Geographical indications: what institutional innovations for a territorial construction of technical innovations?

Stéphane Fournier, Emilie Vandecandelaere, Catherine Teyssier, Clément Charbonnier, Giovanna Michelotto-Pastro, Dominique Barjolle, Olivier Beucherie, Philippe Jeanneaux

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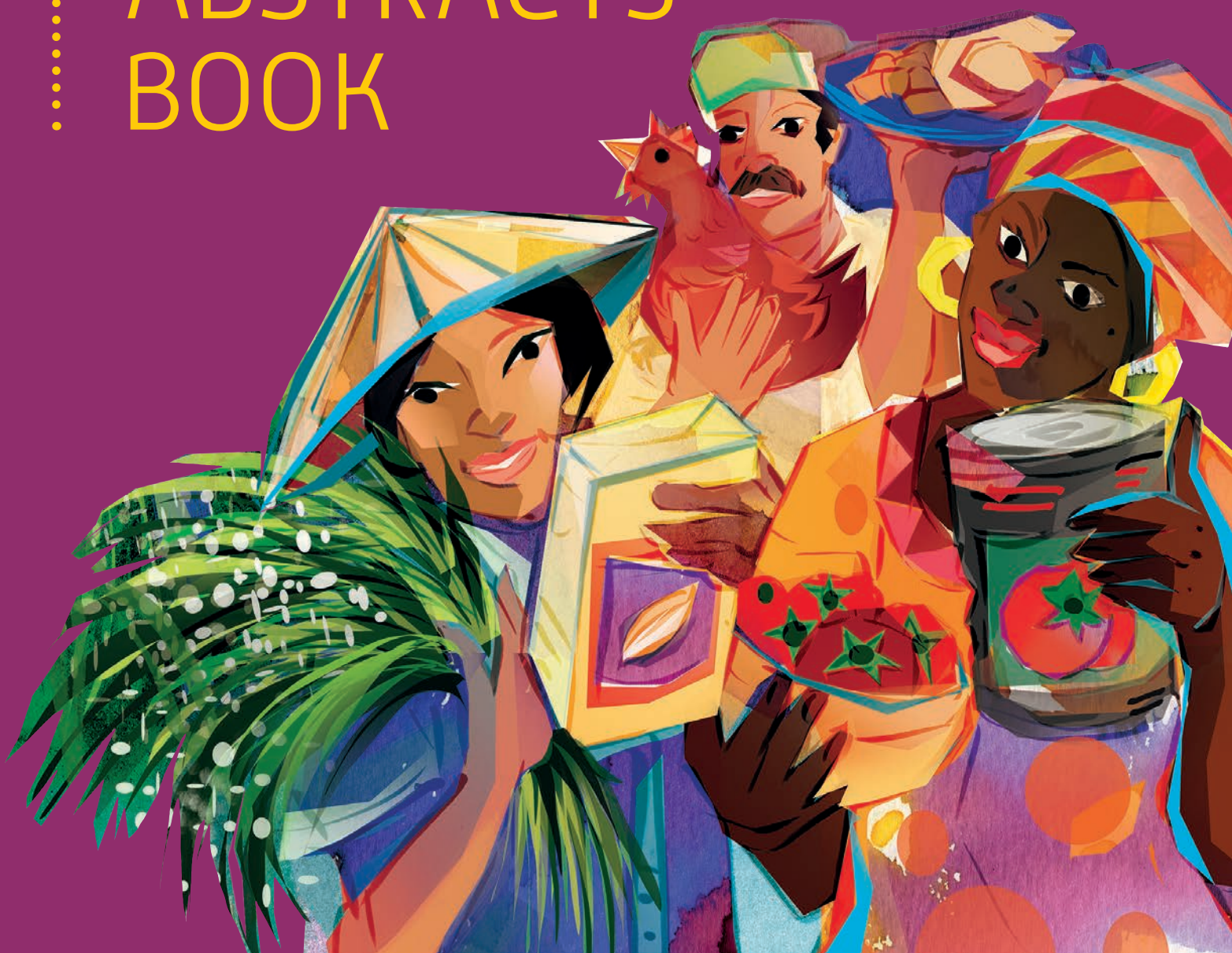
AC&SD 2016

Agri-Chains & Sustainable Development

> *Linking local and global dynamics*

ABSTRACTS BOOK



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Welcome to AC&SD 2016

On behalf of the Scientific and Organizing Committees, it is a great pleasure to welcome you to the International Conference on Agri-chains and Sustainable Development (**AC&SD** 2016). This conference aspires to widen the debate about the role of agricultural value chains towards sustainable development. Year 2015 was a critical political and diplomatic milestone: the member states of the United Nations signed a new agenda for development, with the 17 Sustainable Development Goals (SDGs) placing sustainability at the core of international efforts. Development and academic actors are since then exploring new avenues for translating the SDGs into reality and implementing global and local frameworks and partnerships. Our conference aims at joining these efforts, with the consideration that agricultural value chains form spaces where local and global challenges to sustainability connect and within which local and global actors experiment and negotiate innovative solutions.

The scientific committee has assembled a very attractive program for **AC&SD** 2016 that seeks to cover and confront the diversity of realities behind agri-chains, from localized chains, embedded in specific places, to global value chains. In the parallel sessions, transformations of these agri-chains and their connections to sustainable development will be discussed by speakers from the academia, the civil society, the private sector and decision makers. This multi-stakeholder perspective will also be brought about in the plenary sessions. Here, world renowned keynotes and panelists to three high level round tables will discuss about the role and importance of evaluation, public and private institutions and innovations at different scales for transforming agri-chains towards sustainability transitions.

This edition gathers about 250 participants from 39 countries. **AC&SD** 2016 owes a lot to the scientific and organizing committees for preparing the program, and particularly to Brigitte Cabantous, Chantal Carrasco and Nathalie Curiallet for all the logistics, as well as to our support team of Alpha Visa that we warmly thank for their help.

We wish us all a fascinating, successful, inspiring and enjoyable **AC&SD** 2016 and we very much look forward to its result and to the strengthening of both a scientific community and a community of practice to implement the outcome!!

Estelle Biénabe, Patrick Caron and Flavia Fabiano,
Cirad Co-chairs **AC&SD** 2016

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Table of contents

Session 1

Linking public policies and agri-chain governance mechanisms to support the SDGs: lessons and challenges from and for forest landscapes

Mitigating the negative impacts of the maize boom on landscapes and livelihoods in Laos 10
Jean-Christophe Castella [et al.]

Managing Olam rubber plantation's impacts in a forest area in Gabon:
rethinking the horizontal dimension of sustainable supply chain governance systems 13
Stéphane Guéneau [et al.]

Governing the beef supply chain in the Brazilian Amazon:
progress and limits in shaping the transition towards a sustainable development 16
Isabel Garcia-Drigo [et al.]

Soy value chain, agriculture expansion and savannahs' conversion in Brazilian Cerrado:
linking global governance mechanisms and local political dynamics 20
Pierre-Marie Aubert [et al.]

From zero-deforestation cocoa to sustainable chocolate value chains 23
Marisa Camargo [et al.]

Linking sustainable production and enhanced landscape governance in the Amazon:
towards territorial certification (TerraCert) 25
Pablo Pacheco [et al.]

Session 2

Dairy industry sharing sustainable development goals Emphasizing the diversity of development pathways

Acknowledging social negative loops in inclusive business:
an Egyptian case study of dairy sourcing 28
Annabelle Daburon [et al.]

The transition of animal farming in Vietnam : from semi-subsistence to commercial systems 31
Nathalie Hostiou [et al.]

Stabilising producers' conditions to access market through cooperative institutional innovations:
the case of India 33
Marie Dervillé [et al.]

Are investments of milk corporations in developing countries likely
to promote socially sustainable business? Lessons learnt from West Africa and South-East Asia 36
Guillaume Duteurtre [et al.]

Session 3

Climate Smart Cocoa: the emerging case for public-private partnerships in response to deforestation and climate change

Climate Smart Cocoa: building private sector engagement and investment in response
to deforestation and climate change 40
Ethan Budiansky

An innovative public/private partnership for a sustainable transformation of the cocoa agri-chain in the Dominican Republic 43
Olivier Deheuvels [et al.]

Is our chocolate melting away? 45
Christian Bunn

Public/private partnerships: insights from the cocoa action partnership and the Climate Smart Cocoa programme in Ivory Coast and Ghana 48
Martin Gilmour

Public/private partnerships: insights from the research and development program Cacao Forest 49
Pierre Costet

Offsetting and insetting are needed in equal measures! 50
Isilda Nhantumbo

Session 4

Global commodity chains and sustainability in Latin America: changes towards sustainable development in trade of agrifood products

Mexican agrifood geographical indications: between productivity and sustainability 52
Pablo Perez-Akaki

Sustainable label and governance of global value chain: insights from coffee value chains in Latin American countries 56
Jean-Francois Le Coq

Sustainability in rural territories participating in global value chains. Cases of Costa Rican agroindustrial-chains 60
Rafael Diaz [et al.]

Global value chains for sustainable development of primary producers of coffee in Mexico 64
Marisol Velazquez

Agro-ecological products qualification and certification participatory initiatives effects of Brazilian public policies 68
Eric Sabourin

Coffee chain in El Salvador: an approach on the influence on the sustainable development of the Western Region 70
Gilma Lizama

Session 5

Strengthening the capacities needed to make multi-stakeholder partnerships for innovation in agri-chains work in practice

Scaling inclusive development: assessing the outreach and leverage of agri-chain partnerships in sub-Saharan Africa 74
Sietze Vellema [et al.]

Innovation platforms and value chain: technological interactions and sustainability in Ivoirian plantain sector 77
Euphrasie C.M. Angbo-Kouakou [et al.]

How to support innovation processes in agricultural sector? Diversity and complexity of situations of innovation in Burkina-Faso. 81
Aurélie Toillier [et al.]

The case of Myanmar: after 50 years of dictatorship, making the leapfrogging possible in agriculture 86
Ei Khin Khin

Transition in agricultural innovation and development: a case study of Bt cotton system in Burkina Faso 89
Eveline M. F. W. Compaore Sawadogo

Roots to empowerment 92
Toon Defoer

Organic agriculture and food security in Cameroon 93
Gerard De La Paix Bayiha [et al.]

Capacity for change: the common framework on capacity development for agricultural innovation systems 94
Christian Hoste [et al.]

Exploring capacity to innovate concepts and its assessment in Cameroon 95
Sophie Allebone-Webb [et al.]

Agriculture innovation partnerships in Angola: successful stories 96
Ana Melo [et al.]

Government ***vs*** private sector led innovation partnerships in Ethiopia: challenges and opportunities for capacity development 100
Amanuel Assefa [et al.]

Session 6

Private standards in agri-chains: evaluating their outcomes and assessing their impact

The role of certification on hired labour in banana plantations – cross country analysis of economic, social and empowerment benefits 102
Fedes Van Rijn [et al.]

Fair deal or ordeal? Enquiry into the sustainability of commercial banana production in the Lao PDR 106
Vongpaphane Manivong [et al.]

Evaluation of the FSC forest certification scheme in Brazil: a three level approach 109
Stéphane Guéneau [et al.]

Smallholders and the inclusion debates in certification schemes: perspectives from palm oil certification in Thailand and Malaysia. 113
Marcel Djama [et al.]

Fair trade for all on smallholder farmers and farmworkers 116
Martha Lilia Del Rio Duque

Session 7

Institutional innovations for sustainable food systems: practitioner experiences in 'transitions in the making'

Developing a biocultural heritage indication labeling system 120
Krystyna Swiderska

Introduction to institutional innovations 123
Allison Loconto [et al.]

Participatory Guarantee Systesms (PGS) as innovative institutional approach towards sustainable production. 127
John Mathew

Multi-actor innovation platforms in Southwest China: participatory plant breeding, community supported agriculture and participatory guarantee systems 131
Dr Yiching Song [et al.]

Community supported agriculture: innovative ways to share risk among producers and consumers 133
Judith Hitchman [et al.]

Geographical indications: what institutional innovations for a territorial construction of technical innovations? 136
Stéphane Fournier [et al.]

Session 8

Participatory Guarantee Systems (PGS): a value chain innovation to boost smallholder quality management

Collaborative short food supply chain to make market inclusive for smallholder farmers: case of participatory guarantee system (PGS) in Vietnam 142
Van Anh Thi Truong

The building of agri-chains toward sustainable community development: experiences of applying PGS for organic and diversified agricultural production in Ben Tre Province 145
Mayu Ino

Participatory guarantee system (PGS) the sustainability assessment for vegetable in Red River Delta – Vietnam 149
Dao The Anh

Scaling up sustainable food systems in a local context: an experience of the freshveggies PGS scheme in Wakiso, Uganda 150
Julie Nakalanda Matovu

Smallholder vegetable quality guarantee challenges of VietGAP adoption and alternative Participatory Action Research (PAR) 152
Pham Tho

Participatory Guarantee System, a management tool for value chain development A lesson learnt from Vietnam 157
Nhung Tu Thi Tuyet [et al.]

Short and small ***vs*** long and big supply chains: the case of Bac Tom 162
Manh Chien Tran

Session 9

City driven food chains and sustainable development

Transformation of the vegetable supply chain in Mar del Plata (Argentina) in the face of raising health concerns 166
Ophélie Robineau [et al.]

Sustainable development impacts of various ways to modernize urban food distribution: the case of vegetables in Vietnam. 170
Paule Moustier [et al.]

Landscape factors influencing sustainable food agri-chain innovation:
The role of place in the Toronto experience of Local Food Plus 173
Wayne Roberts [et al.]

Are food losses and waste overestimated in developing countries? 176
Géraldine Chaboud

Vulnerability and resilience of the urban food system to extreme weather:
a case study of Colombo, Sri Lanka 180
Christina Semasinghe [et al.]

Resilience of rural-urban food flows in West Africa 182
Pay Drechsel, Hanna Karg, Richard Kofi Appoh and Edmund Akoto-Danso

Session 10

Innovations in approaches and tools for inclusive and efficient value chain development

Commercial and inclusive value chains: doing good and doing well 184
Malcolm Harper, John Belt and Rajeev Roy

Factors influencing successful inclusion of small farmers
in modern value chains in ACP countries 188
Andrew Shepherd

Cross-border trade and women in value chain development 192
Florence Tartanac

Inclusive and efficient value chains 195
Maximo Torero

Assessing equity in value chains through a participatory guide to business models
that link smallholders to markets: insights from LINK application
across diverse value chain settings 196
Mark Lundy [et al.]

Household asset endowments and implications for inclusive value chains 197
Jason Donovan

Gender equity in value chain and livelihoods development: innovative approaches and tools 198
Dietmar Stoian

Innovation for inclusive value-chain development, successes and challenges 199
André Devaux

Measuring and simulating trust in value chain development 200
Christine Plaisier

Session 11

Linking global value chains and territories: conceptual insights for understanding and ensuring sustainability at different scales

Agri-chains and territories “zero-deforestation”:
what role for the payments for environmental services? 202
Alain Karsenty

Vulnerability and resilience modelling for sustainable food systems 205
Paolo Prosperi and Thomas Allen

Assessing the potential of territoriality in advancing agricultural and rural development 209
Valerie Nelson [et al.]

Understanding the impact of economic globalization on local sustainability with global value chain governance – literature review and research agenda 213
Yann Laurans [et al.]

Sustainability assessment in local and global food chains. A comparative study in the French wine industry 215
Jean-Marc Touzard [et al.]

A hybrid perspective of political economy and socio-ecology to study multidimensionality of agri-chains and complexity of sustainable development: connecting scales and dynamics throughout selected case studies in Colombia 217
Martín Bermúdez-Urdaneta [et al.]

Session 12

Methods and challenges in assessing sustainability in agri-chains

A porter diamond-based approach to assess the role of innovative local food systems in the territorial integrated sustainable development: the case of Cilento Eco-Region 222
Cesare Zanasi [et al.]

Practical analysis of inclusive and sustainable value chains: the case of rice value chain in Mali ... 225
Baudouin Michel [et al.]

Towards a harmonized framework for assessing the sustainability of agricultural value chains: identification of key challenges and perspectives for research 229
Claudine Basset-Mens [et al.]

Using SMART to compare social, economic, environmental and governance impacts of certification at smallholder farm level 232
Brian Ssebunya [et al.]

No time to rest on one's laurels – A SMART sustainability assessment induced further optimisation on a banana plantation in Costa Rica 234
Silvia Marton [et al.]

Towards a harmonized framework for assessing the sustainability of agricultural chains: propositions for building a multidisciplinary dialogue 237
Pierre Martin [et al.]

EX-ACT VC: an innovative tool to assess multi-benefits of food value chains 239
Bockel Louis [et al.]

Session 13

Multi-stakeholder partnerships towards food security and sustainable value chains

Institutional food procurement programmes: key aspects for programing and policy design 242
Florence Tartanac [et al.]

BiomassNet: a stakeholder network for promoting innovation in food and non-food biomass-based value webs in Africa 246
Christine Schmitt [et al.]

Local products for urban markets' supply :
experiments in the region of Seam Reap (Cambodia) 247
Martine Francois [et al.]

Development of the rice value chain in Guinea though suppport for female rice parboilers
and a collective, interprofessional trademark 248
Floriane Thouillot [et al.]

Session 14

Connecting value chains, natural resource management and sustainable farming systems Participatory diagnosis and collective action

Environmental impacts of agricultural practices and water and soil conservation works:
the case of the Merguellil catchment 250
Meriem Jouini [et al.]

The limits and opportunities of the entrepreneurship injunction in collective irrigation:
the case of horticultural value chain in Mozambique 253
Raphaelle Ducrot [et al.]

Dealing with the challenge of sustainable water resource management
in food chain development 256
Jean-Louis Fusillier [et al.]

The extent and determinants of postharvest losses:
evidence from the cooking banana value chain in Uganda 259
Enoch Kikulwe [et al.]

Strategic planning for sustainable organic hillside agriculture
with a farming system and value chain model in Nicoya, Guanacaste 263
Jeroen Houdijk [et al.]

A successful convergence between natural resources management
and value chain development 264
Sara Melki

Session 15

Building sustainability in value chains Assessing firm strategies

On the learning curve: sustainability in the making in the Laotian coffee sector 266
Isabelle Vagneron [et al.]

Fish labels as firm's strategic tools for sustainable aquaculture and traditional fisheries 269
Paolo Prosperi [et al.]

Author index 273

Session 1

Linking public policies and agri-chain governance mechanisms to support the SDGs: lessons and challenges from and for forest landscapes

Mitigating the negative impacts of the maize boom on landscapes and livelihoods in Laos

Jean-Christophe Castella[1], Christine Ornetsmüller, Guillaume Lestrelin[1], Peter Verburg and Pascal Lienhard[2]

Introduction: boom crops in the agrarian transition

Boom crops are a global environmental challenge increasingly addressed through a telecoupling lens that emphasizes interactions between remote producers' and consumers' places at both ends of complex agri-chains. Assessments of environmental footprint of boom crops must include distant locations but also multiple temporal and socio-political scales. Indeed, changing market demands for global commodities such as rubber, oil palm, maize or cassava are having tremendous impacts on local landscapes and livelihoods. Crop boom syndrome is described here as the rapid spatial expansion of a crop and increasing economic impact through least effort and most profitable land use pathways for stakeholders along the agri-chain. Understanding underlying mechanisms of these land use changes, especially how decisions are made by smallholder producers involved in crop booms, is expected to help designing sustainable agri-food systems that would avoid boom effects.

