



# Diagnosing the scope for innovation: Linking smallholder practices and institutional context

## Introduction to the special issue<sup>☆</sup>

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### ABSTRACT

The article introduces the diagnostic studies reported in this special issue and prepares the reader for understanding their full portent, not only as stand-alone articles but also as an expression of a research programme with a common purpose and scientific objective. As such, the article introduces the focus of the CoS-SIS programme on the nexus between farmer practices and institutional context, and primes the reader on the special challenges posed by diagnosis of this nexus. The diagnostic studies scoped the landscape and the regime but mainly as these might impact the niche. What is reported is 'the view from the niche'. The article explains the structure of the research programme and the role of the PhD researchers in it. It further describes a number of methodological issues common to all.

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## 1. Introduction

This special issue reports the results of diagnostic studies conducted under the Convergence of Sciences - Strengthening Innovation Systems (CoS-SIS) research programme financed by the Directorate General of International Co-operation (DGIS) of the Netherlands Ministry of Foreign Affairs. The main collaborators are members of universities in four countries: the Université d'Abomey à Calavi (UAC) in Benin; the University of Ghana (UOG) at Legon, Accra, Ghana; the Institut Polytechnique Rural de Formation et Recherche Appliquée (IPR/IFRA) at Katibougou, Mali; and Wageningen University in The Netherlands. Other Dutch partners are the Royal Tropical Institute (KIT) and Agriterra. In the three African

countries the programme operates in nine agricultural domains that have been selected by working groups of high-level experts and officials to represent national and smallholder priorities. This combination is, in hindsight, not without problems. For example, the government's promotion of some of the selected cash crops has at times led to mass defection from the crops by disgruntled farmers.

A post-doctoral researcher has been assigned to each domain from a relevant national research institute, university, or NGO. In addition, one PhD researcher has been appointed to each domain, with exceptions in Benin, where two domains each have two doctoral researchers because funds from another project were available, and one domain in Mali, which has only the post-doc researcher. The PhD researchers are the senior authors of the diagnostic studies presented in this special issue (Table 1).

CoS-SIS (2008–2013) is the second phase of CoS (2002–2006), an inter-university collaborative research programme that focused on participatory technology development (PTD). One of the key insights that emerged from comparison of eight experiments by and with farmers was that African smallholders face very small

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**Table 1**  
CoS–SIS domains and PhD researchers (at the time of writing).

Country	Domain	PhD researcher
Benin	Oil palm	E. Akpo
	Oil palm	R. Yémadje
	Water management	E. Totin
	Water management	N. Kpéra
	Cotton	C. Togbé
Ghana	Oil palm	C. Osei-Amponsah
	Cocoa	W. Quarminé
	Food security	K. Amankwah
Mali	Shea nut (karité)	A. Sidibé
	Water management	–
	Crop–livestock integration	Drissa Doumbia

windows of opportunity: the benefits that smallholders can capture from improved technologies at the farm level are marginal. A study of CoS' impact five years after the fact showed that especially those changes over which farmers had control had persisted. Most innovations that required support at a higher than farm level did not survive [1]. This insight led CoS researchers to begin experimenting with institutional innovation at levels higher than the farm [2].

As a result of this work CoS–SIS has been designed to focus on the interfaces between (1) the opportunities and constraints of smallholders and (2) the enabling/disabling institutional conditions at levels higher than the farm. The PhD researchers focus on farm level practices and on the constraints and opportunities experienced at that level, together with analysis of the institutional context directly related to those constraints and opportunities. Using the terms introduced by Geels [3], whose scheme has been widely used in the diagnostic studies, the PhD researchers have scoped the landscape and regime, as they affect the niche in which they work with farmers. What is reported in the diagnostic studies is 'the view from the niche'. The research of the post-docs focuses on innovation platforms engaged in institutional experimentation at higher levels than the farm. The envisaged role of the platform actors is to engage in institutional innovation as an emergent property of informed interaction, enriched by the research information provided by the doctoral and post-doctoral research [4]. In all three West African countries the post-doc for the domain, the National Programme Co-ordinator and the Chairman of the Programme Management Team have had an important say in the choices made by the PhD researchers, in terms of entry points, focus of the diagnosis and communities chosen for in-depth study. In many cases it was the post-doc who introduced the doctoral researcher to the communities in which she or he was to work. In most cases, the diagnostic studies played an important role in informing the actors on the innovation platforms.

