just plain poor performance has changed that picture radically, although public seed production is still dominant in some countries, often for political reasons. Although public seed enterprises are something of a threatened species, it is not wise to write them off completely. In some countries there is no immediate option, and although many of these operations are terribly inefficient, others at least maintain a core of dedicated and experienced staff.

#### *4.3 Private seed production*

The current conventional wisdom is that virtually all attention should be directed to the private seed sector. (In most industrialized economies there is little evidence of public seed production, even where there is still substantial public plant breeding.) But a private seed sector will only emerge if there is a profit to be made. Products like hybrid seed that offer an assured, yearly demand usually lead the way in the emergence of private seed provision, but a relatively predictable (although not necessarily widespread) demand is also important. Until recently, the majority of wheat, soybean and even cotton seed in the USA was farm-saved (or locally traded), but the small proportion of formal seed came from profitable, usually small, private seed companies.<sup>5</sup> Thus the private sector is capable of delivering seed of even less commercially attractive species, as recent shifts to the private provision of wheat and rice seed in a number of Asian countries attest (e.g. Tripp et al 2010). But besides the political space to allow private seed enterprise to emerge there is a certain critical mass of demand required before there will be private provision of seed of so-called orphan crops (which in some countries would seem to include almost everything except hybrid maize). There is a substantial (and growing) donor presence, particularly in sub-Saharan Africa, in fostering the supply side of the commercial seed sector. Whether there is attendant growth on the demand side remains to be seen.

#### *4.4 “Community” seed production*

One of the mechanisms to address the dilemma of insufficient demand, and one which features in many CRPs, can be called community seed production, although other terms are used (village-based, farmer-based, farmer groups, rural seed entrepreneurs, village seed business ventures, etc). There are many variants, but the common assumption is that a set of small-scale farmers with no previous business background can be trained and organized to produce and deliver seed in a financially viable manner. This is an exceptionally attractive idea which has, unfortunately, no historical precedent and very little evidence of success (in terms of providing a sustainable seed provision mechanism). The reasons for limited success include the small size of the local market and inattention to transaction costs (Tripp, 2001).<sup>6</sup> Simply because there is little impact from community seed schemes so far does not of course mean that some of them might not succeed in the future, but they demand careful scrutiny.

## **5. The Enabling Environment: Policies and Regulations**

In addition to the organization of seed production and delivery, effective seed provision also requires an adequate enabling environment of policies and regulations. This section briefly outlines the major examples, only some of which should be targets for CGIAR interest.

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<sup>5</sup> The recent increase in purchased non-hybrid seed in industrialized countries is due largely to increasing application of IPRs, often linked to GM crops.

<sup>6</sup> These community projects should not be confused with seed production by cooperatives, where there are a number of success stories for well-established, rather than ad-hoc, cooperatives. In addition, this should not be seen as a critique of organizing farmers for seed production, which is clearly justified in cases such as participatory variety selection, extension, or training outgrowers for conventional seed enterprises.

### *5.1 Policy*

National seed policies may be only vague statements of intent or they may offer fairly precise guidelines and strategies. Much useful progress can be made without a detailed, formal policy document and of course the existence of such a pronouncement does not guarantee subsequent action. One of the more notable examples of the impact of seed policy change is the formal recognition of private sector players in India in the late 1980s, which ushered in a transformation in national seed provision. (Pray et al, 2001).

Intellectual property (IP) policy is of growing importance for variety development and delivery. This is certainly true in relation to the patenting of techniques, genes, and processes in biotechnology and even in conventional plant breeding. Of particular relevance is the requirement that all WTO members provide some IP mechanism for crop varieties. The most common response is some type of plant variety protection (PVP), and donors of various stripes may battle to persuade developing countries to adopt more, or less, restrictive PVP regimes (Tripp et al, 2007). The type of PVP regime may condition the nature of the national seed industry, but the space is limited for direct CGIAR input in these debates.

### *5.2 Regulation*

Seed regulation encompasses variety release and registration, seed certification, and phytosanitary regulation.

In most countries some kind of testing process is required before a variety is allowed to enter seed production. When public plant breeding and seed production were the only options this was something of an “in-house” process but often painfully slow. Reforms in many countries over the past decade have tended to open variety regulation, providing access for private and foreign varieties and expanding acceptability criteria somewhat beyond just yield in good environments. Nevertheless, progress has been uneven and despite the increasing rate of release of varieties of some crops in some countries, the management and funding of the variety release process still can be a bottleneck for variety delivery.