In this presentation, we take the example of the maize boom in Southeast Asia as it largely involves smallholders and not only large-scale land acquisition by foreign corporations. As an annual crop, maize development trends are also different from plantations such as banana, oil palm, rubber or coffee which have longer production cycles. Short production cycles provide more flexibility as compared to perennial crops in term of expansion or relocation depending on the fluctuations in the socio-ecological context of the production. Southeast Asia, and especially Laos, provides good examples of very fast land use changes driven by opportunistic behaviours.

The objectives of this presentation are to: (i) describe crop booms as trajectories of land use change, (ii) identify what can be learned from studying past boom trajectories, (iii) identify at what points in the trajectory interventions can be made to avoid negative consequences and (iv) show how to empower local communities and policy makers to better deal with boom crops.

A conceptual framework for intervention on boom crop trajectories

Typical boom-crop pathways repeat in time and space, *i.e.* land degradation, poverty traps, deceived high expectations, *e.g.* jatropha hype (Amsalu and Zoomers, 2014), banana boom (Friis and Nielsen, 2016), rubber juggernaut (Ziegler *et al.*, 2009). Concrete solutions can be found to avoid the same cause to produce the same effects again and again all around the region. We believe that quick and relevant interventions can avoid many adverse effects of the crop booms. Therefore, we need better methods to assess land use changes on the one hand early and fast enough and on the other hand at multiple scales from local to regional levels. In short, we need to understand boom trajectory mechanisms in order to steer the socio-ecological systems towards more sustainable trajectories.

Early recognition of a boom crop syndrome. Land science has a tradition of post-hoc observations at the regional level (*e.g.* gradual process of transition from one land use pattern to another) that may not be adapted to rapid changes, or arrives too late to support intervention and thus achieves limited impacts. In addition, top-down approaches are poorly adapted to local drivers of land use changes (LUC). When observed at the local level, transitions can be extremely rapid, sometimes with unexpected drivers that do not always fit well with observations at the regional level. Local level land use changes are difficult

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to anticipate and sometimes also difficult to relate to broader, regional level trajectories that are usually more easily captured and predicted. In a context of regime shift, *i.e.* fast transitions in socio-ecological systems that limit predictability of LUC (Müller *et al.*, 2014; Ramankutti and Coomes, 2016) we need to recognize the early warning signs in order to respond timely. Early recognition is necessary to identify '*windows of opportunity', i.e.* locations or time periods that are favourable to intervention and innovation (Lestrelin and Castella, 2011) and to adjust intervention modes to local contexts so as to avoid negative consequences of boom trajectories and show alternatives.

Opening the black box of the boom. Disentangling underlying mechanisms of the boom is necessary for meaningful intervention; since crop booms appear as an abstract, emergent entity that is difficult to grasp. Below the regional maize trajectory many singular village LUC trajectories are unfolding, responding differently to the same stimuli depending on their local contexts and history. These path-dependent trajectories need to be understood if we want to effectively address the booms. Understanding the trajectories requires studying the underlying, contextualized decisions that shape the trajectories (Ornetsmüller *et al.*, 2016). This can help identifying leverage points for mitigating negative consequences of crop booms and promoting alternative practices. Transformative approaches to land use include alternative crops and practices, landscape management modes, and involvement of agri-chain stakeholders in coordination processes.

Methods: representing and simulating the maize boom to understand its underlying mechanisms

Data collection. Field surveys have been conducted in seven villages in the northern uplands of Laos located at different stages of the maize boom. Semi-structured questionnaires addressed the constraints to adoption of technical innovations in a boom context. In addition, we investigated the impacts of maize on land use changes in Sayabouri, Xieng Khouang and Houaphan through analysis of remote sensing data combined with household surveys and focus group discussions. A literature review complemented our analysis of the impacts of the maize boom on local landscapes and livelihoods (*e.g.* expansion of maize roads in the villages, impacts on deforestation and land degradation, process of capital accumulation and reinvestment in paddy land terracing and other diversification options).

Participatory simulations and knowledge integration into a model of the maize boom. Gaming experiments were conducted to capture context-sensitive decisions of farming households (Ornetsmüller *et al.*,2016).First, LUC were investigated at the interface between macro and micro drivers of change: regional market demand versus individual decision making. A series of individual games were developed with local land users to address specific questions *e.g.* how short-term decisions and long-term investments are related (MIALU game), how farmers perceive and react to land degradation (MALAD game), how smallholders manage indebtedness and risk (MARISK game). Village and individual trajectories were elicited through field surveys that led to the game design, then specific decisions and scenarios were explored with the game and finally validated during the collective and individual debriefing sessions. Second,the individual games were organized into an integrative meta-game named Mahasaly (*'higher level perspective on maize'* in Lao language). The insights of the game may be further used to (i) identify opportunity windows for intervention and to (ii) virtually test transformative landscape approaches towards sustainable land uses.

Results: the maize boom from the bottom-up

Characterizing the maize boom trajectory in Laos. The successive stages of the maize boom, *i.e.* adoption, expansion, intensification, diversification, abandonment; are described as well as their positive impacts on farmers' cash income and livelihoods and negative impacts on deforestation, land degradation, loss of biodiversity, pollution with herbicides and household indebtedness. Changes in landscapes are mainly driven by replacement of swidden fallows by maize, opening of maize feeder roads for maize expansion until the land frontier is reached, *i.e.* free access to common land is not possible anymore, leading to the emergence of a local land market and changes in land tenure systems.

Analysing smallholder decision pathways. Disentangling the boom mechanisms means understanding the context of the successive, path-dependent decisions that feed the maize boom trajectory (Ornetsmüller *et al.*, 2016).Crucial strategic decisions are usually followed by routine decisions (business as usual – same practice used for a few years) until new signals show a need for next strategic decision. Here we present elements of context that shape strategic decisions as elicited through the role games. In all cases, villagers manage a transition period from a dominant system to another (regime shift). Overall, we found that on the individual level the available set of competitive opportunities, profitability and feasibility play a strong role in the decision-making process and that the system dynamics in the maize boom are intricately linked to income for household and family oriented goals.

Discussion: drawing lessons for timely and relevant intervention

Reconciling local and regional scales, short term and long term strategies. Farmers engaged in the boom may be looked upon as short-sighted as they are well aware of the downside effects of mono-cropping practices, deforestation and intensive use of chemical inputs. However, they usually combine short term with long term strategic decisions. Farmers use the profits from maize to invest in their children's education and in terracing paddy fields. They tend to dig into the natural resource base through intensive maize systems to secure the conditions of a transition towards more sustainable systems. Some farmers displayed unsustainable strategies during the games that aimed at stretching the maize system a few more years before the children have finished their school years and then turning to other, more sustainable cropping systems afterwards that may involve investment of capital or seem risky at first to them.

Recognizing intervention windows. A better understanding of farmer's perspective allowed identifying early signals of transition between the successive phases of the boom. Interventions are almost impossible during the expansion-intensification phase as long as there is no alternative that can compete with mainstream maize production modes. Two main intervention windows were identified: adoption (pre-boom) phase and diversification-abandonment (post-boom) phase, *i.e.* at the initial stage of the boom before villagers turn to non-sustainable mono-cropping practices and then during the crisis phase when farmers are more receptive to alternative practices as their maize systems do not perform well anymore.

Transformative approaches to sustainable landscapes and livelihoods. We captured the contextualized patterns of decision-making within a limited amount of time (4 months) so that scenarios of alternative behaviours can be tested with multiple stakeholder groups. As an explorative tool the Mahasaly model could be used to assess with local populations the feasibility of compensation mechanisms such as projects that would promote paddy rice terracing in exchange of not opening maize feeder roads, a main driver of maize expansion and deforestation. The feasibility of such an intervention is highly dependent on the local context and the willingness of multiple stakeholder groups to coordinate their actions.

Conclusions

Repeated strong calls from policy makers to address global development issues (*e.g.* climate change mitigation and adaptation, poverty reduction, biodiversity conservation) by tackling unsustainable land use practices (*e.g.* deforestation or forest degradation, overuse of pesticides) may look analytically very effective, as land use can be both cause and solution to these global issues, but they are difficult to implement on the ground as early attempts for transformative changes towards sustainable land use have repeatedly shown. Crop booms are symptomatic of these major conceptual problems with transformative approaches that would be managed from the top down. Misinterpretation of the underlying decisional mechanisms of land use change leads to scale mismatch and time-lag of large-scale assessments. We believe our proposed bottom-up approach can be harnessed for the design of more effective interventions.

Managing Olam rubber plantation's impacts in a forest area in Gabon: rethinking the horizontal dimension of sustainable supply chain governance systems

Stéphane Guéneau[1] and Jean-Philippe Tonneau[2]

Introduction

Modern large-scale industrial agriculture has shown strong growth in the tropics since 2000. Agribusiness development has mainly taken the form of cultivation on new land, mainly in the tropics (Phalan *et al.*, 2013). The expansion of cash crops and plantations in the tropics has caused the conversion of large areas of natural forests to monoculture, leading to biodiversity losses and climate change impacts (Gibbs *et al.*, 2010). Until recently, the African continent was relatively untouched by this vast movement. However, this situation has changed: between 22 and 56 million hectares have been acquired by foreign capital in sub-Saharan Africa over the last 10 to 15 years (German *et al.*,2013).

The Gabonese government has recently undertaken a programme to re-allocate land for agroindustrial projects. Since 2005, about 400,000 ha of land has been acquired by foreign agribusiness companies for investment projects in Gabon (Schoneveld, 2014). This orientation towards the development of competitive agroindustrial activity finds expression, since 2012, in the 'Emerging Gabon' strategic plan promoted by the Presidency of the Republic, one of whose objectives is to find ways to compensate for lower future oil revenues (Alphandéry *et al.*, 2012). They are often presented in the literature as the central point of the governance of sustainability of agribusiness global value chains (Clapp and Fuchs, 2009; Dauvergne and Lister, 2012).

Extending the "governance without government" thesis (Rosenau and Czempiel, 1992) and the 'global value chain theory'(Gereffi *et al.*, 2005), the concept of Sustainable Supply Chain governance systems (SSCG-systems) is defined as the "forms of cooperation of market actors in (international) supply chains (possibly together with non-market actors) in improving the environmental and social conditions of production operations in developing countries" (Vermeulen and Metselaar, 2015).

The concept of SSCG Systems is part of an aspiration to understand the structural changes in environmental and social practices of the globalized forms of production and consumption (Vermeulen, 2010). After more than two decades of implementation, the effectiveness of sustainability non-state governance arrangements remain a controversy issue about which research should address new conceptual frameworks (Guéneau and Tozzi, 2008).While the role of public actors in the governance of global value chains is usually addressed through the public policy instruments that support private initiatives (for example, through grants or public procurement) (Vermeulen *et al.*, 2010), little is said about the public-private articulation at the implementation stage.

Methodology

The methodology we used consisted of a socio-anthropological fieldwork as part of an appraisal mission to assess the rubber plantation's environmental and social impacts. The study area is located in the north of the Woleu N'tem Province, Gabon. It is a former agricultural region, whose villages were gradually abandoned after independence (Pourtier, 1984). Our field observations were concentrated in the concession area, and outside, in the close vicinity of the plantation, particularly in two villages: Okok and Azombé. These field visits were supplemented by semi-structured interviews with over 30 stakeholders in the three main cities of the study area (Oyem, Bitam and Minvoul) and in the Gabonese capital,

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Libreville. The interviews targeted villagers and village chiefs, local and national politicians, officers of the Gabonese administration, OLAM staff and executives, members of NGOs and consulting firms. Additionally, this methodology was complemented by a literature review that addresses the social and environmental impacts of various plantation projects in Africa and elsewhere, including some reports dealing with our case study in Gabon (*e.g.* environmental and social impact assessments).

The Olam-Rubber sustainable policy: implementation issues

Several environmental and social issues have been observed in the plantation area, confirming the diagnosis reported in the Environmental and Social Impact Assessment (ESIA) undertaken before the start of the plantation project (Enviropass, 2012). The concession extends over sparsely populated areas mainly composed of regenerating forests, which were previously exploited and cleared for agricultural purposes. Even though not negligible, the loss of biodiversity due to the conversion of a large area of native forest into plantation can be put into perspective with the disturbance rate of the natural resource in the area. The plant species present on the site have a low level of endemism, but the risks of the disappearance of macro-fauna is of serious concern. Other environmental impacts are the damages caused by mechanical equipment on soils, the risk of runoff and contamination of surface and ground water, and the generation of industrial waste.

In order to mitigate the social and environmental impact of its rubber plantation, the Olam subsidiary in Gabon has implemented a series of measures derived from the 'Plantations code', an OLAM policy that serves as a reference for good plantation management practices implemented across the group (OLAM, 2014). Olam-Rubber decided to reduce the extent of the concession to avoid encroaching on village areas. Originally meant to cover 36,000 hectares, the usable area has now been limited to 28,000 hectares. Olam Rubber has delimited a 5-km buffer zone between the plantation's usable area and the villages along the roads on the periphery of the site and a strip 60 to 100 metres wide around watercourses to conserve wetlands and to preserve the waterways from possible pollution by pesticides and erosion due to runoff. Forests on very steep slopes are also preserved. Collection and storage facilities at specific locations have been set up to allow waste processing and recycling of used oils and fuels.

Consultations were held with the populations of the villages bordering the plantation to define individual and collective compensation for the loss of forest usage rights (hunting and gathering activities) and for alleviating the inconveniences caused by the plantation's operations (noise, etc.). These actions were enshrined in contracts signed by the various stakeholders. The company committed itself to three main types of actions: provision of basic infrastructure (clinics, rehabilitation of schools and housing, public lighting, water pumps, upgrading of roads, construction of bridges, etc.); the priority in hiring of local labour given equal skills; and support for income-generating activities (food-crop farming projects, for example).

Nevertheless, the sustainable development measures implemented by Olam in the neighbourhood of the plantation in a very paternalistic logic generate conflicts. A number of unanticipated effects that have not been addressed by the company exacerbates these conflicts. First, immigration flows into Woleu-Ntem province has become significant: workforce needed for the plantation, employees' families and populations of merchants and artisans whose activities are required to meet the basic needs of the plantation employees (food, retail, services, etc.). In similar configurations in other parts of Africa, the total number of migrants is four to ten times the number of employees of the plantation. The influx of population causes environmental and social problems, as it has already been demonstrated in the case of Cameroon (Assembe-Mvondo *et al.*, 2015).The questionarises about the provision of resources and services normally associated with major urban agglomerations: food, sanitation, roads, health... Even though access to food can be ensured through wages, some non-native populations want to undertake subsistence farming. Providing land to them is an important issue as the Gabonese villagers are very attached to their ancestral usage rights and are reluctant to cede them without very high compensation. Population growth could also affect the Minkébé Park, one of the richest in large animals in Gabon. In February 2013, the Gabonese government announced the loss of at least half the population of elephants in the park.

Moreover, the compensations offered by the company to the villagers for the loss of their rights has reduced the opposition only temporarily. Yet, local people become more and more reluctant to accept the plantation, as they feel the consequences of the agribusiness activity on their daily lives. Local compensation demands are also moving more and more towards purely private actions such as clearing individual plots for food farming or assistance in construction of personal houses. Demands by local authorities exhibit the same ambiguity: they expect the company to contribute greatly to infrastructure, security, health and education.

Conclusion

The Olam-Rubber'case shows that the effectiveness of tropical agribusinesses SSCG Systems can't be addressed solely within the plantations and their immediate vicinities. The problems that emerge beyond the physical borders of the plantation, at the landscape scale, can lead to major environmental damages, particularly on forest resources, through leakage and attraction effects. These unanticipated effects raise the issue of the shared responsibilities between the various stakeholders involved in the territory's sustainability, in particular that of the State. The State uses the circumstances of its limited resources as a pretext to delegate the responsibilities to the private sector of managing the impacts of the latter's activities. Yet, by allocating concessions or by attracting investors through tax exemptions, the State bears its share of responsibility in tackling the environmental and social changes taking place at the territorial level. These blurred of responsibility between the State and the private sector call for a rethinking of SSCG systems in a broader context of public intervention.

From a theoretical point of view, the results of this case study leads us to suggest strengthening the horizontal dimension of SSCG Systems by introducing a "territorial governance" dimension in addition to the "network" dimension. Moreover, the OLAM-Rubber's case emphasizes the need to pay more attention to the definition of responsibilities at the stage of implementation of agribusiness plantation projects, particularly regarding the ability to conduct a structured debate on sustainable territorial development with local institutions.

Governing the beef supply chain in the Brazilian Amazon: progress and limits in shaping the transition towards a sustainable development

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Scope and purpose of the research

During the last 40 years, the beef sector has by large been the main driver of deforestation in the Brazilian Amazon. The States of Mato Grosso, Pará and Rondônia constitute the three largest producers of beef in this region. These states comprise 58 million cattle heads (28% of the total national herd) spread over 32.1 million hectares of pasture (53% of the total pastureland in the Amazon Biome). There is an extensive and growing body of work assessing the factors driving the expansion of cattle ranching in this region (Poccard Chapuis, 2004; Veiga *and al.*, 2004; Barreto, Pereira and Arima, 2005; Pacheco and Poccard, 2011). The beef chain has been increasingly acknowledged by NGOs as the major source of deforestation (Friends of the Earth, 2009; Greenpeace, 2009). In the past, public regulations alone were insufficient to halt the expansion of cattle ranching over forests, and the major meatpacking companies did refuse to control their suppliers. Such situation, however, began to reverse. Shifting from a "shaming the corporation name" to a "building new agreements" situation, private and public actors have then engaged in a negotiation process around mechanisms for enhancing the governance of beef supply chain while explicitly embracing some sustainability goals. Scholars stress the role of state actors in this process. All kinds of private regulation must, in some way, relate to existing regulatory frameworks, in particular, national legislation. Thus, the development of a state regulatory framework can pave the way for private regulation or reinforce it (Bartley, 2007; Gulbrandsen, 2005; Rametsteiner, 2002). We analyse the private and public drivers that lead the meatpacking companies' decisions to control their suppliers in the Amazon, the main governance mechanisms emerged, and their limits from observation on current practices.

Methodology

Our work is based on a historical review of the process and on qualitative interviews with 61 key private and public stakeholders located in the three main beef producing Amazon States (Mato Grosso, Pará, Rondônia) and Sao Paolo and Brasilia, which were conducted between 2011 and 2015. A data display matrix for qualitative analysis was elaborated to organize and analyse patterns of response. The respondents were classified into six types: cattle ranchers, industry sector, retailers, NGO's members, public officials and other informants (*e.g.* academics, agrochemical sector, technicians, and private and public banks representatives). The responses were analyzed with regards to understanding around three main themes: i) main drivers of change shaping beef supply chain; ii) existing governance systems and mechanisms, iii) the limits and challenges for an effective governance of the beef supply chain in the Amazon.

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Results

What drove the meatpacking companies to control their suppliers?

We have identified two main drivers: i) a higher sensibility of the chain's stakeholders to pressures aimed at shaming their reputation and ii) innovative ways to enforce public regulations.

Since the end of the 90's, major Brazilian beef companies began to acquire national and multinational owned meatpacking plants in Brazil and abroad. Their goal was to increase participation in global beef trade. Two national companies stand out, Bertin Group and JBS/Friboi. In 2004, Brazil produced 80% of corned beef consumed in the world, half of it been produced by Bertin Group. The company JBS/Friboi became the main fresh beef export in the same year. In 2009, these companies merged their bovine meat operations. As a result, Bertin Group bovine meat division vanished, and JBS/Friboi became the leader in processed and fresh meat sales.