Following the identification of the domains, preliminary scoping studies by the Research Associates refined the selection of the location and boundaries of application [5]. Of course, these boundaries are still imprecise. For example, the cotton domain in Benin does not include the farmers who dropped out of cotton and might come back to it once the incentives improve. Sterk et al. [1] found that the farmers who participated in the cotton experiments during CoS had stopped growing the crop so that the lessons learned during the experiments were no longer applied. In general, the issue of dropouts from agriculture is a difficult one that is often overlooked; it is a cost of 'modernizing' agriculture that is externalized to other sectors.

All PhD researchers carried out the diagnostic studies as a common chapter in their dissertations. One can ask why we insisted on diagnostic studies as a substantive starting point of a programme of research and experimentation, sometimes against the wishes of the academic supervisors of the dissertations. At the start

of CoS in 2002, Giampietro [6] had made us aware of the danger of pre-analytical choices that can lead a research programme into dead-end path dependencies. An example of such a choice is the mix of disciplines and team members to be included for the purposes, for instance, of writing the proposal before one has an idea which disciplines are required to reach the scientific and development objectives of the programme. Nederlof et al. [7] listed the pre-analytical choices we made in CoS, but these were not carefully evaluated in terms of their impact on the programme. In CoS–SIS, the choice of the domains was a pre-analytical one that might affect the outcome. For example, the access to land in the Adja oil palm fallow system by landless farmers and women (who are not allowed to plant trees) could be jeopardized by the Benin government's drive to revitalize the palm oil export industry by planting hybrid seedlings [8]. In CoS–SIS, as in CoS, we have worked hard to establish a broad-based multi-disciplinary team and to ensure that each doctoral student has both natural and social science supervisors and examiners. This 'convergence of sciences' has hopefully reduced the myopia created by narrow disciplinary perspectives.

However, the main reason why CoS–SIS has devoted so much of its precious research time and resources to both the scoping and diagnostic studies in each domain was to ensure that choices about programme focus, design, experiments, partners, beneficiaries, etc., were made as much as possible on the basis of (some) knowledge of the domain and an understanding of the perspectives of the actors in it. As we shall see below, the focus of CoS–SIS on the nexus of farm practices and institutions requires even more diagnostic effort than technology development.

This introductory article further describes the subject matter of the diagnostic studies and the special challenges that the domains pose for diagnosis. It discusses a number of issues from the perspective of the research programme taken as a whole. The general purpose is to prepare the reader of the collection by emphasizing some of the common challenges the studies faced. The concluding article [9] seeks to draw conclusions from the comparison across the set of articles and to raise the issues that arise.

## 2. Focus, challenges and methods

The persistent failure, also in Sub-Saharan Africa (SSA), to translate investment in agricultural science into farm developments that effectively and sufficiently include the majority of smallholders in rainfed farming has given rise to approaches such as farming systems research (FSR) [10] and participatory technology development (PTD) [11]. Such approaches sought to ensure that technology is grounded in sound information about farming in a context and in procedures that allow farmers to influence the choices in and the process of technology development. Technological innovation at the farm level increasingly is regarded as the outcome of interactive processes in which farmers and other stakeholders play crucial roles. For example, at the time of writing, in six African and two Asian countries, Local Innovation Support Funds managed by farmers themselves are under experimentation [12]. Warburton et al. [13] reported on experiments with autonomous community-based extension workers in marginal areas in Bangladesh, Kenya, Peru and Sudan, which showed continued beneficial impact five years after terminating project funding. In industrial countries a great deal of applied agricultural research routinely is commissioned by farmer organizations and financed through levies on the agricultural industry by means of dedicated enterprises or inter-professional organizations that have been set up under public law.