Seed certification regulations vary around the world. In some countries virtually all commercial seed must be certified, while in others only seed of some species is targeted, and in others certification is optional and truthful labeling laws are in place (where seed simply must conform to the specifications on the producer’s label). The uncomfortable truth is that many countries with mandatory certification have poorly resourced certification agencies and a certification tag is only cosmetic. This gap between policy and practice may not be an impediment to seed delivery (the evidence that officially certified seed is in fact superior is fairly shaky) but there are cases where bureaucratic certification agencies are unwilling or unable to provide services to far-flung seed producers or “minor” crops, seriously dampening incentives for useful seed provision. Options include lobbying for truthful labeling, simply turning a blind eye and proceeding with seed production, or instituting a lower-cost service. Probably the prime example of the latter is known as quality declared seed (QDS), a useful system devised by FAO (FAO, 2006). QDS is often invoked in seed development efforts (including by some CRPs), but the majority of its proponents ignore the fact that besides providing a set of revised standards for individual crops, QDS also requires the establishment of a formal monitoring and sanctioning system similar to, but of lower cost than, full-blown certification. This problem of confusing the rules with their enforcement affects the understanding of conventional certification and indeed much other seed regulation.

Phytosanitary regulation is important for the control of plant disease but has also been invoked to block seed imports. There have been several efforts at regional regulatory harmonization in the past decade, particularly in SSA, which have tried to rationalize phytosanitary rules.

Regional regulatory harmonization has practically achieved buzzword status in seed policy discussions. There are good reasons for regional harmonization and some useful progress has been

made. Probably the most relevant results for the CGIAR are instances where a variety released in one country can be registered in a neighboring country with little or no further testing. Regional harmonization of certification, on the other hand, has tended to move everyone towards the rules of the strictest country, without much attention to local administrative resources and capabilities.<sup>7</sup>

### *5.3 Source seed management*

The subject of source seed also deserves attention. Getting from the initial seed of a variety in the hands of the breeder to significant quantities of commercial seed requires several generations of multiplication. The exact number and nomenclature depends on the crop and the country; for simplicity the initial material will be referred to here as breeder seed and the intermediate generation(s) before commercial seed will be called foundation seed. The production of source seed is a process that is often inadequately funded and badly managed by NARIs and a significant bottleneck to variety delivery. But source seed is discussed here under the enabling environment because an equally serious, and often overlooked, problem is the institutional conditions for the transfer of (public) source seed to (often private) seed producers. This is a problem that seed companies with their own breeding capacity obviously do not face, but is likely to be a factor in seed production for many crops in developing countries for the foreseeable future. There are important decisions regarding the conditions under which NARIs provide this material (costs, exclusivity, etc), the contractual obligations of both parties, and the mechanisms for planning production a year or more in advance. Although in most cases the NARI would be responsible for breeder seed, there are questions about mechanisms for foundation seed production. The possibilities include placing the responsibility with the NARI (but why should a research organization be managing large-scale seed production?); asking the seed producers themselves to take responsibility (which seed companies in India are willing to do but many elsewhere are not); or devising some type of intermediary organization (as is done in Canada and the USA) (Tripp, 2006).

### *5.4 Information*

Finally, information provision deserves to be mentioned as part of the enabling environment, including the types of extension that delivers information about new varieties<sup>8</sup>, the promotional techniques used by seed producers, and the consumer rights and consumer protection information that must be made available to farmers engaging with formal input markets.

## **6. Seed Activities in CRPs**

It is important to begin to identify priorities from among the many proposed CRP seed activities because of the importance of ensuring variety delivery. Large amounts of money are identified for seed activities in some of the CRPs. (For instance, they account for 14% and 16% of the budgets of CRP 3.5 and 3.6, respectively, each representing millions of dollars a year.)

The following activities are the major ones mentioned in the CRPs. In each case, the activity is reviewed and suggestions are offered regarding the relative importance and suggested strategies that might be considered.

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<sup>7</sup> Several donors have invested large amounts of time and effort in regional harmonization projects in the past decade or more. The original intent (to facilitate cross-border acceptance of new varieties and to stimulate seed trade) was eminently sensible but, as often happens, the tail began to wag the dog. The concentration on comprehensive regional regulatory frameworks has often been an invitation for regulators to spend time in expensive hotels, designing the gates they will be paid to guard, rather than establishing incentives for increased seed and variety exchange.