Between 2002 and 2015, the Brazilian beef exports underwent a notable expansion (245% in the period), and the country started to dispute the leadership in the world beef market with India and Australia. Beef exports originated in the Amazon (*i.e.* Rondonia, Mato Grosso and Para) also increased reaching about 2.6 thousand tons in 2015. While the share of the Amazon states in total Brazilian beef exports accounts for a small percent, this is growing over time (Abrafrigo, 2015 and Abiec, 2015). Thus, the context has become to change. Brazilian meat packing companies have started to establish a relationship with international stakeholders.

In this context, the pressure made by environmentalists NGOs was more effective. They could threaten the reputation of meatpacking companies in foreign markets. The initial action of Friends of the Earth and Greenpeace was to target international investors and international beef buyers such as the International Finance Corporation and the British supermarket chain Tesco (Harvey, 2012). Environmentalists NGOs attack the reputation of Bertin and JBS/Friboi mainly through the "shaming the corporation name" strategy. Two international reports, extensively divulgated, have proven the fact that Bertin and JBS/Friboi were supplied by farmers performing illegal deforestation (Amigos da terra Amazônia Brasileira, 2009, Greenpeace, 2009).

Beyond the environmentalist threats to companies' reputation, public actors also put in place innovative strategies to force changes in the beef supply chain. In 2009, the public prosecutors decided to initiate 21 public civil suits against ranchers in the state of Pará. A public civil suit can be applied if the federal government sues a company for violations of federal law. But, the institutional innovation was that they also implicated the meatpacking companies that had acquired cattle from these ranches. Public prosecutors decided to use the concept of "shared responsibility" to hold accountable to the beef industry. The juridical concept of shared responsibility is embedded in the Brazilian Environmental Crimes Law approved in 1998. Briefly, this concept entails the responsibility of the buyers over their suppliers in the chain regarding environmental damages. Thus, if a cattle rancher perpetrates an environmental crime (such as deforestation), the slaughterhouse buying his animals can also be implicated in the crime. The public prosecutors perceived that it was more effective to prosecute the industry than several hundred cattle ranchers spread over a huge territory.

Which governance mechanisms have emerged?

Meatpacking companies were finally forced to sign the so-called Agreement for the Adjustment of Conduct (from the Portuguese, TAC-Termo de Ajustamento de Conduta) to stop the civil actions. This legal instrument establishes responsibilities and obligations of meatpacking companies, cattle ranchers and even of the public authorities regarding the enforcement of the environmental law in cattle farms. For instance, meatpacking companies shall monitor deforestation of their supplier farms through satellite data and the screening of legal documentation such as the Environmental Rural Registry (Cadastro Ambiental Rural, CAR in Portuguese).

Beyond the official agreement with the public prosecutors, the three largest meatpacking companies operating in Brazilian Amazon also signed a private agreement with Greenpeace. The following agreement has similar terms as the TAC, yet it also demands from the industry the control of their indirect suppliers. These indirect suppliers are in general medium and small-scale cattle ranchers selling calves to large-scale ranchers. In spite of this, Greenpeace and the beef companies have agreed to postpone the control to indirect suppliers given the difficulty involved in tracing the animals spread out over millions of properties that can be very distant from the final buyer.

What is the progress made through these mechanisms and their limits?

Some progress has been made particularly regarding deforestation mitigation and law enforcement. Both agreements demand meatpacking companies monitor deforestation of their supplier farms through satellite data. If buyers detect a non-authorized deforestation after June 2008, they cannot buy from this supplier. According to the Brazilian Forestry Code (Brazil, 2012), legal deforestation is allowed in Amazon region at the limit of 20% of the property area. But, legal deforestation has to be authorized previously. Both agreements demand the screening of legal documentation. Meatpacking companies have to verify that their suppliers hold an Environmental Rural Registry (Cadastro Ambiental Rural, CAR in Portuguese) along with an environmental license to operate. Meatpacking companies are obliged to consult two official "black lists" before buying cattle (the list of slave labor and the federal list of environmental crimes)and must refuse the produce from cattle ranchers whose names are not in those lists.

However, this system for verifying compliance with environmental regulations is not necessarily well suited to address sustainability issues more broadly. There are still significant limits. For instance, the Environmental Rural Registry is a mandatory digital registry, which aims to integrate environmental information and actual land uses in cattle ranchers' landholdings. This information allows verifying the existence of the Forest Legal Reserve and the conservation of riparian forests. However, once the registry has been delivered, there are no additional obligations to change management decisions at the farm level. For instance, cattle ranchers are not obliged to restore the environmental passive. Besides, there are any monitoring obligations by public authorities. Only the environmental license to operate can attest that management decisions are changed toward responsible land use. But, the efforts to obtain the environmental license are still very limited because even without an environmental license cattle ranchers can access the market.

Moreover, the value chain actors and government agencies have not yet implemented a trustful system of traceability of the animals. So there is no guarantee that illegal suppliers do not launder the cattle to legal suppliers (Gibbs *et al.*, 2015). The monitoring of the compliance of the cattle agreements is also limited. For instance, in the case of the TAC one of the clauses foresee that meatpacking companies shall participate and finance an annual audit system to verify compliance with the agreement. However, public prosecutors did not announce any progress in this step until the end of 2015. Regarding the private agreement signed between Greenpeace and the largest meatpacking companies, there is an obligation to report on an annual basis the results of the controls over direct suppliers. But, the annual reports made by the meatpacking companies do not disclose any information about the proportion of illegal meat that could be or not in the market yet.

The situation of the indirect suppliers is also problematic: indirect suppliers of calves are mostly medium and small farmers spread over a huge territory that is very costly to monitor. Moreover, some of them, particularly smallholders, are settlers living in precarious areas where the government agencies did not succeed yet to perform CAR and where deforestation still occurs (Godar *and al.*, 2014, Piketty *and al.*, 2015).

Conclusion

Scholars tend to agree governance arrangements emerge as a result of negotiations between actors in uneven social and policy arenas. Companies may have a preference toward more flexible symbolic commitments over which they have control, under the so-called *producer dominated governance mechanisms.* In contrast, social and environmental activists tend to advocate for stronger regulations with accountabilities shared by multiple parties under the so-called *multi-stakeholder dominated governance model.*

Our results show that in the Brazilian beef supply chain, the meatpacking companies are actually leading the implementation of the governance mechanism negotiated, the public and the private one. The implementation phase of the existing governance mechanisms includes the investment in some tools and procedures to make possible the verification of the compliance with laws. As mentioned above, it includes acquiring satellite images to monitor the farms of the direct suppliers and to perform the document controls. Meatpacking companies have also created specific "sustainability departments" to handle the cattle ranchers documents and analyse the satellite data at the farm level.

Nevertheless, these governance mechanisms and tools are still very limited in their scope and objectives toward sustainability goals. It is true they have included the national legislation, and its aim is the law enforcing. Further controls were established, but they do not reach the indirect cattle suppliers. Moreover, only the enforcement of legal instruments such as the Environmental Rural Registry does not lead to a better environmental management at the farm level. More efforts and investments to restore the environmental passive will be required. Finally, the most of the responsibilities still relies only on private hands. There are no public investments in monitoring system nor a trustful system of traceability of the animals. In fact, it is problematic to expect that governance mechanisms built at the level of the supply chain can tackle broader sustainability objectives beyond the zero deforestation goal.

Soy value chain, agriculture expansion and savannahs' conversion in Brazilian Cerrado: linking global governance mechanisms and local political dynamics

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Over the last 20 years, forest areas have been the primary sources of new agricultural land, and the situation is likely to worsen in the next decades, in a context where worldwide demand for agricultural products is expected to increase by nearly 50% by 2050 (Gibbs *et al.*, 2010). In a recent study focusing on a few key commodities – palm oil, soybean and beef – Persson *and al.* (2014) have shown that a significant amount of the production is directed towards international markets to be used by multinational agrifood corporations, circulating in global value chains that are more and more complex.

Against this back drop, more and more actors at the global level have announced ambitious commitments to remove deforestation from their supply chains by 2020, especially regarding the use of the three above mentioned commodities (+ pulp and timber). Ben McCarthy and the Forest Trend initiative have for example tracked 566 companies operating globally and have found out that 366 of them have made a total of 579 public commitments to reducing deforestation impacts of their supply chain (McCarthy, 2016). In the meanwhile, global governance mechanisms such as the Round Table on Sustainable Palm Oil, the Round Table on Responsible Soy or the Global Roundtable for Sustainable Beef have been trying to gather major players of each sector in order to define standards for a more sustainable production (WWF, 2014). The overall aim of such initiatives and commitments is nothing but to stop converting forests to increase food production. However, two types of actors have not been so much involved in such initiatives until now: upstream food chains actors, and most notably producers themselves; and public actors, be they policy makers at the domestic level or international negotiators at the global level.

Taking the example of soy expansion in the Brazilian Cerrado, this paper proposes a cross analysis of global value chain governance and local / territorial political and agrarian dynamics to reflect on the links between agri-chains and sustainable development goals. It focuses more particularly on SDG 15, whose aims are to "protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt bio diversity loss".

Soybean production has almost decupled over the last 40 years, from 1970 onwards. With a world population growing and a meat consumption demand increasing, the globalized cattle production system needs large protein sources which have been more and more covered by soybean. Soybean expanded quickly in South America, after the 1973 USA export embargo,who held a quasi-monopoly position until years 1970. The world faced a lack in protein sources and at that time some countries located in Latin America acquired a strong position as new soybean suppliers, one of them being Brazil.

While at the beginning soybean was cultivated in the south of Brazil, the soy-front rose progressively to the north. Currently this front turns back Amazonian forest demarcation (most notably because of the soy moratorium, see (Nepstad *et al.*, 2014)) and soybean cultures are being progressing in another area: the Cerrado, and more precisely four states situated in the Northern part of Cerrado: Marhania, Tocantins, Piauí, Bahia, also known as "MATOPIBA". As of now, soybean represents almost 36% of agricultural production of the entire Cerrado and has been responsible for a major part of savannah's conversion over the last few years.

Fieldwork was carried out from May to July 2016 in Brazilia, Sao Paulo and in the Tocantins State (Palmas, Porto Nacional and Gurupi). Thirty seven persons have been interviewed to cover the whole

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range of actors involved in the soybean value chain at the Brazilian level, including decision makers and NGOs intervening in the sector. We have also attended to the 13th RTRS conference held in Brazilia on June 1st and 2nd this year.

From our preliminary result, we show that in the Tocantins, there are three interrelated mechanisms leading to savannah's conversion for soy cultivation.

- A first mechanism is linked to the international demand for soybean. Major traders operating in Brazil – ADM, Bunge and Cargill – are always seeking for greater quantity. To do so, they set each year higher objectives to their purchasing agents who, in turn, prompt cultivators to increase their areas under cultivation. As in many cases, purchasing agents are also those who sell inputs/seeds to farmers, they are well positioned to do so.
- A second mechanism is embedded in the current Brazilian financial and administrative system, which allows farmers to respond positively to such incentives in two respects. On the one hand, farmers are legally allowed to convert up to 80% of their property to agricultural production (whereas in the Amazonian region, they are only allowed to convert 20%). On the other hand, there are several ways to access to credit, which facilitates agricultural expansions in a context of growing demand.
- A third mechanism lies in the co-existence of soybean cultivators and cattle breeders on the same territory. Cattle breeders have indeed been the first to invest in the areas (1980's), well before soybean cultivation starts (2000's). In the Tocantins, they own a large proportion of the land. Over the last 10 years, they have been more and more leasing degraded pasture lands to soybean cultivators instead of rehabilitating those lands. In the meantime,they have used that money to open new forested areas for new pasture lands.

Very few actors of this system are linked to international governance mechanisms or commitments, apart from major traders (Bunge, ADM, Cargill), suggesting that the impact of such mechanisms on territorial dynamics has been relatively weak so far. This is correlated to the fact that despite the RTRS has been existing for more than 10 years now, only 0,5 to 1% of the global annual production is certified (RTRS or ProTerra certification). On the contrary, the local legislation seems to be a major driver of contemporaneous dynamics, as mentioned by Aubertin and Pinton in a recent paper (Aubertin & Pinton, 2013).

We can draw two types of conclusion from those preliminary results.

- From a pragmatic / political point of view, they point to the need to better integrate upstream actors and public decision makers in any initiatives to reduce the impact of soy cultivation to have a real impact on territorial dynamics;
- From a more methodological point of view, they suggest that the impact of global value chain governance on territorial dynamics can not be understood without carefully examining local social / political systems and the extent to which local actors' strategies are – or not – affected by global governance arrangements.

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From zero-deforestation cocoa to sustainable chocolate value chains

Marisa Camargo[1], Nicholas Hogarth[2] and Isilda Nhantumbo[3]

Introduction

The concept of sustainable development suggests that economic growth should be designed to meet the needs of present generation, without jeopardizing the rights of generations to come (Brundtland, 1987). Thus, production to attend to the growing population should be developed in a manner that contribute to a green economy, and find an optimal long-term balance between economic, social, and environmental issues (Borel-Saladin & Turok, 2013).

Agriculture has been estimated to be the proximate driver of almost 80% of deforestation worldwide (Hosonuma *et al.*, 2012). However, there is currently no sound mechanism in place to help address this challenge. The Reducing Emissions from Deforestation and Degradation (REDD+) mechanism, created to help address deforestation, has not proven sufficient so far to help curb emissions from agriculture. Indeed, a recent analysis of 115 demonstration projects revealed that the majority of initiatives focus on addressing threats to forests from small-scale agriculture and biomass energy production (Nhantumbo & Camargo, 2015). There is still a large gap in addressing drivers of deforestation associated with large-scale businesses in agriculture commodity chains, such as cocoa, palm oil, and soy, and ensuring that the benefits are equitably distributed along the chain.

Partially as a result of the slow progress of REDD+, and its limitations in significantly engaging the private sector, practitioners and scholars have turned their attention to promoting sustainability in commodities supply chains (Nepstad *et al.*, 2014; Newton, Agrawal, & Wollenberg, 2013). Governments and large corporations have begun to voice their commitment to promote zero-deforestation (United Nations, 2014), but it is not yet clear what these commitments would mean in practice.

The goal of this paper is to explore how zero-deforestation commitments and government policies can be developed not solely focused on conserving forest plots adjacent to agriculture areas, but enhance sustainability of the landscapes where the raw material is produced as well as the rest of the value chain, from farmer to consumer. The aim is to help design commitments and policies that contribute to broader sustainability, rather than focus on a single isolated issue.

Methodology

To achieve this aim, we analyse cocoa and chocolate production and explore the challenges associated with concomitantly increasing yield, conserving the environment, and ameliorating livelihoods. We focus on the entire chain, from farmer to consumer, to identify the other externalities, besides deforestation, that are generated before consumers can purchase the final product. We draw on original data from 70 semi-structured interviews carried out with cocoa value chains take holders and experts representing NGOs, government institutions, industry associations, corporations, private sector, standard development organizations, certification bodies and academia in Brazil, Ghana, Netherlands, Denmark, Belgium, and United States. Additionally, we review the literature on cocoa production and sustainability, as well as life cycle assessment of chocolate production.

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Results

Our analyses show the interdependency between productivity, ecosystem resilience, and livelihoods, highlight that cocoa is not alone in the landscape; that deforestation is only one of the sustainability challenges; and that there are several other issues (such as food security and farmers dependency in one commodity) that need to be addressed before cocoa can be called sustainable. We acknowledge that private sector alone cannot solve all challenges, but it needs to design its strategies promoting more synergies with NGOs and governments actions to ensure an optimal balance between agricultural matrix, biodiversity conservation, ecosystem resilience, and improved livelihoods in the broader landscape, rather than focusing on isolated projects. We propose that a policy mix, with different types of instruments involving all sectors of society should be put in place in a coordinated manner to ensure that both supply and demand of sustainable products are encouraged.

Additionally, we argue that these efforts should not only focus on the landscape level, but resolve a broader discussion on how to internalize externalities along the chocolate chain, which have the potential to confer businesses with greener image, sustainable raw material supply, and improved investment relations. Thus, increasing the overall sustainability of value chains presents a win-win for forests,local livelihoods, and companies alike.

Our findings can inform the global policy discussions on how to develop mechanisms that effectively engage the private sector, and address deforestation while ameliorating livelihoods; and help develop guidelines for private companies to design their sustainability strategies.

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Linking sustainable production and enhanced landscape governance in the Amazon: towards territorial certification (TerraCert)

Pablo Pacheco[1], René Poccard-Chapuis[2], Isabel Garcia-Drigo[3], Marie-Gabrielle Piketty[4] and Marcelo Thalês[5]

Supporting summary

This project provides tools and knowledge to support local public and private actors in the transition towards more sustainable agricultural production (beef, milk, grains, timber, pepper, fruits,etc.), and natural resources conservation, through enhanced landscape governance in the "Green Municipality" of Paragominas, State of Pará, in the Brazilian Amazon. This research will foster innovative partnerships between the public and private spheres and help integrate production options within the cattle, timber and agricultural sectors, small and large farmers. Ultimately, this project aims to reduce deforestation and greenhouse gas emissions through the development of more intensive production and nutrient recycling.

This project supports multi-stakeholder dialogue at municipal and state levels, also leading to greater social inclusion. Local multi-stakeholder platforms will receive data, analysis and options needed for more informed policy decision-making. The research will also facilitate knowledge exchange between local stakeholders and public agencies at state and federal levels, as well as business platforms supporting sustainability in the Brazilian Amazon.

The project will:

- Assess the strengths and weaknesses of the "Green Municipality" to support low-carbon cattle ranching in the context of broader trends towards more sustainable agriculture.
- Conduct assessments of the economic and technical performance of different innovative production systems and their potential to support sustainable ranching and other systems and practices,which will help to realize food security and mitigation targets.
- Establish a monitoring system to analyse agriculture and landscape dynamics with a focus on land use change, production efficiency, eco-system services, and socio-economic benefits.

Expected Outputs

- Municipal multi-stakeholder platform
- Identification of low carbon cattle ranching practices with documentation based on literature review and field observations
- Experiments in demonstration farms and local dissemination actions
- Reference guidelines on best economic and technical production systems and practices
- Spatial database including biophysical and socio-economic information, and identification of missing information and strategy to complete and manage the dataset
- Monitoring system for assessing land use, production efficiency, eco-system services, and socio-economic benefits, and trade-offs

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- Analysis on the "Green Municipality" model to support transitions to sustainable beef cattle and landscape management and ways forward
- Public-private arrangement to advance sustainable cattle beef and agricultural production under a territorial-based certification system

Expected Outcomes

- Develop improved technical and institutional options for the expansion of sustainable beef cattle ranching in the Eastern Amazon within a broader transition to more sustainable agriculture.
- Develop a monitoring system combining GIS tools and social control (peer to peer), like an alternative to the actual top-down system.
- Develop a multi-stakeholder platform in Paragominas agreement on a road map and common social, economic, and environmental targets to support sustainable beef production, within broader perspectives on agricultural development.
- Improved land-use and local development planning, thanks a higher integration between agricultural activities and environmental conservation, a better consensus between social groups.

Expected Impacts

- Increase the territorial security, and restore his attractivity for investors of private and public sectors. The direct and indirect benefits of this security and attractivity, are a new way to incentive local actors for improving their practices, in terms of production, conservation, governance.
- Direct engagement in participatory action research with municipalities' agricultural and environmental decision makers, linked to state and federal level public agencies, will support adjustments of jurisdictional policy.