In line with these developments in the earlier CoS programme, eight doctoral researchers zoomed in on experiments to develop effective, appropriate, adapted and desirable technologies with groups of farmers, together with local extension workers and

researchers, on the basis of extensive diagnostic studies [14]. However, it led to a conclusion that moved the quest for innovation of smallholder farming in SSA beyond development of technology. In addition to technology development, innovation at the farm level requires institutional change that links farmers to remunerative markets through integrated value chains, creates level playing fields, stops corruption and exploitation, enhances farmers' ability to organize and articulate demand with respect to service providers [4,15], and otherwise ensures governance and policy conditions that support smallholders, instead of the current institutional context that creates a pervasive bias against the small farm sector on the sub-continent [16].

Hounkonnou et al. [4] provided a review of the international literature that grounds the CoS–SIS programme's recognition of the importance of supportive institutions in the history of agricultural thought. The role of supportive institutions in agricultural development has been overshadowed in the last decades by enthusiasm for methodological individualism that explains collective outcomes as an aggregation of individual utility optimization. It is only recently that the autonomous role of social relationships in determining individual behaviours has come to prominence. The rise of New Institutional Economics and the award of Nobel prizes in economics to North in 1990 and to Ostrom and Williamson in 2009 stand testimony to the changed insights into economics and the shift in paradigms that is slowly beginning to make itself felt on the 'battlefields of knowledge' [17], even if some agricultural science establishments seek to hold on to the idea that agricultural development is synonymous with a technology supply push to increase productivity per hectare.

The nexus of smallholder practices and enabling or disabling institutions at the higher than farm level requires special efforts to understand the complex, messy, multi-level situations and relational configurations in which actors with diverse interests interact – or fail to interact – to generate outcomes that we call here 'opportunities for' or 'constraints on' farm development. The assumption is that, even in currently unpromising situations, selected configurations of key actors and their interaction across levels can lead to agricultural innovation, provided they can achieve mutual understanding and agree to take concerted action towards innovation. Such a soft system perspective [18] implicitly or explicitly in these studies guides the analysis of messy situations, leading to the identification of realistic entry points and interventions for creating smallholder opportunity by the actors concerned.

The diagnostic studies reported here we believe vindicate the focus chosen by CoS–SIS. Even superficial analysis of the selected domains in the three West African countries, be they food or cash crop domains, suggests that institutional issues explain a large proportion of the variance in the quality and quantity of agricultural output. Often the institutional context is shown to impose adverse conditions on farmers. With respect to African food farming, much of it still can better be described as a coping strategy rather than as remunerative enterprise that rewards innovation and professionalism. As a result, notwithstanding their vast underutilized agricultural resources, annual cereal imports into Africa have steadily increased from 2.5 million metric tons in the 1960s to more than 15 million metric tons in 2000 and 2001 [16]. These imports are expected to increase by a factor 5 during 2000–2050 [19].

Efforts to improve the institutional conditions in which African smallholders produce often involve the creation of artificial conditions, such as costly subsidies, complex input distribution programmes and credit schemes, or price supports that over time become unsustainable and non-replicable. For instance, the input subsidy programme of the Malawi Government [20], while leading to a significant small farm surplus in good rainfall years, experiences fiscal constraints when a run of bad rainfall years occurs.

The challenge is therefore, to identify space for change that is not vulnerable in this sense. The relative success of export crop production in SSA based on outgrowers linked to centrally managed enterprises, be they public, private or NGO-based, that provide inter-linked services such as credit, input supplies, co-ordination, or marketing, shows that this is possible. Most SSA export commodities such as tea, coffee, cut flowers, cocoa, and cotton are produced by smallholder farmers.

In this special issue we take a broad perspective on institutions. Research on institutions has been pursued in a long-standing tradition in sociology and anthropology that started with Durkheim and Traugott [21] and was elaborated by people like Giddens [22] and Douglas [23] and her followers (e.g., [24]). The economist who placed institutions on the map was North [25] who realized that markets are not 'natural phenomena' but bundles of agreed rules, such as money, that reduce transaction costs. Accordingly, he defined institutions as the rules of the game that reduce uncertainty in human interaction [26]. For Williamson [27], institutions refer to the ensemble of deeply embedded norms and values, constitutions, legal and regulatory frameworks, policies, governance, and negotiated agreements that are 'institutionalized' in various structures, networks, and value chains that govern individual behaviour. This is not to deny the role of the individual agency but to highlight 'the social' in influencing the individual.