<sup>8</sup> A few CRPs mention experience in the distribution or sale of very small, introductory packs of seed of new varieties, which is particularly useful for species and varieties that the farmers can easily recognize and maintain, or where larger, commercial quantities of the seed are available.

### 6.1 Setting priorities

Because of the localized nature of seed provision, most supporting activities are necessarily carried out at the national level, usually with CGIAR partners. There is obviously a tension between the IPG ideal of providing general products that can be taken up across a number of countries and the reality of dealing with the idiosyncrasies of national policies, laws, business environments and public sector capacities.

The best solution to this challenge will not necessarily be based on the provision of principles and methods or elaborate cross-country studies, unless there is some certainty that these are priority inputs that will be taken up and used in a practical way by partners. Thus CRP language such as “a platform for enhanced knowledge sharing” or “strategies and methods for characterizing and reaching high-priority rural clients” may not move us forward. Similarly, a number of crop-based CRPs propose: “analysis of national seed systems... completed in at least 10 countries”; “in-depth characterization and constraint analysis of seed supply and input systems”; “a socioeconomic and biophysical model for diagnosing bottlenecks and developing strengthening strategies of integrated or single ... seed systems”; or “modelling interactions between social dynamics..., and physical dynamics...[in seed systems]”. All of this sounds like the sort of cutting edge research that the CGIAR should be doing, but most of it probably isn't. They lead to expensive studies that are easy to tick off on a log frame and can be converted to journal articles, but may make little substantive contribution. The important question to ask before proceeding is *not*, “Will these provide publishable research results?” but rather, “What, *precisely*, is going to be done with the information and how, *precisely*, will this advance the cause of delivering new varieties to the widest number of farmers?” If the answers are as vague as some of the descriptions, then the exercises should be reconsidered. There are scores of national seed system diagnoses and studies already on the shelf.

### 6.2 Policy and regulation

The areas of seed policy and regulation are also, for the most part, national-level concerns. Again, cross-country studies or analyses (on paper a justifiable CGIAR activity) may not be the highest priority and specific national-level inputs may not often be a CGIAR comparative advantage. The only substantial mentions of seed policy are in CRP 2 and a reference to “weak seed laws” in 3.3, without any detail. We can assume that this is not the highest priority unless there are situations where the CGIAR can go beyond pointing out what is wrong with particular policies and play a significant role in helping partners bring about change. The CGIAR track record on practical policy change is fairly undistinguished. Using CGIAR clout behind the scenes, in partnership with others, to make policymakers aware of the options, will often be a preferable pathway.

Several of the CRPs mention regulations or regulatory frameworks, often without any supporting detail. The major regulatory issues are variety release and seed certification and they probably deserve different levels of attention. As described in (5.2), seed certification can be a frustrating subject. Although there is much that needs to be done to improve national certification systems, this is not obviously within the CGIAR mandate. The CRPs make relatively little reference to certification and a rule of thumb may be that CGIAR activities should only address situations where certification rules (or lack of them) obviously hamper the delivery of varieties. Several CRPs mention QDS, without specifying if this simply urges relaxing the rules a bit or rather promises investment in establishing a full-blown alternative regulatory system, which would seem outside the CGIAR purview. The major justification for intervention might be in root and tuber crops or agroforestry species where most national regulatory systems have little practical experience and where overly conservative officials may stand in the way of variety diffusion.

Variety release regulations would seem to be a more justifiable target, where they stand in the way of variety delivery. CRPs 3.1, 3.3, 3.4, 3.5, and 3.6 all make multiple references to variety release. (The subject is only present as an assumption in 3.2, which may reflect the fact that maize has probably profited most from recent loosening of regulations in Africa, with many new varieties being released.) Priorities would include consideration of non-traditional criteria, such as stress tolerance or nutritional quality; and the *implementation and financing* of what in many cases are already-agreed regional

release protocols. Although the precise issues and interests may vary across crops, some sort of united front across CRPs would be useful at the national level. Behind the scenes lobbying rather than sophisticated analysis would probably be the priority for achieving better variety release regulation in most countries.