Partners

The Center for International Forestry Research (CIFOR) is leading the project. CIFOR is working with Agricultural Research for Development (CIRAD), Brazil's Ministry of Agriculture, Livestock, and Food Supply (EMBRAPA), Museum Paraense Emilio Goeldi (MPEG) and public administration of the Municipality of Paragominas and Redenção in the South of Pará State.

Session 2

Dairy industry sharing sustainable development goals
Emphasizing the diversity of development pathways

Acknowledging social negative loops in inclusive business: an Egyptian case study of dairy sourcing

Annabelle Daburon[1], Veronique Alary[2], Ahmed Ali[3] and Vincent Martin

Agri-chains have a key role to play to progress towards more sustainable future in accordance with the recently adopted Sustainable Development Goals (SDG). Societies are increasingly aware of the many services they provide, for example: food supplies, employment, creating landscapes, energy sources, etc. Agri-chains are evolving rapidly, linking diverse actors from the public and private sector, as well as civil society at multiple levels, from local to global. In this context, an increasing number of inclusive businesses (IB) are emerging, particularly in countries with high economic growth potential. According to the United Nations Development Programme, an IB is a: *"Commercially viable model that benefits low-income communities by including them in a company's value chain on the demand side as clients and consumers, and/or on the supply side as producers, entrepreneurs or employees"* (UNDP, 2008). These initiatives are often promoted in association with Non-Profit Organizations (NPO) and claim to develop economic, as well as social values. Major agro-industries, including transnational groups, are flocking to emerging countries where demand trends offer promising prospects. In those ones, the majority of agricultural production still comes from family farming and rural poverty remains extremely common. Although large companies rely on global markets, they implement strategies to promote the use of local supplies in order to reduce their vulnerability to world prices instability. They promote large or mega-farms and/or try to link up with local family farms, often associated with NPOs. Both NPOs and companies aim to ensure that the quality and quantity of products collected meet industrial requirements. Although this type of project represents numerous opportunities for companies and NPOs, as well as the community hosting the project, it also involves risks for businesses and sustainability. These hybrid partnerships are a new phenomenon and their local benefit is still questionable, especially regarding the social dimension of sustainability (Bolwig, 2011). From a development research perspective, converting IBs into more powerful sustainable development tools involves a number of challenges, including identifying the links between the IB's social impact and business activity (Porter *et al.*, 2011). Indeed these connections can be found along an agri-chain at macro-level (labels that allow businesses to access new global markets), meso-level (local authorities favour businesses that create local employment) and micro-level (job creation in a family stimulates a positive brand image among potential consumers). Our analysis focuses on the meso- and micro- levels.

Besides economic value creation for the promoting company, an IB model is designed to reach certain socio-economic impacts (direct positive impacts) on community members. It will also generate indirect impacts: positive or negative. These can generate in return feedback on the business performance (positive or negative) (Sundkvist *et al.*, 2005). We will focus our analysis on the loop constituted by socio-economic negative indirect impacts (SENII) generating in return negative feed-back on business activity at local level (Figure 1). Acknowledging this negative loop in the management strategy at the local level could both improve business performance as well as limit negative socio-economic impacts on the community hosting IB models. Ultimately, it encourages companies engaged in IB to adopt strategies that integrate better social concerns at meso and micro levels.

We examine the case study of an IB in Egypt. The potential for growth in the Egyptian dairy market is tremendous. A transnational company, specializing in dairy products, entered the market in 2006 and by 2016 was one of the leading companies in the national yogurt market. It owned two plants, a mega-farm (4000 dairy cows) and collected milk from dozens of large dairy farms on new reclaimed land. In 2011, the company initiated a milk collection project among small-scale farmers in association with an invest-

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ment fund and an international NPO. By promoting milk collection centres (MCC) in small villages within the framework of local public farmers' associations, the company sought to secure its supply of raw material while to contribute to rural community development. Producers had mixed crop-livestock production systems with limited production assets (< 2ha and one or two dairy animals). In 2016, 12 MCCs were operating mostly located in Middle Egypt. Since 2014, the project has been the subject of an *in itinere* "impact study" regarding socio-economic and technical aspects. Data were collected at farm, community and supply chain levels in a total of 5 villages over 3 years (with and without MCC). One of them is the case study village of Halabeya. It has been involved in the project longer than the other villages (one of the first MCC opened in 2011) and project promoters consider it to be one of the best business models. Data related to this village will mainly feed our analysis. Semi-directed interviews, focusing on socio-economic impacts of the MCC, were conducted every year on an original sample of 28 farmers from Halabeya, 9 milk independent collectors from the area and 2 MCCs (Halabeya and Nowera at a distance of 10km). Three participatory workshops were also organized between May and June 2016. From 9 to 15 key stakeholders related to dairy sector were gathered (farmers, veterinary, agricultural cooperative employees and managers, MCC staff members, milk trader and a feed trader) to identify project impacts on the local community. On site discussions and observations completed our data collection and were used in a qualitative approach. Inductive process led to negative loops identification. SENII, as a decreased business activity (profit creation, volume collected or customers...), decreased human capital, or credit access were investigated. Feed-back on business image, milk supply (quantity and quality) and services attractiveness were considered. Our results are presented as follows: first we describe the business model and its impact pathway as conceived by the project promoters; we provide a brief description of the impacts, as well as the main issues involved; then, we identify the negative social externalities falling out of the scope of project managers. The resulting negative feedbacks on business activity are then reviewed. On this basis, we suggest ways of integrating the negative loops into the management strategy.

In theory, the MCCs were supposed to collect cow milk from small farmers to satisfy company requirements (milk quantity and quality). In exchange for setting up the MCC and providing agricultural services (training, low cost feeds, etc.), a 5-year contract was established to ensure that the MCCs delivered exclusively to the company. NGO was in charge of project implementation. The company offered prices that were supposed to generate profits that the MCC could reinvest in agricultural services for local suppliers. For the company, the aim was to develop lasting commercial partnerships. The project's impact pathway targeted three levels of intervention: farms, supply chain and community. By providing funding to set up the MCC and quality expertise, promoting training for suppliers and staff members, and by relying on NGOs and the cooperative social networks, the company expected to improve milk quality and quantity, increase farmers' incomes, create jobs and empower women. MCC management was supposed to become autonomous. Several objectives have been achieved in Halabeya. Milk quality has improved according to both local farmers and project promoters. Milk prices improved locally and, thus, increased farmers' incomes. However, the income generated by milk remains marginal within the family's global economy. Jobs have been created within the MCC and some women have been employed. The project helped diversify local marketing channels and, thus, increased the resilience of small local producers. But in 2016, the MCC economic model was extremely precarious, with a gradual decline in the quantity of milk collected over the years.

During the impact assessment, we observed several negative loops that affected MCC business performances. Some women rented milk skimming devices to other women before MCC, playing a key role in the local social network. They decreased their business activity as the MCC collected milk among their customers. In return, these influent women conducted smear campaign against the MCC within the community. Similarly, some independent milk collectors' activities were threatened at the opening of the MCC (losing some of their suppliers and decreasing their profit to compete with MCC prices). In reaction, as they were not acknowledged in the MCC business model, they "defended" their activity by threatening in return MCC activities. Raising milk prices to challenge MCC prices and milk collection,

altering milk to spoil MCC collect, smear campaign against the project were some of their "violent" reactions. MCC had difficulty to keep a sufficient pool of farmers and milk adulteration resulted in dead loss weakening the precarious economical balance of cooperative. Moreover, these milk collectors played a key role in the agricultural activity by providing financial services to farmers. By selling to MCC, farmers were cut off of one of the main local financial services. This limited the farms' capacity to invest, including in high quality feeds or high quality dairy animals, going against theoretical project impact pathway. Similarly, local feed retailers were threatened by punctual MCC feed sales to their suppliers. These key actors in the agricultural activity conducted smear campaign against MCC's feed quality, deeply challenging the interest of farmers in these services and by this challenging the attractiveness of MCC model largely based on agricultural services promotion. The most virulent reactions happened in the early months of MCC activity.

If a manager had to consider the negative loop when making decisions, this would imply: looking for this loop across the entire community in a dynamic process. It appeared that the early stages of the business implementation are crucial. Thus preventing negative loops creation and strengthening appear to be a key factor to ensure success of IB. One prerequisite, during the early stage of business model conception could be the involvement of a wide range of community members to assess the potential negative loop and adjust the business model to the local context following shared value logic (Porter and Kramer, 2011). Promoting iterative management mechanisms appears also essential (Porter *et al.*, 2011). To properly acknowledge negative loops evolution, managers have to collect this information on a dynamic basis. One solution could be to identify key actors in the community who can collect and channel information on negative loops, from the community to local managers. Using the recent research of Banerjee and his colleague on the identification of individuals able to diffuse best information in a community could be interesting (Banerjee *et al.*, 2014). Are the individuals able to spread information in a community also the best ones to collect it? Exploring this question would be valuable furture researchs.

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The transition of animal farming in Vietnam : from semi-subsistence to commercial systems

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Since Doi Moi economics reform in the late 1980s, Vietnam's agriculture is changing from semi-subsistence to commercial production systems. Growing domestic demand for food stuffs has pushed Vietnamese farmers to increase their level of productions, especially for animal products. Livestock in Vietnam has been particularly affected by those changes. On the production side, livestock industrialization can be characterized by 4 major dimensions:

(a) Increase of animal production, (b) intensification of production systems; (c) up-scaling of farms, and (d) specialization/diversification. The aim of this study is to show and characterize the industrialization ie the evolution of livestock production from subsistence with animals for "animal power/ draught animal" to "production for consumption" for these 4 dimensions, using literature review and national data base.

Since 1994 animal production has increased at national scale. From 1994 to 2011, the number of agricultural and rural households has increased from 12 to 16 millions, but the number of households with animals (one animal and more) has decreased from 10 to 9 millions. Different trends according animal species were observed. The number of animal per farm has also increased by + 100% for pig production and + 10% for dairy production.

Vietnam is now facing the challenge of animal intensification with better animal technical performances and higher productivity (8 to 12,3 piglets per sow for example) due to improved feed, buildings and equipment, and exotic breed. Milk productivity of dairy cattle in Vietnam is still limited in comparison with neighbour countries. However, the milk yield and the total milk output have been considerably improved in few current years. In livestock farms, more and more animal feed is produced by feed industries. For 2013, Vietnam had imported 5.84 million tons of animal feed and ingredients, representing 48% of the raw material (corn, Soya bean and wheat) needed to satisfy the demand. From 2001 to 2015 animal feed produced by companies increases from 21% to 66%.

At present, small-scale production predominates. However in 2008, the Government adopted a new National Livestock Development Strategy to 2020. Priority was given to large-scale farming system and livestock production is expected to scale up. This new orientation was confirmed and expanded in 2014 by the adoption of the "Restructuration plan of the livestock sector towards enhancing added value and sustainable development". This new plan aims at encouraging a rapid scaling-up transition: instead of having 20,000 small-scale dairy farms (of 5 cows on average) that produce 900 tonnes/day, which was the situation in 2010, the country aims at having only 2,000 large-scale farms (of more than 20 cows) which will produce 2,500 tons/day by 2020. The number of cows raised in large-scale farms of more than 1,000 cows, which was insignificant in 2000, is expected to reach 1/4th of the national herd. Since few years, some dairy companies (Vinamil, TH Milk, Duchtlady) have built their own large-scale farms, especially in the north of the country.

Diversification of activities remains important in Vietnamese farms. Revenue of rural household is composed by a diversity of agricultural and non-agricultural activities. Livestock activity represents 13%

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of the revenue in 2013 (and the contribution was quite stable since 1993). Opportunities for non-farm employment and other non-farm income sources will likely compete for household labor available for animal raising – an issue for scaling up

A huge industrialisation trend of livestock sector occurs in Vietnam, but with different features were observed according to regions (North/South; highland/lowlands).

Stabilising producers' conditions to access market through cooperative institutional innovations: the case of India

Marie Dervillé[1], Claire Aubron[2] and Bruno Dorin[3]

Rational for the research

India has since the late 1990s the world's largest milk producer, with 135.6 million tons in 2013.

This leading position is the result of continued growth in milk production (+ 4% / year) since the 1970s. It is at least partly due to the "white tide operation" (Operation Flood), launched by the National Dairy Development Board (NDDB) in 1964 (Alary, 1999; Dorin and Landy, 2002). The program was based on an original use of food aid: the sale of milk powder donations to domestic urban populations to finance structuring a wide cooperative network on the model experienced by AMUL in Gujarat, north -West country. This cooperative model is based on the articulation of three complementary structures: i) the village cooperatives responsible for the collection, ii) the Unions processing the milk at district level and iii) the federation marketing the products produced in the state. Ten years after the launch of this operation, 13270 village cooperatives were created. They are 162186 in 2013 according to the NDDB. The structuring of these cooperatives and the associated dissemination of inputs and services have supported the development of production, increased the surplus that can be collected and sold on the market and provided an additional income for families. Cooperatives have collected 12.5 million litres of milk in 2013, *i.e.* a little less than half of the formal circuit. Although their relative share decreases, self-consumption and informal channels, in particular in the outskirts of cities, remain the cornerstones of the Indian dairy industry amounting to 40% of the production each.

Beyond its growth, the inclusiveness of the Indian dairy sector appears as a major achievement. Three indicators can be mentioned: i) the partial spatial complementarity between the white and green revolutions; ii) the increase of per capita dairy products availability (from 120 grams per day in 1970 to over 300 today, which is close to the world average) and iii) market and services access facilitated even for very small farms (average herd of less than 3 animals) including with restricted access to land (70% of cattle and buffaloes belong to the farms with less than one hectare of cultivated land, some of them being landless).

India, little present on international markets and protected by a growing inner market isn't really exposed to the world price instability. Furthermore, having a low global level of support to its agriculture, the signing of the GATT agreements in 1994 had little effect on the level of protection of the Indian market (Dorin and Landy, 2002). Nevertheless, liberal reforms in India since the 1991 financial crisis and, especially the end of the Milk and Milk Products Order in 2003, gradually changed the functioning of the sector: criteria for private companies to enter the sector were relaxed and cooperative exclusive zones were lifted, leading to the development of the private sector. Private companies have positioned themselves on high value added segments and entered into competition with cooperatives. In addition, agriculture and agro industries, including food distribution, have been opened to FDI in June 2016. Today the growth in private collection is faster than that achieved by the cooperatives. Producers companies following a juridical status created in 2003 are also developing rapidly (Alagh, 2007; Singh and Singh 2013). How to explain this trend? Do financial and decision-reactivity provides a competitive advantage to private and producers companies? This could be an explanatory factor especially as the

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Indian cooperatives are constrained by the strong and often counter productive involvement of Administration (Dorin and Landy, 2002; Singh and Singh 2013). Is this trend risky for the inclusive model of development of the Indian dairy sector? Are PCs inclusive? These questions arise especially as specialized farms and larger (ten animals) based on irrigated forages grow presumably changing competitive relations for small and very small dairy farms.

Conceptual framework and methodology

The main research studies on the Indian dairy sector are disciplinary and focussed on a particular scale of analysis (country, farm, herd) (for example: Singh, 2000; Sharma et Gulati, 2002; Patil, 2006; Birthal *et al.*, 2008; Kumar et Staal, 2010). Nevertheless, several studies have highlighted the relevance of multi-scalar approach and interdisciplinary work to analyse transition phases, as sector dynamics rest on vertical and horizontal interactions between various production systems (Dufumier, 2007; Aubron *et al.*, 2009; Geel, 2009; Dervillé et Allaire,2014).

In this perspective, to shed light on the microeconomic impacts of macroeconomic and sectorial developments, we adopt a systemic approach and elaborate a multi-actor and multi-level framework, combining agrarian-diagnosis and markets institutional analysis. Considering that sectorial dynamics result from individual but also collective innovation strategies as well as from public action, the aim of the communication is to shed light on the coordination devices that frame conditions to access dairy markets. How are quality criteria, volume, prices and bonus set in the traditional cooperatives? Do they really contribute to the inclusiveness of the Indian dairy sector development? Are they threatened by the liberalisation? What are the conditions to access market in PC?

The work of characterization of structural (mobilization of land, irrigation, livestock, labour, equipment level, etc.) and institutional (rules governing the establishment of dairies, rules payment for milk quality...) changes is based on an analysis of the literature (journals, reports, legislation) and thorough interviews with the different actors of the sector (farmers, groups of farmers, collectors, cooperatives and private dairies, public, consumers) in the state of Gujarat in particular.

Main results

The agrarian diagnoses conducted in contrasting regions of India (Gujarat and Bihar) has clarified that the dairy farms development trajectories result from the specific pace of implementation of dairy and land policies and dissemination of technical innovations such as water access (Aubron *et al.* 2015). The spatial differentiation of these paths suggests an effect of the biophysical environment, the productive structure, the local institutions and the presence of cooperatives on the rhythm and way of development of the diary sector.

The second set of results concerns cooperative organisational innovations and highlights the role of their hybrid governance on the sustainability of the model.

Beyond the three stages that seem possible to reconcile economic efficiency and inclusion, the cooperative model, under the benevolent guidance of the NDDB, appears as a vast network of complementary structures: i) the “Mother dairy” founded in the launch of the operation flood not only supply the cities with liquid milk but also play an essential role in regulating the production via the production and storage of the powder; ii) cooperatives and their cooperation, notably with the support of well-established cooperatives (which ranked first AMUL), which play as an incubator providing expertise and brands until new cooperatives gain autonomy; iii) Villages cooperatives appear a vector of local development, providing training, social regulation and services, especially with the development of village shop; iv) development of feed manufacturing plants and their distribution at cheap rate enhancing the profitability of production and finally v) the system of rules ensuring the coherence of this hybrid network. If the Indian government does not directly support milk prices, it seems that the cooperatives, with their milk and input prices setting system, play a role in stabilizing the dairy market (at least in Gujarat where they play a very pivotal role).

Finally, the last set of results concerns the cooperative adaptive strategy to the strengthening of competition; it appears to be institutional. In 2003, the private companies legislation was amended with the addition of a chapter on Producers' company. Also supported by the NDDB and Mother Dairy, the creation of PCs in areas where traditional cooperatives haven't emerged or are inefficient aim to balance the growth of private enterprises. PCs are only open to producers and remain on the mutualist principle of one-man one vote, but, compared to traditional cooperatives, their governance is more business oriented (the role of patronage is strengthened in terms of financial incentives and representativeness, milk collection and processing is delegated to a private operators, most of the transactions are computerised to increase transparency...). In addition, in order to strengthen their competitiveness, PCs can operate at national level, have an access to more diverse financial sources, have the obligation to create reserves and may create subsidiaries. They are, however, unlike cooperatives, taxed by the state.

In a context of global instability which tends to shift the risk on the weakest link of the chain, mainly producers (Hueth and Marcoul, 2003; Jongeneel *et al.*, 2010), the originality of the Indian cooperative model and its renewal offer interesting perspectives in terms of

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Are investments of milk corporations in developing countries likely to promote socially sustainable business? Lessons learnt from West Africa and South-East Asia

Guillaume Duteurtre[1] and Christian Corniaux[1]

In emerging and developing countries, many international corporations are investing in dairy processing industries. Some of those businesses support the development of milk powder imports, resulting in upgrading the local value chains but also resulting in direct competition with local milk producers. Some other firms invest in local milk sourcing, and contribute to the local development of the dairy industry as a whole. In that context, multi-national dairy corporations are increasingly questioned on the impact of their business on sustainable development of the dairy industry. Based on 2 complementary field studies conducted in West-Africa and in South-East Asia, we assess in which conditions those new investments from dairy business firms might result in socially sustainable businesses.