With the crises of banking and finance upon us, it is becoming clear that we lack the institutions to control the consequences of unfettered capitalism. Such an analysis suggests that institutions allow collectivities at different levels to operate rationally and beneficially. Different authors have warned against this implicit assumption. Cleaver [28] points to the fact that many institutional contexts can be called 'bricolage', a hodgepodge of pluralistic formal and informal institutions that often conflict, represent the interests of different groups of actors, and serve to protect the power of the powerful. Grindle [29] warns against 'one size fits all' approaches, idealized end-states, and setting universal standards for 'getting the institutions right'. Instead, she observes that 'development scholars and practitioners increasingly embrace a common theme of seeking appropriate responses for given problems in a specific context. In this new thinking, next steps, good enough, bottlenecks, contextualized diagnosis, and binding constraints are in; variable processes of getting to development are more often acknowledged to be critical to understanding than the end state of development. This perspective emphasizes the importance of knowing the context through 'contextually sensitive analytics', the fact that informal institutions are as important as formal ones, and the importance of politics, often as 'a spanner in the works'.

Institutions can be seen as outcomes of agreements and concerted action that arise from interaction among the actors who can make a difference. The promise of the approach that is tested in CoS–SIS is that careful analysis of farmers' constraints and opportunities and the institutional conditions that give rise to them can lead to identification of promising opportunities for key actors to come together and agree on concerted action to remove the constraints or create new opportunities through institutional change. This does not have to cost much. For instance, the agreement among district officials, Licensed Buying Companies (LCBs) and farmers brokered by Dormon et al. [30] to make random checks on the weighing scales used by LCBs dramatically discouraged the routine doctoring of the scales to under-report the weight of farmers' cocoa by as much as 10–15%. This not only put more money in farmers' pockets but also increased their confidence in the system. The example shows that institutional innovation requires excellent understanding of how 'a system' actually works. There are important reasons why this asks for a special effort in terms of diagnosis.

In the first place, developing research sensitivity for institutions takes time, especially amongst agriculturalists trained in natural

science or classical economics (i.e., most of the senior authors of the articles in this special issue). A diagnostic study allows for careful exploration of conditions in the field and for breaking out of the box that one's discipline has created. That at least is how one of the authors has explained the experience (Charity Osei-Amponsah, personal communication). Moreover, it takes time for researchers to realize that mere identification of a constraint experienced by farmers, such as lack of access to inputs or credit, does not in itself constitute an institutional analysis. The constraint has to be translated into institutional issues or failures [31], expressed in terms of the interactions among networks of key actors.

In the second place, many of the institutions that play crucial roles in creating smallholder opportunity have formal functions or purposes that have very little to do with the actual function as farmers experience it. The classical example is Checkland's [32] metaphor for a prison. Formally and ostensibly, a prison's function is to protect society from criminals but, says Checkland, many a prison can be better described as a training school for turning first-time offenders into professional criminals. Similarly, a credit scheme for small farmers ostensibly serves to provide seasonal credit for farm activities. Many credit schemes are experienced quite differently: it is a procedure for gaining money from the state, based on giving part of it to the official in charge of allocating loans.

So it could be said that a minimal command of 'two languages' – the language of official rules and the language of 'informal' practices – is required [33, p. 85]. 'Embedded in a 'dysfunctional' context of the supply of public services, and legitimized by social and cultural logics, the corrupt practices outlined here are ultimately part of the profound process of transformation under way in the African state. This transformation is currently heading in the direction of the progressive privatization and informalization of public services' [33, p. 101]. 'The 'informal privatization of the state' as it emerges overwhelmingly from our studies well and truly indicates an increase in the private profits of the agents of state and at the same time a deterioration in the supply of public goods and services from the perspective of the user' [33, p. 109].

In other words, institutional analysis of constraints and opportunities experienced by farmers (as users) requires investigation of complex agreements and understandings among powerful actors who often have a self-interest in obscuring what is going on and protecting their turf.