### *6.3 Source seed*

Source seed production and delivery by NARIs is a significant bottleneck in many countries. There are two sets of challenges: (i) the physical and financial resources to produce the requisite seed and (ii) the institutional capabilities to interact with the seed producers who will use this source material. CRPs 3.1, 3.2, 3.3 and 3.5 all make reference to this issue, although given its importance more detail would be useful. The first set of challenges, source seed *production*, is absolutely crucial. If NARIs are the key CGIAR partners in variety development, and if they are unable or unwilling to establish a financially and administratively competent system to produce breeder seed of new varieties, then the entire process of variety delivery comes to a halt. This is not a research issue but rather a survival issue. CGIAR centers need to put their heads together and decide, country by country, what needs to be done.

Once we get beyond the first (breeder seed) stage of nationally released varieties we find ourselves in more complicated institutional territory. Foundation seed is the intermediate stage not only for physical seed production but also often for the transfer from a public research entity to a seed producer that will probably be private, or perhaps civil society or public, but almost certainly distinct from the research organization. As described in (5.3) there are some complicated questions about who should produce foundation seed and, depending on those answers, how planning, contracts, and obligations are managed. It is unlikely that a one-size-fits-all answer will emerge across countries, but within any country it would be inefficient to pursue many different modalities for different crops. This is not an issue requiring sophisticated, cross-country research, but it is a crucial determinant of whether the model of international agricultural research partnership with national systems continues to be relevant. The CGIAR system needs to collaborate with the relevant partners to come up with a strategy for each country.

One possible option is to simply bypass the NARIs. This is done to some extent in several hybrid consortia that provide inbred lines to seed companies with their own breeding capacity (as well, mostly cosmetically, to traditional NARI partners). The possibility of apparently providing finished products to seed producers is raised by the regional foundation seed units described in CRP 3.2. An exploration of expanding such activities to other crops and regions would hopefully be an incentive for NARIs to adopt better management or, in the worst of cases, a step in a transition to new ways of delivering the products of international agricultural research.

### *6.4 Interactions with seed providers*

The delivery of source seed of new varieties must obviously be followed by competent seed production and marketing. As explained in Section 4, there are only a few options available. There are only brief references to conventional public and private seed producers in the CRPs (often related to capacity building, and a few vague references to PPPs), and a reference to input marketing at “action sites” in 1.2. This is surprising, because these entities are likely to be the principal intermediaries for the delivery of CRP products. Although the major interactions in the delivery chain are expected to be in the hands of local partners (NARIs and others) there is no excuse for centers or CRPs to not know the details of the formal seed sector in each of the countries where they work. Who are the public and private seed producers, what is their experience related to the target crops, and what might be done to increase their commitment to seed production and delivery? As with source seed, this isn’t about research but rather survival.

The majority of attention in the CRPs is reserved for non-conventional “community seed production”. CRPs 1.1, 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6 all cite this as a seed provision option. Unlike conventional public or private seed producers, these community schemes need to be started from scratch, and presumably centers will invest in this (as they have in the past). There are probably imaginative ways

to justify this as an IPG, but it amounts to creating your own partners and requires careful consideration. There have been many community seed production efforts of various shapes and sizes. Virtually none of them seem to be durable and only a few have been the subject of even a rudimentary business plan. Community schemes may have lower costs than conventional seed companies in some respects, but they tend to be shielded from many other costs by the kind attentions of the development projects (and CG centers) that create them and they also face exceptionally limited markets. This judgment on community seed enterprises may turn out to be unjustifiably gloomy and a set of sustainable business plans may be developed and followed (although there is no mention of even attempting this in the CRPs). As a first step, before any cross-cutting studies or elaborate projects, each center should list on a piece of paper every community seed scheme they have been associated with in the past decade and opposite the column of names fill in columns headed, “Where are they now?” and “Why?”. The exercise may serve to focus future activities and priorities.

#### *6.5 How do we support seed delivery for “orphan crops”? [A digression]*

There are simply too many CG-related crop varieties that are released (almost always with fanfare) and never leave the shelf. This situation is not likely to be sufficiently addressed in the near term by CRP plans for seed studies, PPPs, or community seed production. In *some cases*, it may be necessary to consider some type of external investment (support, subsidy, whatever term is acceptable). One way to look at this is in comparison with crop management research. No one would argue with the fact that public investment in developing, say, IPM techniques must be complemented with some type of public (or externally supported) extension or training in order to deliver those techniques to farmers. It may be that the same reasoning will be necessary for seed of *some* crops and varieties in the near term. In both the seed and IPM cases, there are three possible outcomes: The technology brings demonstrated benefits that warrant a public investment in delivery that is designed to phase out as adoption proceeds and/or lower cost delivery methods appear; the cost of delivery (using current knowledge) is greater than the benefits derived from the technology and so priorities should shift elsewhere; the technology does not bring the benefits envisioned and should be abandoned.