The dairy profiles of developing and emerging countries refer primarily to their specific historical trajectories. Most South-East Asian countries are relatively "new" milk producers with an emerging sector highly connected to milk marketing schemes. Most farms are commercial farms that started milk production in the last 15 years, with a majority of them being very small. In Indonesia, the average size of dairy farms is around 4 dairy cows; in Vietnam, it is around 6 dairy cows. On this base, milk production has risen tremendously in the region. On the opposite, West African countries are traditional dairy producers, with most of the milk being consumed locally and very little being collected for processing. Apart from a small number of commercial dairy farms located around the main cities and raising specialized dairy cows, most West-African producers are agro-pastoral households. They raise multi-purpose animals producing around 1 litre per day and per milk cows, but with a very high capacity to cope with to the local agro-climatic environment. Those farms do participate in traditional dairy marketing channels by selling fermented milk, butter or raw milk on rural markets or in the vicinities. Those marketing strategies might vary according to the herd mobility on short or long distances. But they lack capacity to participate to formal milk collection schemes connected to processing industries. In West-Africa, cow milk production is estimated to 1.5 million tons, but less than 5% of this milk is collected by dairy processing units.

In this context, milk is recognized as a "social" product in both types of those emerging and developing countries. And local dairy policy programs have been highly concerned with supporting rural livelihoods. In East Asia, dairy policies have focused on small farms support programs through credit, trainings and cooperative promotion. And in West Africa, social oriented dairy development policies have focused on developing rural milk collection schemes through networks of "mini-dairies".

However, this global context is changing rapidly. New international trade agreements have brought increased competition from imported powder milk. And more and more domestic dairy development programs are oriented towards large farms that are more eager to provide milk to large processing units. Those shifts in international and domestic policies have resulted in less interest for smallholders. And this new vision, focused on promoting a modern dairy industry with lower impact on rural development, has been strongly challenged by international NGOs and producers organizations. In this situation, there is a need to clarify the role of international firms in the development of the milk sector. In particular, the social impact of the international dairy businesses must be assessed with attention.

Built on several research programs conducted in West Africa and South-East Asia, we identify 2 main inclusive business models involving international firms in those regions.

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The first one relies on large-scale industries that develop their sourcing from local milk in addition to powder milk. Those units justify their local milk sourcing strategy by expected economic benefits (in particular regarding volatility of powder milk prices) or by for specific processing lines that valorize locale milk (cheese, white cheese, butter, ripened cheeses or high quality milk).

Example of firms collecting fresh milk in East Asia and West Africa

Firms	Country	Milk collection in litre/day (year)	Specific processing lines
IDP	Vietnam	30 000 (2014)	Certified "local" UHT milk
Vinamilk	Vietnam	500 000 (2014)	UTH milk "100% fresh milk"
Danone Dairy Indonesia	Indonesia	60 000 (2015)	Lactic acid beverages
Mali-lait	Mali	5 000 (2015)	White cheese
Kirène	Senegal	800 ? (2015)	UTH milk "from local cow"
Danone / Laiterie du Berger	Senegal	4 000 (2015)	Fermented milk

The second inclusive business model relies on industries involved in corporate social responsibility projects to support their local credibility, but with no direct relation between the business strategy and the local milk sourcing. In these situations, the investments of the firm in supporting local communities are not restricted to milk producers. They might concern any community that represents an eligible target for the funds used for local development projects. Those programs are most of the time managed by NGOs and are limited to a restricted period of time. The impacts of those "social projects" do not directly affect the business of the firm (though some of the programs might concern milk producing communities) but can still have an impact on the ground. They also affect the reputation of the firm.

Corporation	Country	Type of CSR actions	Relationship with milk producers
Vinamilk	Vietnam	Scholarships, community development	Few
Sari Husada	Indonesia	Community development	Few
TH milk	Vietnam	Scholarships, community development	No

Aside with those initiatives of large scale firms, the dairy sector in emerging and developing countries is structured around a large number of small and medium enterprises (SMEs). Some of those small-scale dairy companies are involved in milk collection, and they play a significant role in securing outlets for producers. However, those SMEs have very few relations with international firms.

The new investments of private corporations offer opportunities to promote sustainable development of the local dairy industry in the developing word. In the future, new partnerships between producers' organizations, private firms and NGOs could support the development of inclusive dairy value chains. The Round Table organized on 3-4 November 2016 in Abuja (Nigeria) by the partners of the "Milky Way Alliance" is a good example of such initiatives. Investments in cooling centres and other milk collection facilities, when managed in a sustainable way, could foster the social role of international private firms in those fragile rural economies.

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Session 3

Climate Smart Cocoa: the emerging case for public-private partnerships in response to deforestation and climate change

Climate Smart Cocoa: building private sector engagement and investment in response to deforestation and climate change

Ethan Budiansky[1]

Background

Cocoa is an important agricultural commodity for rural communities and the private sector. Globally, roughly 50 million people are involved with and depend on the cocoa value chain for their livelihoods. Nearly all cocoa producers grow other crops, including food crops and timber, which support livelihoods and non-cocoa industries. Cocoa plays a special role in West Africa and has critical implications for food security, economic growth and environmental sustainability. West Africa accounts for over 70% of global cocoa output. The crop supports an estimated two million households, most of them small holders with three hectares or less. Côte d'Ivoire, in particular, produces 40% of global supply representing 15% of GDP and employing 5% of Ivoirian households. For Côte d'Ivoire and Ghana,the health of the cocoa sector has broader implications for the national economies and budgets. Global businesses source over $6 billion worth of cocoa from the region annually.

Central America's cocoa sector is significantly smaller, but production has been increasing rapidly and the region is of growing interest for the private sector – particularly small and medium enterprises (some locally based, and others international). Central America is where cocoa was first cultivated and cocoa continues to play an important role in the local culture.

Changing weather patterns associated with climate change threaten the reliability of farmers' yields and thus their incomes, the national economies of the main cocoa producing countries, and the sustainability of the cocoa sector as a whole. It has an impact on the whole farming system including the other components of the agroforestry system and food crops. The impact on food crop production will have a greater negative impact on women farmers as they are responsible for 85% of food crop production in cocoa growing areas in West Africa. Recent studies show that land suitable for cocoa production, particularly in Ghana and Côte d'Ivoire, will decrease significantly in the near future as a result of climate change.

Historically, cocoa expansion has played significant role in deforestation in West Africa. With increasing demand for cocoa and climate change reducing current land suitable for growing the crop, future cocoa production threatens the remaining forests, particularly in protected areas. There is evidence that cocoa farms and farmers are already encroaching on numerous protected areas in Côte d'Ivoire, the number one producer of global cocoa. Deforestation not only threatens biodiversity but over all cocoa sustainability and farmer livelihood in the region.

Role of the Private Sector

The private sector plays an integral part in the long-term sustainability of the cocoa sector, and the private sector is the natural entry point to reaching smallholder farmers, few of whom are organized into cooperatives. In the past 10-15 years, the private sector has been especially concerned with the sustainable growth of the cocoa sector to meet future demand. The cocoa industry is already committed to one of the pillars of CSA-sustainably increasing agricultural productivity and smallholders' incomes. While modest progress has been made in improving overall production, the sector's long-term productivity, sustainability and impact on forested areas, particularly in light of a changing climate, are in question.

1. World Cocoa Foundation (WCF), Washington D.C. 20005, USA.

The private sector often provides technical assistance to farmers in many countries – both directly through their own agronomists and indirectly through support of public extension and NGOs. The private sector also engages with governments to influence national strategy on cocoa sector development, and this engagement can be expanded to include climate change and deforestation. There are significant opportunities to leverage and optimize existing industry investments in cocoa sustainability with a view to adapting and building resilience to climate change among farmers and protecting forested and protected areas. However, up until now there has been little coordinated effort to do so. How the private sector deals with these issues has implications for food security, national economic growth, and the sustainability of production in these landscapes.

Problem Statement

Climate change will impact the cocoa sector in West Africa and Central America with consequences for both the millions of smallholder farmers who grow cocoa, national economies of the main cocoa producing countries, and for the global cocoa/chocolate industry. As the global demand for cocoa increases and land suitability shrinks, the risk of deforestation grows. Action is needed to accelerate industry investment in measures that will enable farmers and the industry to adapt to climate change pressures. A landscape approach is particularly important given that cocoa is commonly grown in agroforestry systems and its proximity to protected forest areas. Increasing the private sector's investment in CSA is integral to the long-term sustainability of the cocoa sector and the long-term livelihoods of the smallholder farmers who depend on this crop. However, the industry currently lacks a clear sector wide platform for developing a climate smart cocoa strategy and sharing risks in investing in solutions. Moreover, despite the recognized threat to cocoa sustainability posed by deforestation, there is a lack of a concerted effort across the cocoa value chain to address this threat.

Program Overview

In May, 2016 WCF launched the Feed the Future Partnership for Climate Smart Cocoa with support from the United States Agency for International Development and WCF member companies. The vision of this Program is that smallholder farmers are empowered to use CSA practices that improve supply chain and ecosystem resilience. The overall goal of the Program is to increase private sector investment and engagement that promotes and supports the adoption of climate smart agriculture (CSA) among smallholders in cocoa-producing landscapes.

To achieve this goal, the Program will focus on two objectives. First, the Program will implement a shared cocoa/agroforestry strategy for addressing climate change threats to farmer livelihoods and ecosystems in cocoa-growing regions. In order to develop the strategy, the Program will carry out the following key activities:

- Report on the Cocoa-Climate Landscape: Build knowledge on the impact of climate change on the cocoa sector, and the current landscape of private sector investments in CSA.
- Cocoa Agroforestry Market System Assessment: Assess cocoa agroforestry market system to identify end-markets and market incentives for cocoa agroforestry products and key capacity building needs.
- Governance/Structure for CSA Dialogue: Support/establish multi-stakeholder CSA platform/workgroup to begin strategic dialogue.
- CSA Framework & Investment Plan: Identify short-, medium-, and long-term investment actions for addressing climate change in the cocoa sector that includes investment opportunities in CSA pilots and innovations.

The second objective of the Program is to develop innovative pilots in CSA and use lessons learned from successful pilots to guide private sector investment in targeted CSA activities to improve resilience

for farmers, other supply chain partners, and ecosystems. This will be carried out by the following key activities:

- Identification and Design of Pilots: Identify and link sector actors with specific interest in piloting CSA relevant projects, to refine and designpilots.
- Implementation of Pilots: Facilitate implementation of CSApilots.
- Identification of Key Questions: Identify key learning questions to guide pilot M&E and additional studies/analysis.
- Lessons Learned: Compile lessons learned from pilots in accordance with identified sector needs.
- Promotion: Refine and promote successful pilots to attract additional investment.

While the majority of the pilot projects will be identified through the Strategy component of the program, initial pilots have been selected to be started immediately. These include:

- Facilitation of market linkages to support agroforestry system development.
- Adaptation of training manuals and curricula to reflect relevant CSA information.
- Screening and breeding for drought and heat tolerant cocoa planting material.

Aligned with the Climate Smart Cocoa Program, WCF is exploring approaches to address deforestation along the cocoa supply chain. As part of this process, WCF is compiling learnings from other platforms and commodities, such as oil palm, to identify opportunities for the cocoa sector.

An innovative public/private partnership for a sustainable transformation of the cocoa agri-chain in the Dominican Republic

Olivier Deheuvels[1], Pierre Costet, Marianne Martinet, Patrick Jagoret[2] and Stephane Saj[3,4]

Most of the world cocoa production (95%) comes from the 5 million smallholders and their families who depend upon cocoa cultivation for their livelihoods. In this non-mechanised cash-crop, cultivated on small surfaces between 0.5 and 3 hectares, production costs are mostly, if not only, generated by workforce and, to a lesser extent, by the use of fertilizers and pesticides. In the Dominican Republic, as in other producing countries, the increase of production is mainly the consequence of the extension of cultivated areas, and, to a lesser extent, of yield improvement. Government's strategies to improve cocoa yields traditionally rely on genetic improvement and capacity building on pests and disease management. Both strategies have proved to fail, in particular because of a lack of knowledge about actual farmer's practices. As in most producing countries over Africa, Asia and Latin America, these practices are ruled by strategies of diversification where timber and/or fruit trees are incorporated into the cocoa field and cultivated together with the cocoa trees on the same plot. This association of trees, whether they are perennial crops such as cocoa or timber/fruit species, with other annual and/or multiannual crops, form what is currently known as Agroforestry Systems (AFSs).

A recent study conducted by a public/private alliance has shown that the Dominican cocoa farmers are faced with four challenges of considerable importance:

- (i) the low education level and the ageing of cocoa farmers (72% are over 50 years old, and 80% have not studied further than primary school) and the loss of attractiveness of inland cocoa farming for the new generation that is more and more channelled by the tourism sector on the paradisiac Dominican beaches (only 20% of the cocoa farmers have their children actually living on the farm);
- (ii) the genetic heterogeneity of the ageing cocoa trees in the Dominican cocoa fields (56% are more than 25 years old), that partly explains the low yields. The lack of knowledge on this genetic diversity is also a major risk because the country will, probably sooner than later, have to face diseases having a high impact on production, such as Monilia (*Moniliophtora roreri*) or Witch's broom (*Crinipellis perniciosa*). There is no national selection program that would produce resistant or tolerant varieties, and farmers are not prepared to recognise the symptoms and have no technical knowledge for the control of these diseases;
- (iii) the high diversity of plant species associated to cocoa (more than 40 species have been inventoried), the lack of efficient design in their repartition on the plot (cocoa tree's density varies between 100 and 1600 trees per hectare, along with the density of associated plants) and the farmer's lack of knowledge, both in shade design and management adapted to cocoa production and to the strong climatic risk associated to hurricanes in particular, makes it a striking necessity to implement innovative agroforestry systems with productive shade adapted to strong winds;
- and (iv) the low production volumes and the important lack of connections to markets, especially for the products generated by the associated plants in the cocoa-based agroforestry systems, whether they are fruits or timber. More than 65% of the associated plants in the cocoa fields are producing edible fruits and only 1% is oriented to timber production. In addition, more than 30% of the associated plants are cultivated only because they provide shade to the cocoa trees, as it is the case for the

1. CIRAD, UMR SYSTEM, Lima 12, Peru.
2. CIRAD, UMR SYSTEM, F-34398 Montpellier, France.
3. CIRAD, UMR SYSTEM, F-34060 Montpellier, France.
4. IRAD, Programme Plantes stimulantes, Nkolbisson, Cameroon.

famous Dominican “Amapola” (*Erythrina poeppigiana*). Among the fruit producing species, only 6 (coffee, plantain, banana, avocados, mandarine and “sapote”) are sold locally by a small number of farmers. However, most of the fruits are either self-consumed or left to rot in the cocoa field. A better productive and multi-service shade design, but also improvements both in transportation and access to market are key issues to raise the income generated by cocoa and non-cocoa products in the Dominican agroforestry systems.

These conclusions led to a public/private partnership which primary objective is to design an innovative project for the cocoa agri-chain in the Dominican Republic. Based on the identification and quantification of the products generated by the Dominican coca-based AFS, academic centres, fair trade and organic certification agencies and French chocolate, pastries and oil factories are joining efforts with public and private research and development institutions under the CACAO FOREST program. This program offers to:

(i) implement participatory investigation to co-design and implement with farmers, local experts, the local agro-industry and investigation centres, innovative cocoa-based cropping system with locally improved cocoa varieties and productive associated plants with enough production for local markets. These innovative cocoa AFS will be tested in the field and compared to current and intensive full sun monoclonal models, following two protocols: (a) a plot creation demonstration network, created from non-forested land uses, and (b) a path change demonstration network, where current practices will be modified to innovative practices in a 4 years’ time step-by-step process;

(ii) create and strengthen links between cocoa and non-cocoa products and local and international value chains that could absorb them, in particular in regions like touristic areas where the demand is strong. In particular, the Cacao Forest program will induce local businesses to assess opportunities for buying associated products from cocoa AFS and will encourage local cooperatives to promote such products locally and internationally;

and (iii) combine this market-oriented approach with an objective of environmental and social sustainability including the improvement of ecosystem services provided by these AFS, such as mitigation enhancement by increasing C-capture, biodiversity conservation, soil and water conservation, and pollination improvement.

The Cacao Forest project seeks transforming the cocoa agri-chain in the Dominican Republic by making the cocoa production an attractive alternative to the tourism sector for the next generation of farmers. This 6-years long innovative program started in the Dominican Republic in 2016. Is is currently being adapted to Peru, and will be starting in Ecuador, Ivory Coast and Madagascar in the coming years.

Is our chocolate melting away?

Christian Bunn[1]

Using the latest climate impact modeling technology and through a collaborative partnership with WCF, CIAT will present update and refined maps of the potential zones of impact of climate change on cocoa. The presentation will explain how through the use of technology and in partnership with national regulators in Côte d'Ivoire and Ghana, CIAT has been able to update and ground-truth data elements to arrive at more precise and predictable set of outcomes for the impacts. The presentation will demonstrate how multi-stakeholder processes can yield powerful tools for policy makes, industry and farmers.

Introduction

The cocoa tree, *Theobroma cacao* originated from the wet forests of South America, very close to the equator. In general, for optimal conditions maximum temperatures should not exceed 32°C and not drop below 18°C. Temperatures below 10°C can be lethal. The cocoa crop requires high precipitation of about 1500 – 2000 mm throughout the entire year. In its natural habitat rainfalls are heavy and the temperature is relatively uniform. However, in its major production regions in West Africa production systems have been adapted to a climate with one or two dry seasons per year. Months with less than 100 mm are considered dry months (Lass and Wood 1985), as little as 60 mm is tolerated. While a dry season induces uniform flowering, overall yields are higher without such a period.

Because of the specific climatic requirements of the cocoa tree any change of climate is likely to have effects on its cultivation. Previous studies have investigated such impacts using spatially explicit suitability indicators for Ivory Coast and Ghana (Läderach *et al.*,2013) or a regression study for Ghana (Anim-Kwapong and Frimpong, 2005). The first study used the machine learning based species distribution modeling approach Maxent to model the impacts of climate change on the geographic distribution of suitable climate conditions for cocoa production. Losses of suitability were mostly projected towards the Savanna (Läderach *et al.*, 2013) caused by increased dry season temperatures (Schroth *et al.* 2016). Multiple regression analysis of time series from the Tafo cocoa region in Ghana also suggested negative total production effects (Anim-Kwapong and Frimpong, 2005). The study linked a regression model with results of global climate models that projected reduced annual precipitation and higher mean temperatures to conclude that climate change will have negative impacts on cocoa production in Ghana.

However, these previous studies were limited in their use to guide adaptation. Läderach *et al.* (2013) present relative suitability changes that are difficult to interpret, other studies reported on regional drivers of impact that don't account for local variation (Schroth *et al.,* 2016), while Anim-Kwapong and Frimpong (2005) report their regression model for a single district without accounting for differences in local environmental limits. It is therefore not possible to develop locally specific adaptation strategies based on these previous studies.

Theoretical framework

We here sought to guide adaptation strategies by using a multiclass suitability distribution model. A gradient of impacts was developed to differentiate fundamental types of adaptation strategies: cope, adjust, or transform. The first two categories will remain climatically suitable for cocoa production in the future. It is differentiated between production locations that will not change fundamentally their climatic characteristics, *i.e.* they remain in the same AEZ. These sites will be able to *cope.* Agronomic practices can remain largely similar. On the other hand, sites that will transition from one AEZ to a different AEZ between current to 2050s climate conditions are described as *adjustment* sites. At these

1. CIAT, Colombia.

locations agronomic practices will have to change to adapt to the new cocoa AEZ. Some areas were found to become unsuitable for cocoa production in the future. These sites will need to *transform*. Production in these zones will likely become unviable and other cultivars should be considered. Last, locations that are currently unsuitable but show a more favorable climate in the future are described as *opportunity* sites. At these sites cocoa production could be established in coming decades if soil conditions and protection status don't prohibit this.