It is not the case that African agriculture lacks institutions; it is marked by elaborate institutional configurations. However, many of these seem best understood as having the purpose of extracting wealth from farmers or preventing wealth from reaching farmers. This makes diagnosis of the institutional conditions and identification of promising interventions that could create realistic opportunities for smallholders a sophisticated exercise. The default is to stick to the safe description of farmer practices or to the formal system as it is presumed to operate. The challenge for the diagnostic studies reported in this issue was to move beyond that and attempt to empirically study and analyse the scope for change.

In the third place, the situations studied are dynamic. International markets, food prices, national policies, the behaviour of local, national and international companies, the funding of NGOs and development programmes, as well as political situations, change very fast. For example, the impact of Structural Adjustment policies imposed by World Bank and IMF in the early nineties and the subsequent failure of the private sector to take over service provision and marketing tasks in the smallholder sector [34] rapidly led to changing contexts that motivated a wide range of responses, from the re-invention of public sector roles and the emergence of local private enterprises, radical change in the level and mode of conventional donor assistance programmes, and to the so-called 'land grab' by which huge tracts of land under smallholder or

pastoral management are being transferred to management by foreign government agencies or private companies. It is often quite difficult to know what is going on, given the lack of public information on such issues within the affected countries.

In the fourth place, in today's inter-connected world, local developments, even in the most remote villages, are influenced by global events and trends such as fluctuations in the international price of food, climate change, the banking crisis, or rich countries' and supermarket chains' efforts to safeguard their own food supplies by acquiring productive resources in Africa (e.g., [35]). Many of the articles in this special issue use Geels' [3] distinction between niche, regime and landscape to give an analytically useful hierarchical ordering of institutional relationships. The Geels' framework does not necessarily match to geographic scale (e.g., local, sub-national, supra-national). It refers especially to spaces for innovation, institutionalization of innovations and processes of purposeful change that prove themselves, and the major external framework conditions for such innovations and innovation processes. Thus niche refers to theatres or arenas in which one can change something by means of institutional experimentations; lasting effects of such niche experiments, however, require changes in institutional regime i.e., in the habitual and wider-than-local rules of the game, embedded in practice. Regimes strongly affect outcomes but are difficult to change; such change requires purposeful actions by committed individuals working together in networks of relationships across levels. Landscape refers especially to external framework conditions over which the actors at niche or regime levels have little direct or immediate influence. They are givens with which they have to work, such as climate change or international market prices. CoS-SIS is designed to explore the contribution of the niche experiments, observed or created by the PhD researchers and their partners, to changing (parts of) the regime by means of the deliberations and actions of the platform participants. The diagnostic studies seek to describe and analyse the 'opportunity space' for this happening in a given landscape.

In the fifth place, the PhD researchers have struggled with the boundaries of disciplinarity. Convergence of Sciences means inter- if not trans-disciplinarity. Most of the PhD researchers have been trained according to disciplinarian requirements. Some began their work on CoS-SIS with very clear career perspectives in terms of their disciplinary interests. For instance, within the Benin team, Togbé is an entomologist interested in crop protection, Akpo a plant breeder interested in genetic techniques, Yémadje a soil scientist with a special interest in mycorrhiza, Totin a socio-economist, and Kpéra a wildlife protection specialist with special interest in the relationships between crocodiles and humans. Such specialist interests had to be stretched to produce diagnostic studies that are open to the many-stranded dynamics that affect smallholders' constraints or opportunities, irrespective of initial disciplinary perspective. During CoS-SIS we observed some remarkable shifts in primary interests; the studies reported here bear witness to understanding of the multi-faceted nature of innovation processes in diverse contexts.

The CoS programme showed that an interdisciplinary degree, and a thesis requirement for articles to be written and submitted for publication in a peer-reviewed journal does not make it easier for the graduate subsequently to pursue an academic career, given the overwhelming disciplinary focus of academic institutions. Hence the agreement is that the accent in the doctoral work will be on the discipline within which the candidate seeks to build a career. For example, many of the natural scientists will, as part of their doctoral work, carry out purely natural science experiments. However, the programme also requires that each thesis includes two chapters (articles) that are common to all: the diagnostic study and an analysis of institutional change. A commonality of purpose has been fostered and supported in all CoS-SIS team members through



**Table 2**

Entry points for research and experimentation in each CoS–SIS domain.