This presents a research challenge (which the CRPs would presumably welcome) but also a practical challenge: After doing whatever is necessary to get as many crop varieties into conventional public and private seed production and delivery, devise the most cost-effective strategy for delivering seed of the other crops in country X and *measure the returns to this strategy*; convince the relevant governments and donors that this is worth supporting; and establish a monitoring capacity so that the strategy is periodically reviewed and adjusted (to fade away when full commercial incentives are available, or if it turns out that the farm-level performance of the varieties does not warrant the investment).. It would be done in a way to support emerging private seed producers (direct subsidies, vouchers, small pack distribution, etc.). Its management would require a degree of attention (from someone, not necessarily the CGIAR) that is unusual for such development initiatives.<sup>9</sup>

This plan may not be feasible, but it surely must be superior to the continued ad-hoc investment in all sorts of schemes that have resulted in little impact to date. It would involve a great deal of meddling and negotiation in each country and the appropriate level of CGIAR involvement would need to be decided, but it would obviously require buy-in across CRPs within any country where it was attempted. Donors to the CGIAR (and to allied efforts) would have to be convinced that such a messy and unphotogenic alternative to things like disparate community seed production schemes was worthwhile. They would have to be convinced that what they lose in human interest stories in newsletters is balanced by gains in actual crop production and rural welfare, by a steady movement toward more broad-based, sustainable seed production, and by increasing national policy attention to actual technology assessment, delivery and uptake.

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<sup>9</sup> It should be emphasized that we are not talking about the large-scale input subsidy programs that have become a feature in several southern African countries (Mason and Ricker-Gilbert, 2012.)

### *6.6 Information*

The above discussion is all about building the supply side, but the thing that distinguishes countries with robust seed provision is their seed demand side. Effective demand depends partly on information (e.g. about new varieties and seed sources). The crop CRPs all mention support to extension as an activity, but relatively few details are provided. Much of this would presumably profit from a joint effort across crops at the country level, although some individual strategies may be justified. CRP 4 will have to decide how to present nutritionally-enhanced varieties, especially if they are not also the most agronomically superior choices. Information for farmers on how to manage varieties once acquired is also useful, and is described in CRP 3.4.

Another aspect of demand is, of course, the actual value of commercially acquired seed. This is often higher where output markets are well developed (e.g. where grain quality is rewarded). Even in less well developed economies, the value of new varieties influences the degree of variety turnover and seed acquisition. This reinforces the importance of monitoring variety uptake and performance.

### *6.7 The study of farmer seed systems*

Several of the CRPs discuss studies of local seed practices (selection, storage, exchange, etc). Some of this is related to participatory variety selection or plant breeding. These are activities that a number of centers already carry out with partners. The priority for such work, again, is to push toward variety delivery. There is probably a danger in reifying “farmer seed systems” and making them an object for infinite study when the more relevant information for the CRPs is related to the interactions of the formal and informal systems (Louwaars and DeBoef, 2012).

### *6.8 Intellectual property management*

There are a number of issues at the system level related to managing IPRs to ensure seed and variety delivery, particularly transparent policies that help determine how NARIs manage the access to CGIAR germplasm and how centers themselves interact with domestic and MNC seed companies. There is little mention in the CRPs of these issues and presumably most of this was in the purview of the former Central Advisory Service on Intellectual Property and is now being managed directly by the CGIAR Consortium Office.

### *6.9 Training*

Various CRPs describe training activities in the seed sector, but it is difficult to evaluate plans as general as “capacity building in seed production and delivery”, “capacity building for seed entrepreneurs”, or “training in skills and strategies to effectively test, release, scale-up, and market new varieties”. Several centers have particular experience and expertise in seed technology training and it will be worth discussing how this capacity might be better utilized by the system as a whole and, conversely, who the alternative suppliers might be.