Methodology

Suitability types for cocoa production in Ghana were defined using a combination of spatial climate data from WorldClim and a database of occurrences of cocoa production. The database of occurrences was assembled from data used in (Läderach *et al.*, 2013), (Schroth *et al.*, 2016) and received from private sector partners. The RandomForest algorithm was used to identify suitability zones within the occurrence data and to extrapolate their spatial distribution under current and future climate. Input variables were 20 bioclimatic variables at 2.5' resolution from WorldClim (Hijmans *et al.*, 2005) for current conditions and the respective data for 2050s in the intermediate RCP6.0 emissions scenario from the CCAFS climate portal (Ramirez and Jarvis, 2008).

Regional experts evaluated and verified cocoa occurrence data for model input, prioritized climate and soil variables for modeling use and confirmed the validity of the resulting model.

Random Forests (Breiman, 2001) are machine learning classifiers that are formed by ensembles of classification trees. Random Forests (RF) are very popular because of their efficiency on large datasets without over fitting. We used the randomForest package (Liaw and Wiener, 2002) in the statistical software R (R Core Team, 2014) that implements the RF approach.

We here used the RF classifier in three distinct applications. (1) We initially used it to produce a dissimilarity measure to group occurrence locations into suitability clusters with similar climate characteristics in an unsupervised variation. (2) We then used the RF classifier to classify climate data of current and future conditions into the resulting suitability types. (3) We then used RF to evaluate individual or sets of climate variables to distinguish insignificant changes in climate from changes that pose hazards to cocoa production.

Results

Fig. 1 – Distribution of climate change impact zones and dominant adaptation typology in Ivory Coast: dark green are opportunity areas, light green areas adjustment or incremental adaptation, yellow areas are designated systemic adaptation zones: for orange areas climate projections are not unambiguous and should increase resilience, red areas will transition to other crops without substantial changes in production systems.

The extrapolation of suitability types and their changes with future climate confirmed previously reported projections. Impacts of climatic changes threaten the viability of cocoa production towards the Southern and Northern margins of the cocoa belt in Ivory Coast (Fig. 1). The central cocoa zone will be least affected with only incremental adaptation requirements. Towards Ghana and to the Northwest of Abidjan systemic changes will be necessary to keep cocoa production viable. Towards Ghana the projected climate change impact is highly uncertain because of disagreement between global climate models. This region will require an adaptation strategy that aims at increasing the resilience of the system.

The most affected region in the Northwest was characterized by mean temperatures that are below the national average at cocoa locations under current climate conditions. However, dry season precipitation was lower than elsewhere and the number of consecutive dry months is higher than further South. The less affected regions along the cocoa belt have high mean temperatures under current conditions, but precipitation is higher.

We evaluated sets of bioclimatic variables as indicators for projected hazards. Instead of look-ingat changes of individual variables we evaluated the resulting change in suitability for cocoa production. Suitability of heat indicators showed unambiguous negative impacts. Severity of drought is highly likely to increase, while the likelihood for negative changes in the length of the dry season is only 60%. Uncertain is the projected trend for total annual precipitation with some models suggesting increases, and other decreases.

Conclusions

We here presented impact gradient mapping as a decision support tool for climate change adaptation at cocoa's most important origin, the Ivory Coast. Our research suggested that drought, caused by reduced rainfall in the dry season and increased temperatures threatens the viability of current cocoa growing areas. The most affected regions were found to currently benefit from lower than average temperatures which makes cocoa production feasible despite unfavorable drought conditions. Projected climatic changes suggested that total precipitation will increase, but an increase in high temperatures outweighs this positive effect, and as a result conditions for cocoa production will worsen. With current production practices in the transformation region cocoa would no longer be a suitable crop in coming decades.

These findings are in line with previous research for the region that identified similar regions of high impacts (Läderach *et al.*, 2013) and also suggested increased dry season temperature as the most likely cause (Schroth *et al.*, 2016). Previous research however, limited itself to presenting relative changes of suitability which made it difficult to discern significant from insignificant impacts. Furthermore, GCM model disagreement masked the possible impact of changed precipitation in the previously chosen "most likely" impact scenarios. Here we made this uncertainty explicit and showed for which regions this uncertainty is highest and production systems will require measures to increase general resilience.

POSTER

Public/private partnerships: insights from the cocoa action partnership and the Climate Smart Cocoa programme in Ivory Coast and Ghana

Martin Gilmour[1]

The cocoa and chocolate industry are increasingly concerned about the effects of climate change on the production of cocoa, especially in the main growing region of West Africa. The potential effect of climate change on cocoa production needs to be better understood and studies should be linked to what is actually happening on the ground in the areas identified by modelling studies as at risk.

The industry is very interested in cacao farming systems which have greater resilience to a changing environment and what will be necessary for cacao planting material to achieve high productivity as a result of these changes. This could also mean that different cacao farming systems with a mix of tree crops would be appropriate and shade tree management could become more important. The effect of climate change parameters on cacao tree physiology is beginning to be understood better but more needs to be done in order to better understand the characteristics necessary to breed more resilient cacao. CSSV disease in West Africa is already recognised as a huge threat and the effects of climate change on exacerbating this need to be understood better. The cocoa and chocolate industry has come together under the CocoaAction partnership to work with the cocoa authorities in Côte d'Ivoire and Ghana on cocoa sustainability issues, and this will be a good framework to understand climate change effects better and implement solutions, at least in west Africa. Aligned with CocoaAction, the recently launched WCF USAID ACDI/VOCA Climate Smart Cocoa programme is an excellent start at beginning to tackle the threats of climate change to the cocoa sector.

1. Mars Chocolate, Slough, UK.

Public/private partnerships: insights from the research and development program Cacao Forest

Pierre Costet[1]

Valrhona is a French premium chocolate manufacturer. It has recently launched a pioneering project called Cacao Forest which brings together private and public sector actors to reinvent the way cocoa is produced. The project's scope spans four countries over the course of six years. It was launched in 2015 in the Dominican Republic, and has recently extended activities to Peru with plans to begin work in two African countries in the near future.

By drawing upon local practices and knowledge, extensive scientific research, and the input of people all along cocoa and associated species' value chains, Cacao Forest aims to develop lasting agroforestry-based solutions that work for all involved. All of the members of Cacao Forest have different priorities relating to cocoa production, such as ensuring sustainable family farming, preserving the diversity of cocoa varietals and improving cocoa quality. Valrhona has brought these different factors to bear in creating the ambitious research and development program that is Cacao Forest. It places innovation at the heart of everything it does, drawing on modern agro-ecology and agroforestry principles to inform our scientific activities, to creating bottom up management structures, to the way it disseminates research results.

During the session on climate smart cocoa, they will address some of following questions:

- How can we balance private sector ambitions with the processes and goals of public research organizations?
- How can we develop projects and ensure they have a positive impact on producers, local actors, as well as other stakeholders?
- How can we build a "cluster" approach and involve different agricultural and transformation value chains, such as those of cocoa, fruit and timber?
- How can we finance all this?

1. Valrhona, Tain-l'Hermitage, France.

Offsetting and insetting are needed in equal measures!

Isilda Nhantumbo[1]

COP 21 has indeed brought an impetus to climate change action above and concerted effort to engage all stakeholders into taking responsibility for mitigation and adaptation to climate change including more resilient agriculture.

Companies and smallholders often play a complementary role in crops such as cocoa in West Africa where smallholders' supply the commodity to a series of actors including large conglomerates along the supply chain. The industry is committed to sustainable and climate smart agriculture represents a new business imperative that demands collective action. Such commitment is certainly fundamental to staying below 2C temperature raise.

Both offsetting and insetting are essential for delivering the sustainable development agenda namely the SDG 13 on climate action including REDD+ policies and programmes; SDG 15 particularly the support for sustainable use of terrestrial ecosystems, degraded land restoration and equitable benefit sharing mechanisms for integrated land uses and more resilient landscapes. Additional contributions to SDG2 on food security and sustainable agriculture as landscapes in which cocoa is produced are intertwined with food crops and often compete for land and labour; SDG5 on gender equality to ensure that technological solutions and policy incentives address the needs/roles of both men and women; and, SDG8 on inclusive, sustainable growth and productive and decent employment to deliver economic and social benefits. This seemingly mammoth ambition demands an integrated approach and definition of key levers and indicators of success complementing the bottom line.

The study conducted by IIED on sustainable supply of cocoa/chocolate highlights:

- Implementation of policies and incentives for offsetting and insetting emissions in both producing and consuming countries. All actors along the supply chain should introduce efficient technologies and contribute finances sustainable farming systems including agroforestry systems and restoration to reduce deforestation. Farmers are generally disenfranchised to transform production systems and practices. Empowering farmers to inset emissions and support land use changes towards resilient production systems and landscapes require adopting the notion of investing in locally controlled enterprises, that is, strengthening tenure rights (land, trees and carbon), strengthening producers organization; building business capacity and enabling access to financial resources.
- Market premiums from certified products and performance based payment for reduced emissions are critical for sustained transformative change.
- Investors and financing institutions hold carrots and sticks as financing can be linked with accountability to critical indicators of climate change and SDGs.

Therefore, a landscape approach is necessary to achieve sustainable and zero deforestation cocoa/chocolate. West Africa still lags behind in vertically integrated industry. Yet that could add further to climate smart cocoa/chocolate. The outcomes can be reduced emissions from transportation and contribution to achieving SDGs 5 and 8. This would meet the transformative agenda of the CocoaAction. Tradeoffs, viable options or scenarios should be discussed to provide a compromise solution for sustainable cocoa/chocolate. The decision on course of action has to be collective including governments of producing and processing/consuming countries, farmers, investors, agriculture extension services, CSOs and the myriad private sector actors along the value chain.

Other information including drawing on lessons from other commodities will be brought as appropriate based on interventions of the key note speakers of this panel.

1. IIED, London, UK.

Session 4

Global commodity chains and sustainability in Latin America: changes towards sustainable development in trade of agrifood products

Mexican agrifood geographical indications: between productivity and sustainability

Pablo Perez-Akaki[1]

Geographical indications (GIs) have become one of the most important strategies in promoting rural development, both in developed and developing countries, as is the case of Mexico. However, experience in the latter is full of contradictions and unfulfilled promises, because despite the large volumes that have achieved exports of Tequila and Mezcal, they have a limited benefit to farmers, key players in the agri-chain. As the case of Tequila and Mezcal, the rest of the Mexican experiences in GIs have serious conceptual difficulties, technical, operational and administrative, that has prevented them from operating.

GIs can be defined as institutional structures that connect the specific quality and reputation of a well with a certain territory (Belletti and Marescotti Touzard, 2015). They are valued by consumers, as well as many other goods, GIs goods walk long ways to connect producers and consumers and their chains include many agents interacting in order to realize these economic flows.

To date in Mexico there are 14 approved DO, among which the DO Tequila is by far the greatest in visibility and international recognition. However, it is criticized for its questionable results for the benefit of the regions where the agave is produced, the raw material that allows distillation of the famous drink. The rest of the DO of Mexico are presented in Table 1, which further identifies the Mezcal, well that could incorporate the Tequila in its definition, as well as other agricultural products and even craft goods, as Olinalá and Amber.

Table 1. Appellations of Origin in Mexico, 2016

Denomination	Date	Applicant	Authorized states	NOM
Tequila	Dic 09, 1974	Tequila Herradura and the Cámara Regional de la Industria Tequilera de Guadalajara	Jalisco, Nayarit, Tamaulipas, Michoacán and Guanajuato	NOM-006-SCFI-1994
Olinalá	Nov 28, 1994	Unión de Artesanos de Olinalá	Guerrero	Pendiente
Mezcal	Nov 28, 1994	Cámara Nacional de la Industria del Mezcal	Guerrero, Oaxaca, Durango, Zacatecas, San Luis Potosí, Guanajuato and Tamaulipas	NOM-070-DCFI-1994
Talavera	Mar 17,1995	Talavera de Puebla S.A.	Puebla and Tlaxcala	NOM-132-SCFI-1998
Bacanora	Nov 6, 2000	Gobierno del Estado de Sonora	Sonora	NOM-168-SCFI-2004
Café Veracruz	Nov 6, 2000	Consejo Veracruzano del Café	Veracruz	NOM-149-SCFI-2001

1. Universidad Nacional Autónomade México, Naucalpan, Estado de México, Mexico.

Denomination	Date	Applicant	Authorized states	NOM
Ámbar de Chiapas	Nov 6, 2000	Gobierno del Estado de Chiapas	Chiapas	NOM-152-SCFI-2003
Sotol	Jun 12, 2002	Gobiernos de Chihuahua, Coahuila y Durango	Chihuahua, Coahuila and Durango	NOM-159-SCFI-2004
Mango Ataulfo del Soconusco Chiapas	Ago 4, 2003	Secretaría de Desarrollo Rural del Gobierno del Estado de Chiapas	Chiapas	NOM-006-SCFI-2005
Charanda	Ago 12, 2003	Asociación de productores de Charanda Michoacán NOM-144-SCFI-2000		
Café Chiapas	Ago 12, 2003	Comisión para el Desarrollo and Fomento del Café de Chiapas	Chiapas	NOM-169-SCFI-2007
Vainilla de Papantla	Feb 24, 2009	Secretaría de Desarrollo Rural de Puebla and the Consejo Veracruzano de la Vainilla	38 municipalities from Veracruz and Puebla	NOM-139-SCFI-1999
Chile Habanero de la península de Yucatán	Jun 4, 2010	Chile habanero de Yucatán, A.C.	Yucatán, Campeche and Quintana Roo	NOM-008-SCFI-2002
Arroz del Estado de Morelos	Feb 16, 2012	Secretaría de Desarrollo Económico de Morelos and Uníon de productores de arroz de Morelos AC	22 municipalities from Morelos	NA

Source: Own elaboration based on data from the Mexican Institute of Intellectual Property.

IG goods generally participate in large food chains, reaching distant regions of the world. In these chains many actors over them cooperatively work together to consolidate the flow of goods but also competitively seeking greater participation in the value added of the goods in question are normally involved. Then, the study of agricultural chains (food chains, global commodity chains – CGM, global value chains – CGV) has become very important to understand these global economic dynamics, which drastically affect the local conditions.

In this sense, the theoretical and methodological construction for the study of the CGM initiated with the pioneering work of Gereffi *et al. (1994)* which includes 4 dimensions of analysis: input and output, which studies the flows of goods and their characteristics and the accumulation of value of goods in the process of accumulation; geographical analysis, which details economic spatially along the chains, something that can help better understand the other two remaining dimensions processes; governance, which is perhaps the most interesting in the case studies, as it aims to identify strategies used by economic actors to seek to improve their position in the chains against other participants, *ie,* strategies for exercise domain or achieve greater decision space; institutional framework, that studies the rules governing relations between participants in market chains and agencies were created to understand how to achieve that economic processes are given.

Agrifood chains and their contribution to sustainable development goals

The Sustainable Development Goals (SDG) emerge from the Summit on Sustainable Development of 2015 where an agenda for development by 2030 was set, aim to intensify efforts to end poverty, reduce inequality and fight climate change (UN, 2016).

These goals are going to be achieved through 17 goals, many of them directly linked to the agrifood chains of goods with GI: no poverty, decent work and economic growth, Inequalities reduced, responsible consumption and production, climate action, life on land, peace, justice and strong Institutions and partnership for the goals. The rest are indirectly, but also related, with agri-chains.

Particularly in the case of goods with GI, emphasis on rural development, regional development is greater. That's why good with GI have stronger relationship with social and environmental objectives than chains of agricultural goods not recognized.

A recent view on the goods with GI to understand them as public goods sums in favor of SDG. In this interpretation, the GI assets belong to all citizens who live in a certain territory, who have a cultural heritage and are able to market it to ensure their survival (Vandecandelaere *et al.* 2010). Therefore, it is in the public interest to promote such initiatives, to achieve to remain competitive in the long term because they contribute to the economic and social stability of the territory. In this light, Belletti, Marescotti and Touzard (2015) identified five justifications for considering GIs as public goods:

- They are closely related to traditional public goods such as water, air, natural resources, etc., as well as human and social aspects such as knowledge, skills, historical roots, etc. They can be considered specific to the different places local public goods.
- They are able to drive positive effects on social and economic aspects in the territory, as in the case of income, employment and social cohesion, which could be considered public property by the effects generated in society. To these can be added, for example, business knowledge, female labor inclusion, leading to consolidate local social capital.
- Because of the reputation achieved at national and international level, are territorial public goods themselves in their local area, connected to natural public goods and social public goods as such fame generates positive effects on other activities, such as tourism, food and crafts.
- They are public goods in global commodity chains since they encourage the institutionalization of production and trade, guaranteeing a standard of quality and traceability of goods. This behavior extends to other participants in the marketing chain.
- They are symbolic cultural public goods and / or which have right to existence. These are symbols of national identity, represent cultural heritages and thus have a positive effect on exports and consumption.

The public status of goods with IG requires strong public regulation to ensure that there is an appropriation of some agents of the benefits generated by trade in chains and closely monitor that attainment of the goals of sustainable development that nations have committed and generate the desired prosperity in rural areas.

Mexican assets with IG and its relevance in the development

Although Mexico has a stake in the IG decades, its results are not very encouraging to date, since they have not been able to fulfill prominently with overcoming poverty, protecting the environment, reducing inequalities, boost consumption and responsible production or the formation of cooperatives to generate profound changes in marketing chains and local societies.

As shown in Table 1, the number of GI increased significantly in Mexico in the first decade of this century, although its results are not observable or satisfactory. Therefore, what is analyzed in this work is the way in which the agro-food chains GI goods have been transformed into the incorporation of SDG

to generate profound changes in local societies. This analysis will highlight experiences in different Mexican cases with GI, such as Tequila, Mezcal, Chile Habanero and Cacao.

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Sustainable label and governance of global value chain: insights from coffee value chains in Latin American countries

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During the last decades, the private standards has been of raising importance in the agro-food sector,the raise of private standards, as new governance mechanisms, has influence on the structure and *modus operandi* of supply chains (Henson et Reardon, 2005) and raised many debates regarding their impacts on the farmers (especially small farmers) or on environment (especially for eco-labeling).

In this debates, Coffee agro-food system has been largely analyzed, as so-called sustainable coffee demand experimented a rapid growth in the last 2 decades (Ponte, 2002; Pierrot *et al.*, 2010), leading to the development of a wide range of private standards focusing on social and/or environmental features (Raynolds *et al.*, 2007; Soto et Le Coq, 2011). Authors described and compared the governance these new coffee standards (Muradian et Pelupessy, 2005; Raynolds *et al.*, 2007) and analyzed the implication of their raise on the governance of the coffee global value chain (Ponte, 2002; Ponte, 2004; Giovannucci et Ponte, 2005; Muradian et Pelupessy, 2005). Other authors analyzed more specifically the process of adoption private standards and their impact on producers, especially in Latin American countries where the development of coffee certification was particularly noticeable[4] (Barham et Weber; Kilian *et al.*, 2006; Soto *et al.*, 2010; Barham *et al.*, 2011). Recently, regarding the process of diffusion of private standards in producing countries, authors show that the national condition matters in the adoption process (Manning *et al.*,2011).