Country	Domain/Doctoral student	Entry point
Benin	Cotton Togbé	Creating capacity and opportunity for farmers to use the LEC ( <i>Lutte Etagée Ciblée</i> ), an adapted Integrated Pest Management (IPM) strategy that depends on the availability of certain pesticides, as well as on a regular IPM
	Oil palm (seedling system) Akpo	Improving the quality of the system of distribution of improved ( <i>tenera</i> ) oil palm seedlings to smallholders
	Oil palm (inter-cropping) Yémadje	Improving access to fertile land using the oil palm fallow (agro-forestry) practices developed by Adja farmers. This access is deeply affected by land tenure conditions. The agro-forestry system is a contested arena
	Water management (rice in <i>Bas Fonds</i> ) Totin	In the south, to improve irrigation practices to allow smallholders to capture the expanding market for local rice as world market prices rise
	Water management (agro-pastoral dams) Kpéra	In the north, to improve the multi-actor management of the multi-functional use (for livestock, drinking water, irrigation, crocodile conservation, fisheries, swimming) of agro-pastoral dams
Ghana	Oil palm Osei-Amponsah	Improving the quality of crude palm oil produced by small-scale women processors so as to allow them to access the strong but unsatisfied demand for high-quality oil
	Food security Amankwah	Focusing on the savannah zone of northern Ghana, to develop technical practices and value chains that would allow smallholders to benefit from markets for small ruminants (currently exploited by Burkina Be)
	Cocoa Quarminé	Differential farm gate payment for different categories of bean quality (currently farmers get the same price whatever the quality of their beans).
Mali	Crop-livestock integration Doumbia	In an Office du Niger (ON) irrigated area, to establish viable zero grazing dairy farming based on crop residues and fodder made possible through new technical practices and ON management changes
	Water management	In an Office du Niger irrigated area, to improve management of tertiary canals after their devolution to water user associations
	Shea nut ( <i>karité</i> ) Sidibé	Shea nut collection and processing by women is affected by tensions between inclusion versus exclusion in remunerative processing co-operatives, quality versus quantity, and production for foreign versus domestic markets

Source: Adjei-Nsiah et al. [5].

frequent interaction, both in formal workshops and in field visits, at national and international levels. The role of the three National Programme Co-ordinators, and the post-docs in each domain (with whom the doctoral students work closely) has been particularly important in this respect. The reader is invited to judge the extent to which these diagnostic studies, in addition to their idiosyncratic interest, share a commonality of purpose and contribute to insights that are supported by the comparative element in these studies.

### 3. The studies: entry points and purpose

The diagnostic studies were preceded by broad scoping of opportunities, carried out by the post-docs who led to identification of the ‘entry points’ for CoS–SIS research and experimentation in each of the domains [5]. The entry points, which were refined and adopted in an international workshop comprising all CoS–SIS partners, are presented in Table 2. They define the areas addressed by the diagnostic studies reported in this special issue.

These entry points were chosen for pointing to promising CoS–SIS activity in the domain. The post-doc researchers laid a firm basis for identifying the entry points but the doctoral researchers and their supervisors had a strong voice in the final choice. The doctoral researchers are expected to work closely with specific communities of smallholders (or in the case of Osei-Amponsah, with small-scale processors) in their domain and identify institutional issues directly based on the constraints or opportunities within that institutional space. In all cases the communities have been selected as meaningful given the entry point chosen for the domain.

We, as authors of this introduction to the special issue, feel that this series of articles provides a unique view of a little known West Africa: the struggles and victories of the people who form its biggest single professional even if highly diverse category, who generate most of its wealth, but have least influence over matters that determine their lives. The articles bring to life the professionalism, multi-level trade-offs, innovativeness and coping strategies

in smallholder agriculture. They show the sector to be an interesting area of research and work and an area that gives ample space for professional achievement.

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