## **7. Conclusions**

The preceding discussion suggests some priorities and directions for the CRPs related to seed systems. These do not constitute a detailed plan and even the broad outlines are subject to change as more becomes known about the organization and funding of CRPs. The suggestions are based on the premise that variety delivery should be the most important factor in deciding what seed system investments are justified. This is certainly not the only aspect of seed systems that is important, but given the current state of the CGIAR (and the nature of other current investments in seed systems) it would seem by far the major priority for CRPs.

There are certain activities mentioned or even emphasized in the CRPs that deserve less attention. These include elaborate studies on seed systems, especially those without any clear, practical follow-on strategy; leading roles in seed policy or regulatory reform (because others are better placed to do this, although CGIAR collaboration may prove valuable); and direct support to the development of conventional or unconventional seed producers (because many others are doing this). There are other

“traditional” CGIAR activities related to seed systems that have received little attention here and which will surely continue to some extent, including farm-level seed management research, extension advice, training, and securing IPRs.

There are four activities that deserve particular attention from the relevant CRPs:

- *The organization and implementation of variety release.* This is arguably the most straightforward of the four priorities. Variety release procedures have improved in many countries, but there is still a way to go. Both NARIs and CG centers need to make sure the process is efficiently managed and adequately funded. Gains made on paper through regional harmonization agreements need to be put into practice.
- *The production of breeder seed by NARIs.* Some type of stable, sustainable system needs to be in place to make sure funds are available to produce adequate breeder seed of a range of varieties. This includes ensuring a better assessment of demand for that seed and improving the incentives for the NARIs to go out and drum up that demand.
- *The handover of source seed from public research to commercial seed producers.* This is a potential breakdown point in the seed chain, where adequate incentives are often not in evidence. Whether seed producers are willing and able to take responsibility for foundation seed production or some other modality needs to be defined is a question that will have different answers across countries and perhaps across crops. But at whatever point the handover is made, there must be a transparent system in place that ensures adequate quantities of source seed backed by the requisite financial resources and forward planning.
- *Explorations of the most efficient ways of delivering seed of crops and varieties for which there are demonstrated farmer benefits but no current production and delivery mechanism.* This would involve thoroughly investigating both conventional and unconventional production options (but not sponsoring them) and, where necessary, considering some type of temporary financial support (from governments or donors). These explorations would carefully consider costs and benefits and would assume a continuously evolving seed system.

Pursuit of these priorities requires consideration of the implications for organizing CRP work, the nature of research activities, and the quality of partners. Judgments on these issues will affect the extent to which the CGIAR and CRPs take on these vital tasks or assign them to other entities.

Almost all of these activities require organization at the national level; each country will present a different set of conditions and limitations. This does not sit particularly easily with the concept of IPGs, although it will certainly be possible to make some cross-country comparisons and to learn lessons. Hopefully initial successes can be used to build a critical mass of evidence and argument. But much of the work involves immersion in the details of particular national systems. It sounds as if much of it should be done by others, but who has a greater incentive to see that systems are in place that guarantee the uptake of the CGIAR’s products and therefore ensure that widespread impact can be demonstrated? To the extent that the requisite activities are not within the CGIAR mandate, then a significant proportion of the funding envisioned for seed activities in the CRPs should be removed and channeled to other, more appropriate entities. A minimum CGIAR responsibility is to make sure that all CRPs involved in a particular country are singing from the same hymn sheet. Such coordination has not always been in evidence in the past.

There are also implications for the CGIAR’s research mandate. Many of these activities can be called research, but most are not cutting-edge and will not often be publishable. Much of what is required is behind-the-scenes analysis, organization, and monitoring. It is not destined for academic journals or high-level conferences and may not even be immediately appealing to many donors.

Finally, there are implications for CRP partners. One important set of partners are the growing range of seed producers. CRPs need to be perfectly aware of these and understand their individual strengths and weaknesses, but their growth should depend on the actual demand for seed in a country. In any case, there are many donors and programs dedicated to the development and support of these seed producers. The greatest single weakness of partnerships in the current seed delivery system for CGIAR products is the status of many NARIs. They are under-resourced and many have few incentives to worry about technology delivery. In these cases the CGIAR has to make hard decisions about whether to abandon them and look for alternative partners or modalities; persuade NARIs and their governments to change their ways; or somehow continue with the current relationships. The course of these decisions on exit, voice or loyalty with the NARIs will make a significant difference to the delivery of CGIAR seed products.

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