In line with this literature, this communication aims at exploring the relationships between private standard diffusion, institutions and public policies in the case of coffee labels in Latin American countries.

Based on the analysis of secondary data and direct interviews to stakeholders of the coffee sectors in five Latin American countries (Costa Rica, Nicaragua, Guatemala, Salvador and Colombia), we argue that the pace and pattern of development of private standards depends on existing value chain structures and national institutions, which is the results of historical dynamics and public policies. In turns, we argue that the effects of sustainable standards development on the governance of the value chain depend on existing structure and policy context in producers' countries.

Conceptual framework, material and method

Global value chain (GVC) has been proposed as a concept to capture the different functions from production to consumption of good. Global value chain concept enables to capture relationships of power between actors among international value chain, and led to distinguish between demand-driven and s producer-driven (global) governance of value chain (Gereffi, 1994). Further, to better grasp the (micro) governance of value chain, Gereffi *et al.* (2005) proposed a typology of governance according to the complexity of the transfer of information and knowledge involved by the transactions within the chain, the level of codification of this information, and the capacity of the suppliers to meet the requisites of the transaction. They identified 5 types of governance: market, modular, relational, captive, and hierarchical.

Following Porras et Salazar (2013), we tend to balance between these two approaches of GVC governance (macro and micro) to grasp the governance of coffee GVC and implication of the raise of the sustainable coffee demand on value chain in producers' countries.

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4. Nowadays,76% sustainable coffee come from Latin American producing countries, where as only providing 59% of conventional coffee (regional team latin america, 2011).

We first reviewed academic literature regarding coffee value chain and sustainable labels, as well as non-published materials and reports to capture the structure and trends of evolution of coffee sectors in the selected Latin American countries. Then, we carried out on between 2010 and 2015 national case-studies of the coffee national value chain in these countries. These case studies were aiming at identifying and characterizing types of actors involved in the national coffee value chain with a specific insight on national and transnational actors. Direct interviews to the different actors (traders, millers, producer's organizations) of the national value chain were conducted to capture their strategy of regarding marketing and sustainability labels adoption, and the trend of evolutions of their relationships. Additionally, a desk review of policy and legal documents and interviews to public administrations and organizations leaders involved in the regulation of the national value chain was implemented to capture the institutional framework in which coffee value chain evolved. Finally, interviews to actors involved in services supply to the direct value chain actors as well as sustainable label promotors and certification agencies were conducted. This information was analyzed to defined the strength and weaknesses of national value chain regarding in the adoption process of sustainability labels.

Finally, a comparison of national case studies has been carried out to identify the key factors (including political, institutional, actors' strategies) that enable or limit the sustainable labels adoption, and explained the changes in the governance of national coffee value chains.

Results

Sustainability label: the strengthening of demand driven global governance of coffee GVC

The analysis of dynamic of development of sustainability label (such as UTZ certified, Fair Trade,-CAFÉ Practice, 4C, Nespresso AAA, Rainforest Alliance) in the national coffee value chain in selected countries shows that these labels have been promoted by international trade firms upstream toward the national producers and national producers countries. These raise of sustainability label has thus strengthen de demand-driven nature of the coffee global value chain global governance.

Sustainable label: A "forced opportunity" for strengthen national actors

As a response to this new market demand emanating from consumer countries, producers and producers' organizations were pushed to adopt these labels to maintain their market share. However, in the studied countries, this has not modified drastically the national value chain governance toward more hierarchical governance driven by multinational. Instead, in the Latin American countries understudies, the national coffee value chains are still following a market, modular or relational governance mode.

Key factors to withstand transnational use of sustainability standard to enhance their power: National policies and regulations, and farmers' collective action capacities

In the countries understudies, different factors enable the national value chain actors to overcome the risk of further empowerment of international multinational thanks to the sustainable coffee label development. In Costa Rica, national regulation as well as collective action (cooperative movement and creation of new cooperative consortium) enabled the small producers to adopt sustainable labels and include it has an additional tool to enhance their products marketing and added value. In Nicaragua, although public policies support was been limited, international cooperation supports enable cooperative movement to strengthen, increasing coffee quality and sustainable coffee standard adoption. In Colombia, strong cooperative movement enables a large adoption of sustainable standards including small producers.

Discussion

Our analysis confirms the finding of Manning *et al.* (2012) regarding the importance of national contexts in the raise of sustainability labels. Furthermore, we identified some factors that enable to avoid transnational strengthening through sustainable label development.

Our finding contrasts with other studies conducted in Africa, such as Kenya (Le Coq *et al.*, 2011; Pinard *et al.*, 2011), where lack of farmers' organizations capacities and inappropriate national market regulations enabled the transnational firms to the promotion of sustainable coffee label to gain power in the national value chain.

The implications of the raise of sustainability labels on the GVC governance and especially the capacity for local actors to withstand transnational integration and power concentration though sustainable label promotion depend also on the characteristics of the commodity. Indeed, our observations on coffee contrast with the trends on other commodities such as banana or pineapple where transnational firms had further integrated productions (Vagneron *et al.*, 2009) and the raise of sustainability standards was not prone to provide new marketing opportunity or new added value to producers (van der Waal et Moss, 2013).

Conclusion

The raise of sustainability labels in coffee markets tends to increase the demand driven governance of the coffee GVC. However, at national level, value chain governance is not strongly affected by the raise of sustainability label and local actors thanks to national regulation and/or collective action could withstand the upstream integration process of multinational and, even, could use sustainable label to reinforce their marketing capacities and market positions.

These conclusions, specic to coffee, underline the importance of sound policy and regulation as well as consolidation support to farmers' organizations to take advantage of new markets dynamics (here, the sustainability label demand) to promote small farmer integration in global markets.

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Sustainability in rural territories participating in global value chains. Cases of Costa Rican agroindustrial-chains

Rafael Diaz[1], Jorge Valenciano and Carlos Carranza

Introduction

This paper deals with a balance of implications for the sustainable development of rural regions of Costa Rica, regarding their participation in global value chains. The discussion is based on cases of agro-industrial chains, with presence of foreign direct investment: coffee, bananas, tourism, pineapple and flowers.

The analysis is developed considering as a reference the book of Gallagher, Chudnovsky, y Porzecansi, (2009) and the specific analysis of Costa Rica by Cordero and Paus (2009), in which the relationship between sustainable development and FDI is analyzed. Gallagher, Chudnovsky, and Porzecansi, (2009: 10-11) depart from the spillover effects that generate multinational companies (MNCs) via learning and transferring of knowledge processes that allow to build skills and technological capabilities by local firms, as well as the transmission of the best environmental practices.

In this presentation such relationships are analyzed in the context of global agro-industrial chains, paying special attention to the consequences or restrictions that face local growers within the governance system of the global value chains.

Case Methodology

Cases of Costa Rican agro industrial chains are considered in the analysis, following Diaz and Valenciano (2012) proposal to analyse FDI and sustainable development when global agribusiness chains are operating. These authors depart start from the perspective that FDI automatically does not generate sustainable development. Positive impact depends on a set of value chain factors al local and the global value chain itself. Internal factors refer to the social and productive pathway of the activity in the place where it is embedded, and global value chain factors depend on its governance structure. Then the meaning of FDI regarding the power structure of the chain constitutes the framework of the analysis. The kind of impact on the local sustainable development is captured by an index calculated at the local (district) level, which allows to characterize different states of (in) stability. More general (macro) effects are considered in terms of costs and expected benefits.

When asked about the indicators required to catch the link of MNC operations in country with economic growth in hand with environmental sustainability and social equity, the Vachom and Mao (2008) framework is considered. They use the strength of the supply chain notion that at domestic level is defined as the availability and quality of its participating organizations. Vachom and Mao (2008, p. 1552-1555), proposed empirically to link this concept with the dimensions of sustainable development, in terms of environmental performance, environmental corporate practices and social sustainability. This has been considered through the relationships between the supply chain management with the environmental management, by its various terminologies (green chains, design product, reverse logistics, life cycle assessment,etc.).

Discussion

In that sense, specific features of the agro chains are analyzed considering various relevant elements to observe positive or problematic effects regarding FDI.

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Considering the expected benefits, in the case of traditional export activities (coffee and banana), national competitiveness depends less on FDI, to the extent that national institutional development gives a relatively independent local support allowing local producers to boost economic and social development in the communities where they operate. The opposite occurs in the case of non-traditional agri-chains such as pineapple, whose integration into national production, followed export objectives, has been nuanced by the enclave in Buenos Aires de Osa (southern region of Costa Rica), and a strong command of MNCs in the production and marketing of pineapple in the North zone. That control on marketing channels allows multinational companies to exercise governance over local producers, conditioning contracts, product quality requirements and prices.

In considering the costs of value-added trap in low value options, is clear that this is a feature of agri-chain with FDI presence. This is the case of the pineapple chain, with Costa Rican low participation in the industrialized production or commercialization by local producers, and with little local development of research activities. On the contrary, the coffee chain presents lesser domain of FDI and more sophisticated institutional local development, by the presence of productive diversification in the hands of growers, coffee mills and localroasters.

Another important cost refers to the process of local firm crowding out,which places two scenarios. In the coffee chain FDI has increased its participation since the crisis of the sector during 90's that has reduced national capital participation, mainly in coffee mill and export chain segments. In other activities such as the pineapple chain, FDI integration has affected both spaces, producers of pineapple and others agriculture activities, many of them family based, oriented to local market. This has resulted in an increase in the opportunity cost of the land use, which led to small local producers sell or rent their lands to multinationals, displacing local production of traditional goods that gave support to country's food security.

Cordero y Paus (2009), when analyzing the case of Costa Rican free zones found that the impact of FDI has been positive at macro level, but at the micro level, regarding linkages and spillover effects are small in absolute and relative terms (limited local supply and limited national absorption capacity). These authors detected that the relative success of the attraction of FDI hides the absence of active longterm policies regarding market failures (imperfect coordination and coordination failures), that have limited possibilities of national producers to participate as competitive suppliers. Besides this, incentives for attracting FDI in high technology is not compatible with trade liberalization, while tax exemptions to industrial and tourism sectors, have limited government capacity of funding to create and maintain country specific country attractiveness required to attract FDI, such as the of Areas of conservation and protection of wildlife in relation to the tourism (Lamb and Paus, 2009: pp. 116-122).

Finally, it is interesting to consider the balance of the results obtained following Vachom and Mao (2008) methodology, returning to its starting point, the strength of the supply chain concept as a basis for assessing the sustainability of the chain at an international comparative analysis.

According to Vachon and Mao, this fortress refers to a quantitative dimension in terms of availability of suppliers, facing market potential, and a qualitative dimension concerning operational capabilities of suppliers and the sophistication of the buyers in the supply chain (Vachom and Mao, 2008: 1553). In the case of agro-industrial international chains, it involves an analysis of a supply chain that links FDI taking advantage of natural advantages of the agriculture and availability of labor. These elements give support to national actor participation as suppliers in the chains agro-industrial. The fortress, analyzed from a quantitative perspective as raised by Vachon and Mao, would arrive to the conclusion that in agro-industrial chains where there is presence of domestic producers, and even more so of small producers, constitutes the case of a chain with national strength.

On the other hand, the qualitative dimension is referred to the satisfaction of sophisticated buyers, which depends on the type of participation of national stakeholders. In the agro-industrial chains the country role is located in agriculture, however, depending on the type of participation in the marketing chain, the

national strength varies. In all cases requirements of the buyer are decisive, however the structure of the chain in which dominant quality standards (conventional markets) are associated to more vertical chain governance structures, as in the case of pineapple, banana, flowers and coffee conventional. However, in the case of producers participating of niche chains, the national fortress of their participation in those chain is superior, while they are growers endowed with more sophisticated technologies. And they have more potential for shortening of the chain because they may negotiate with actors closer to the consumer, by passing some intermediaries, as in the case of some coffee and flowers chains.

Vachon and Mao analyzed the relationship between the fortress in the supply chain with the development sustainable, by a comparative study using international data and a survey to executives of companies. They confirm the hypothesis of Porter with a positive relationship between the strength of the chain and environmental practices that lead to innovations. Also found a positive relationship between the management of supply chains and its social sustainability, through the involvement of companies with local communities (Vachon and Mao, 2008: 1556-1558).

The mentioned approach is applied in this paper as shown in table2, which sets that link in other terms, at the level of community sustainable development observed where are located the analyzed agro-industrial chains. Synthetically, as shown in table 2, the relation with economic growth is considered positive, because these activities injected the economy dynamism via exports and local employment. Depending on local embeddedness, by the participation of growers in the chains, the chains will constitute clusters with greater potential, such is the case of coffee. On the other hand, the relationship with social development is considered between unstable and fragile. Although the followed approach does not allow to distinguish the effect of a production chain in particular on the locality location (county), it let assert that features analyzed by Vachon and Mao are relevant in the areas where the analyzed chains are operating with participation of FDI, and governance structure itself, while it shows the quality of grower participation in the chains.

Final remarks

The results of the present study suggest for the purposes of formulation of political of attraction of FDI with links in them spaces rural, the following elements.

Enchaiments

Participation of rural spaces in agro-industrial chains mean very clear linkages: they constitute the participation of small farmers, the contribution of labor force, and in any case the use of natural resources. How to promote an improved participation, or more realistically, how to avoid an impoverishing enchainment?

Resource Development

For regions participating in global agro-chains as suppliers of labor, training processes, and capacity-building are fundamental. This prevents participation in activities whose competitiveness depends on the abundance and low-wage labor.

Explicit consideration of the governance chain

The efforts raised by modern trade policies, in order to make small producers to participate in global value chains, are important in the processes of growth. However, those policies not only must enable grower participation in global chains, but they must consider those elements that subordinate growers to the power centers of value chains. For this purpose, it is important to have clear wisdom about the full operation of the chain, in order to consider the key elements that are used by these centers of power to exercise coordination, and on this base to establish strategies that allow to balance commercial relations along the chain.

Local and international institutions

The institutional framework is also a fundamental mechanism in determining the competitiveness of small local producers. Local institutional support becomes fundamental in both encouraging and strengthening local actors through programs of differential access to credit, technical assistance and market intelligence. In this sense is fundamental to strengthen sectoral institutions linked to agricultural and rural development, at region level while this allow to promote the participation of small producers in global chains. It is also relevant to understand the relationship of external financial agents with producers in different segments of the chains, as well as the financial flows that provides the FDI, because of the effects of funding on competitiveness and the governance structure.

Foreign direct investment and comparative advantage

IED in rural area is natural resources oriented; mainly cheap, fertile soils and climatic factors. This search for advantage brings multinational companies, related to agriculture and tourism, to set up processes in developing countries. It is clear that the primary purpose of these companies is to pursuit profits, but there is not a clear relationship of the contribution of these enterprises to the sustainable development of rural regions. It is recognized the benefit in the employment generation, however in issues as environmental sustainability and social equity there is not clear evidence about the positive contribution of these companies. There is another type of FDI on a small scale, especially at the level of the production of flowers and small tourist enterprise.

Global value chains for sustainable development of primary producers of coffee in Mexico

Marisol Velazquez[1]

This study was developed under two projects, my PhD thesis —"Commercialization and consumption of coffee in Mexico"— and the Latin American Network of Research in Global Value Chains.

It is the aim of this paper to demonstrate how the methodology of Global Value Chains can help primary coffee producers in making decisions about the best choices for production in terms of sustainable development. Research took place in the coffee-growing region of Pluma Hidalgo in Oaxaca, Mexico, where coffee production is one of the main economic activities and is located in a protected environmental zone.

Theoretical framework

The analysis is carried out under the framework of Global Value Chains proposed by Gary Gereffi and Korzeniewicz (1994) in the nineties and its various developments to date (Gereffi, Spencer and Bair, 2002; Gereffi, Sturgeon and Humphrey, 2005; Gereffi and Lee, 2009; Bair, 2009; Ponte and Sturgeon, 2014; among others). It frames the study of productive chains from production to marketing, including not only the description of what is done in each link but the economic relationships between nodes. The approach is to study the production chain from four analysis dimensions: input-output, which refers to products chained in a sequence of value-added services in each economic activity; spatiality, which is the level of concentration or dispersion of economic activities and includes economic geography of production and consumption; institutional framework, based on the institutional context in which it is framed; governance, which initially (1994) referred to the ownership or control of the chain by the producer or the buyer; then was understood as coordination or linkage (2005) between the company and suppliers and; then it arose as normalization (2014), *i.e.* how the set of norms, rules and standards – understood as conventions – controls the chain. Governance domain is determined in a macro-level way and by indicators that encompass the general behaviour of all the links in the chain. Governance by linking or coordination is determined by the interaction of three variables: 1) the complexity of the information and knowledge that is required to sustain a particular transaction, specifically with the product and process specifications, is measured by the existence of instructions, manuals and specifications rules; 2) the extent to which the information and learning can be encoded and transmitted efficiently, without the necessity of invest of the acting parties. This variable is measured by existence and type of contracts; 3) the potential and actual capabilities of suppliers to react to the requirements of the transaction, evaluated from the set of certifications, acquired knowledge and production capacity of suppliers. The combination of these three variables results in the degree of coordination between suppliers and firms, as well as the degree of power asymmetry. Governance, in this sense, can be market, modular, relational, captive and hierarchical. The application of this model allows to evaluate changes in a type of governance or another overtime. (Gereffi *et al.*, 2005; Pérez Akaki, 2010).The third form of governance is the normalization or regulation and it is explained by conventions backed by external agents which determine the way in which consumers choose the product. In commercial terms, it is the control exercised by the imposition of normativities, rules and standards of certain companies or institutions to the chains (Ponte and Gibbon, 2005; Gibbon, Bair and Ponte, 2008). This last one arises from the Theory of Conventions (Dupuy, 1989; Bessy and Favereau, 2003, Eymard-Duvernay, 1992) and was proposed as a solution to problems of coordination in business. Conventions are born as guides to action and collective systems to legitimize such actions (Ponte and Gibbon, 2005). They mean that a group decides actions to be taken and are valued by all. The problem is that when this is applied to markets, a little group, which appear

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as institutions or organizations, determines how to regulate the product. It is not consumers who decide, but organisms in which consumers trust absolutely. Gibbon and Ponte (2005) developed governance by normalization and propose 6 types of conventions: commercial, defined by market value and where the price difference is explained by the quality of the product; domestic, in which long-term relationships and brand awareness determine the choice of product and are referred to tradition; industrial, explained by production efficiency and quality which is measured by means of norms and standards evaluated by a third party; civic, influenced by the collective, social or environmental well-being; inspirational, where creativity, innovation and uniqueness are considered art or craft and influence the choice; opinion or reputation, in which the judgments of experts give value to the product. It is noteworthy that these conventions should be endorsed, certified or recognized by external agents to be accepted. Under this logic, there are rules and regulations supervised by institutions which ensure that a product or service meets the requirements agreed by those conventions. In the methodology proposed in this paper the consumer is added as part of one of the dimensions relating to space and it tries to combine the three proposed forms of governance into one, in order to cover the study of the chain from a macro level, to analyse the entire chain; middle, noting the link between firms and suppliers and; micro,to establish what conventions are presented in each node.

Methodology

Each of the dimensions has a set of variables and indicators to analyse the chain, as shown below.

1. Dimension Input output
1.1 Characteristics of export product
1.1.1 World coffee exports
1.1.2 World coffee exports of green coffee, extracts of coffee and roasted coffee
1.2 Income distribution along the chain
1.2.1 Final price
1.2.2 Unit value of imports of green coffee
1.2.3 Added value in the global chain of coffee
1.2.4 Price obtained by the producer
1.2.5 Costs of transport and storage costs
1.3 Structure of the global chain

Participants in each link
2. Spatiality and Economic geography Dimension
2.1 Concentration and spatial dispersion
2.2 Geoeconomic structure of production
2.2.1. Coffee production
2.2.2. Socio Economic characteristics of producers
2.3 Geoeconomic structure of consumption
2.4 Geography of export

Destination of export
3. Institutional framework dimension
3.1 Historical context
3.2 Quality

Results

The result has been the characterization of the coffee chain in the Pluma Zone in Oaxaca, Mexico. The principals results are:

1. Dimension input-output

1.1 Characterization of the national product and export

- Intense flavour, aroma from mild to moderate
- Cultivation under shade
- The sea breeze brings the grain quality attributes
- Low or no use of agrochemicals

1.2 Local or global marketing

- The medium producers in the area traded locally in the tourist resort of Huatulco and Puerto Escondido, regional in Oaxaca and national in specialty coffee shops
- Small producers in the area sold to medium producers and / or marketers or large assemblers as Becafisa or Alsea
- Of the final price medium producers obtain 100% as value added, while small producers get only15%

2. Spatial dimension and economic geography

2.1 Concentration and spatial dispersion

- Coffee production is concentrated in distant lands to the municipal head. The roasted and ground processing is done in the municipal head
- The area has an average altitude of approximately 1000 meters above sea level which means a medium average and is classified as highland coffee

2.2 Economic geography of production (year 2016)

- Planted area: 5706 hectares
- Harvested area: 5331 hectares
- Production of coffee: 3307 tons
- Production of organic coffee: 1750 tons
- Producers: 451
- Production units: 301

Socio-economic characteristics of producers

Basic Services: Piped water: 84% production units. Drainage: 41% production units. Electric energy: 85% production units. Gas for cooking: 37% production units. Indigenous Language: 2%production units. No level of education: 63% production units.

2.3 Consumption

- Each producer drinks, on average, a litre of coffee a day

3. Institutional framework dimension

The institutional framework of the coffee chain is reduced to the Mexican Association of the productive chain of coffee (Amecafe) and only support in terms of advice, training and sometimes promoting coffee consumption through competitions, workshops and exhibitions.

4. Governance dimension

- Small producers belong to a chain control by the buyer, while medium drives their own chain.
- For small producers there are relational links, with medium levels of coordination and asymmetry measured by a highly complex transaction, low skill coding and high responsiveness of suppliers. In the other way, the medium producers would be under medium levels of coordina-

tion, but with captive links controlled by themselves, with highly complex transactions, high coding ability but low responsiveness because themselves produce. Conventions or standards are domestic, referring to a product that is consumed by tradition; civic, in the case of producing organic; industrial, since it requires some specific quality and; into a lesser extent, opinion for those who are interested in the quality of the grain.

The main contributions are shared with producers in the region in order so that they can make decisions based on information about their own chain, generating sustainable development together in that place from coffee production. This can be possible in four aspects that distinguish this region from other coffee growing areas: 1) Most of the coffee plantation is located within a protected environmental area, giving a special attribute to coffee from these farms; 2) coffee Pluma has historical reputation for quality and taste, this is a domestic convention; 3) the kind of producers, unlike everywhere else in Mexico, are medium producers with an average between 2.5 and 100 hectares of land and 4) Pluma Hidalgo is a town that produces organic coffee. With these features and information about the behavior of the chain, the producer can decide whether to globalize their product or continue supplying nationwide, organic coffee produce or not and to determine the final selling price.

Agro-ecological products qualification and certification participatory initiatives effects of Brazilian public policies

Eric Sabourin[1]

In the last years in Brazil, beside External Audit firm Certification (EAC), various participative certification instruments, behind the figure of Social Control certification, have been set up between producers or between producers and consumers (Medaets & Medeiros, 2004; Brasil, 2002; MAPA, 2008). These alternatives are due to the development of local agro-ecological markets and the dynamics of the effects of reputation (Hess & Ostrom, 2007). This paper propose a comparative analysis of three certification systems (EAC, Network Participative Certification – NPC and Social Control Certification – SCC) in which the advantages and limitations of auto centered and decentralized certification are highlighted as an autonomy process both for family farmers and consumers units and organizations.

Selling ecological farm products is not just a matter of capitalistic exchange. Although it is now the norm for many of the small and family farms of Brazil (Conterato, 2004; Ploeg, 2008), one still see socially controlled markets which is also governed by the rules of reciprocity and redistribution, the two different economic forms defined by Polanyi (1957) beside merchant exchange.

When the producer's name is at stake, reciprocity relationships generate values of trust, reputation, honor and accountability. It is often these ethical values that guarantee the legitimacy and the authority of the certification process of quality and origin standards: geographical indications, production process, ethnic or cultural identity. In fact, it thus creates a territoriality of reciprocity around a specific product. However, a part from this group of qualified producers and also for the marketing of other products which are not quality-labeled by these producers, it is the rules of the capitalistic exchange market that apply. So, qualification and certification could also induce exclusion. That is why, in this type of process, there has to be some sort of interface between production and the market. The quality certification mechanism can reintroduce a dimension of reciprocity and solidarity (the domestic unit, the peasant community, the co-operative) into the capitalist exchange market system.

The communication will also examine how these grassroots certification instruments have influenced the public policies programs in Brazil and the main trade off and synergy between public policies and these instruments. The results come from a research based on three case studies in Brazil, of family farmers producing and marketing their own agro-ecological production.

The method is based on a comparative study of three Brazilian recent qualification and certification systems of family farm products: an External Audit Certification firm (Ecocert Brazil) with the Cooperagrepa, an agro-ecological cooperative of Amazonia (Mato Grosso), the Ecovida Participative Certification Network in the South of Brazil (Santa Catarina) and the agro-ecological markets group Eco Borborema for the Social Control Certification experience in the Nordeste (Paraiba)

The comparative scheme examines the social and institutional trajectory of any initiatives and some four key elements of quality control: the checking means, the certifier organization functioning, the means of communicating quality, the costs and it analyses their effects or influence on local or national public policy certification instruments.

In fact, the NPC system works as an interface between the logics of reciprocity and exchange on two counts. Firstly, it creates a link between domestic production and market exchange by protecting the qualified production from the effects of competition. Furthermore, the guarantee and control of product quality in the NPC systemis based on reciprocity and mutual aid between peers. However, this virtually

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gratuitous certification mechanism (3 days of work/family/year) defies the capitalistic mercantile logic but at the same time it enables producers to enter into dialogue with it, especially concerning international standards required for the export market. In this sense, NPC is a hybrid certification mechanism suitable for systems that combine the logics of exchange and reciprocity.

The results show an important advance with the institutionalization of participative certification by Brazilian legislation, with a specific set of norms and its bureaucracy services, implanted by the Ministry of Agriculture (MAPA, 2007). The main expectation of a certification system is that it should lead to reducing the asymmetry of information and fraud and/or opportunism. The three certification systems studied all fulfill this goal with no significant differences in terms of results, but with an important difference in terms of costs and processes: participative and social certification is quite cheaper.

The capitalist exchange market sets the homogeneity of firms' standardized certification norms against heterogeneity procedures or Network Participative Certification registration modalities. Certification resulting from External Audit shows some difficulties to integrate and translate the diversity of production systems and conditions, the diverse realities of different countries, terroirs and producers, and particularly social and cultural realities.

This is one of the assets of certification by social compliance. It should not, however, become a complete substitute to technical compliance. This is why the producer's opinion as peers, and that of the consumers as judges, is absolutely essential.

Notions of reputation, trust and knowledge sharing are at the heart of the qualification process of products (especially agro-food products). Social pressure has been recognized for its efficiency in the process of guaranteeing quality credibility. In Brazil, several authors have put forward the idea of developing the debate about social compliance as an efficient alternative mechanism in terms of quality control in the frame of family peasant farming.

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Coffee chain in El Salvador: an approach on the influence on the sustainable development of the Western Region

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El Salvador, has limited territory -20.742 square – kilometers and with a dense population, about 6.4 million people, which leads to the search for alternatives to optimize insufficient resources in order to meet the needs of the population. In the specific case of the coffee chain, it has many advantages, in this sense, since underpins many grower families. Besides coffee plantations provides secondary forest that adds 7% to the 4% that currently exists as primary forest in the country.

The Global Commodity Chains (CGM) approach originally proposed by (Gereffi & Korzeniewicz, 1994), is used to analyse the relationships between agents along the chain, from growers to the different presentations it reaches consumers. By distinguishing the various links long the chain is, permits to identify its agents and its functions. By this way, public policies to strengthen competitiveness can be set, especially regarding upgrading processed for small and medium growers.

According to the structure of the coffee chain identified in El Salvador, 86% of coffee producers are classified as small – grown less than 10 acres of land – and is in the western region where it accounts for 45% of total producers who grow more than 50% of the country that is dedicated to coffee growing area. Also in this region there are located around 70% of country's coffee mills, which together capture similar percentage of domestic production. Some of these are exporters, parts of them establish relationships with other exporters and transnational corporations in order to gain market share and guarantee its supply of grain.

The analysis of sustainable development, on the other hand, involves the construction of indicators of different dimensions, which may allow to get an approximated idea of the development level that in a given region or geographical area. In this regard, three dimensions of sustainable development are analyzed: the economic, social and environmental ones. Sustainability is analyzed considering the definition of sustainable development, coined by the United Nations, presented in the Brundtland Report in the year 1987 (Gómez de Segura,pp.15-17). In that order, cultivation of coffee in El Salvador is attributed great importance because of its contribution as a currency generator, jobs and their valuable contribution to carbon sequestration and conservation of biodiversity in flora and fauna.

In this way, CGM is used for to analyse along the entire Salvadoran coffee chain, identifying the role of the players involved in the chain and those linked actors in different segments Generally, the links identified are three: the first link in the distribution channel that runs from the farm to the coffee mills; the second link envolves coffee mills to foreign importers or roasters; and finally, the last link of the channel runs from the roasters to consumers.

Approximately 95% of the coffee flows directly from growers to coffee mills and from these to foreign importers. Coffee provided by growers is coffee sherry without any processing. This is because most producers are small and do not have enough financial resources to acquire technology and, additional to this, before taking the harvest it is already committed to the coffee mills/ exporters, since they provide funding for the harvest.

According to the latest census conducted by the Consejo Salvadoreño del Café (CSC), there are about 75 coffee mills, most of whom are also exporters. Certain larger coffee mills may be identified, who establish agreements with transnational corporations to commercialize the grain. The amount of coffee for domestic consumption is minimal, around 1%.

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Since almost all the coffee is exported, in the last link roasters agents led by transnational corporations are in charge of carrying out the respective grain processing and distribution in different presentations. Finally appears the consumer provides by supermarkets, and coffee houses.

The analysis of players participating in the chain, permits to establish the relationships of coffee industry with sustainable development the region, especially considering the presence of transnational corporations who operates coffee mills/exporters and integration strategies. Different variables were chosen in each of the above three dimensions, with indicators (according to available official data)in order to develop an integrated sustainable development index.

The methodology for developing the integrated sustainable development index, is the proposal by Sergio Sepúlveda in 2008 and initially applied by the Instituto Interamericano de Cooperación para la Agricultura (IICA). Based on this methodology indicators to analyse each of the analysis units (41 municipalities of the western region) they are constructed in each of the three dimensions separately and together as an integrated index; using a function to homogenize the measurement units of different variables, in order to establish the relationship among of these with the development status (positive or negative).

In the economic dimension, proxy variables at local (municipality level) are: open unemployment, employment generated by the primary sector and the average household income. The relationship o unemployment with the state of development is negative, given that higher unemployment is associated with lower welfare families; in the case of employment in the primary sector, a positive relationship is associated, since these municipalities are mostly engaged in related sector and in the case of average household income activities, a positive relationship, as partners that higher income better able to achieve their needs.

Four variables are considered in the social dimension related to education and access to basic services. Illiteracy, is considered with a negative relationship with the state of development desired, since the higher percentage of illiterates the fewer opportunities to improve their living conditions; access to potable water and electricity is considered positive, since water quality is critical to improving the quality of life requirement and the need for access to stable electricity and lighting; and on the other hand, the fact of not having access to health service, is graded with a negative relationship, because there are aspects of health that are associated with health problems,especially gastrointestinal, affecting the quality of life.

In the environmental dimension there are considered the following variables: households that burn trash, throw garbage into the street and throw sewage into the street, are associated with a negative relationship with the state of development; likewise the use of firewood for cooking, since it causes pollution; and forest area with natural forest management is considered with a positive effect, given that this contributes by carbon capture and diversity of flora and fauna conservation in the country.

Once an index for each of the three dimensions is calculated, the simple sustainable development integrated index is obtained (equal weight to each of the dimensions). Finally, the state of development is classified according to the value in the following ranges: 0 to less than 2, is said to be collapsing; 2 to less than 4 development is critical; 4 to less than 6 is unstable; 6 to 8 is less stable; and 8 to 10, development is optimal.

Finally the analyses try to associate the state of development with other aspects that may affect it, such as the presence of transnational corporations in the chain, coffee cultivated area. A regression analysis is developed in order understand if the kind of influence of coffee production in the sustainable development of this region; however, one should not forget that this is an approximation and that the limiting obtain adequate information to measure the quality of life and sustainability considerable influence.

Finally, it is concluded that relevant aspects governance in the chain influence on sustainable development, throughout practices employed by leading companies who manage the chain. Based on (Diaz Porras & Valenciano Salazar, 2012, pp. 16-17) the type of existing micro level governance are identified in each link of the chain according to the type of integration of the supply chain.

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Session 5

Strengthening the capacities needed to make multi-stakeholder partnerships for innovation in agri-chains work in practice

Scaling inclusive development: assessing the outreach and leverage of agri-chain partnerships in sub-Saharan Africa

Sietze Vellema[1] and Greetje Schouten

Rationale of the development pathway

Smallholder farmers, often belonging to the most marginalized groups in society, manage over 400 million small farms and provide over 80 per cent of the food consumed in Asia and Sub-Saharan Africa (IFAD, 2013). These regions face high levels of food insecurity, with almost over 800 million people undernourished – 239 million in Sub-Saharan Africa and 578 million in Asia (FAO, 2011). Policy and interventions addressing food insecurity and undernourishment focus on the right combination of technical and institutional changes, which potential increase agricultural production and food access via market expansion. Partnerships involving companies, organised farmers and public agencies have become influential organisational actors for implementing intervention strategies that endeavour to increase smallholders' access to technology, inputs and markets with the aim to alleviate poverty and increase food security at the same time (Verena Bitzer & Glasbergen, 2015; V. Bitzer, Wijk, Helmsing, & Linden, 2011; Ros-Tonen, Van Leynseele, Laven, & Sunderland, 2015).

To generate this type of technical and institutional change processes, many present-day development policies and projects emphasize the need for inclusive development, often through so-called "value chain collaboration 'beyond the chain'" (Gupta, Pouw, & Ros-Tonen, 2015; Ros-Tonen *et al.*, 2015). These types of agri-chain partnerships are understood as collaboration between different value chain actors, often combined with other societal actors, including NGOs and governmental actors, in order to reach developmental outcomes (Helmsing & Vellema, 2011a, 2011b; Ros-Tonen *et al.*, 2015). Large amounts of public money are invested in interventions aiming at the inclusion of small holder producers into agri-chains and/or agribusiness operations.

The paper is based on action research of the Partnerships Resource Centre with the 2SCALE programme, implemented by the coalition of IFDC, ICRA and BoP Inc. The 2SCALE programme brings the right partners together for collective, coordinated action in value chains and / or agri-business clusters. The 2SCALE programme is based on the assumption that greater market participation by small-scale local entrepreneurs will boost food security and agriculture-based trade in Africa. The programme expects that market expansion will give farmers the incentive to invest in productivity-enhancing technologies and partnerships will be able to address the challenges faced by local firms or agribusiness clusters entering the market place, such as lack of scale economies, high transaction costs, limited knowledge of markets. The programme's focus on food security and improved nutrition, and the inclusion of vulnerable smallholder producers ts the orientation of the Sustainable Development Goals.

The programme's ambitions are also expressed in terms of scale to be realised by its technical and institutional innovation. Development-oriented interventions are increasingly scrutinised for their scalability potential. Donors ask the intervening organisations to express their impact in terms of verifiable numbers of beneficiaries reached. In the domain of inclusive development and agri-food chains, this implies demonstrating scale in terms of numbers of farmers reached by the intervention. Scale can also be realised via an emerging network of replicated practices and interventions, which all have a specific outreach and geographical coverage.

The objective of the paper is to offer development practitioners and policy makers an analytical perspective for assessing the process of scaling. The risk of focusing on numbers only is that scaling is not

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approached as an unfolding process that can, to some extent, be steered or influenced. It seems relevant to think about how the scalability of induced processes of inclusive development at an early stage of the intervention. The concrete innovations and partnerships initiated by the 2SCALE programme imply a transformation process of agri-chains towards inclusive and sustainable development. What enables practitioners and partnerships facilitators to assess whether this transformation process is scalable?

Conceptual framework

This paper is motivated by the observation that whether an innovation is adopted on a wide scale importantly depends on complicated interactions between the nature of the innovation itself and the context wherein it lands. The approach developed in the paper is anchored in the work of realist evaluation, which looks for the processes triggered by a program or innovation, but recognises that the outcomes, for this paper scalable inclusive development, can only be explained by including context in the assessment. The interaction between the properties of the technical / institutional innovation and context is where explanation for scaling can be traced, but this can also be the core focus of strategic guidance of an innovation process. This invites practitioners and policy makers to look beyond the technical and organisational boundaries of the new practice, and to recognize how scaling and leveraging thereof depends on the ways interdependencies and embedding are managed. This implies that scaling of an innovation can take place in one context and not in the other. A 'one size fits all' approach to steering processes of scaling is often insufficient. It is necessary to assess when, where and why some innovations lapse into inactivity while others go to scale and even indicate system change.

The paper develops and applies a framework for assessing the outreach and leverage of partnering and inclusive development in the context of agri-chains in West and East Africa. The framework adopts business-oriented perspectives that are anchored in the scholarly traditions in public administration, organisation and management studies and system thinking.

Firstly, the paper uses the work of Dubbink (Dubbink, 2013) to assess the place for partnering in the context of contested relations between market, state and civil society in historically and regionally specific business systems (Whitley, Helmsing and Vellema, 2011). This specifies the institutional environments wherein the innovation and partnering process evolve and become embedded. Societal triangulation is proposed as the first indicator for assessing the contextual embedding of a scalable process of inclusive development.

Secondly, the paper uses the work of Seelos and Mair (Seelos & Mair, 2010a, 2010b) to trace whether organisational closure occurs in the evolving process of inclusive development. Organisational closure refers to a process wherein the room to make choices or modifications is narrowed. The nature and orientation of the intervention become less malleable. This can be due to operational reasons, *e.g.* how the aggregation of products is arranged or due to organisational reasons, *e.g.* how processes functional to marketing or certification silence emerging tensions within partnerships.

Thirdly, the paper makes scaling dependent on the type of leverage point managed in the socio-technical innovation, for which the hierarchy composed by Meadows (Donella Meadows, 1999; DH Meadows, 2008) is useful for specifying the scope of systemic change that the socio-technical intervention may induce. The paper develops a specific interest in identifying leverage points that entail novel feedback mechanisms and / or novel rules and practices. Whether these proto-institutions diffuse into the specific contexts (Lawrence, Hardy, & Phillips, 2002) is considered to be an indicator

Main results

The paper applies the framework for assessing the scalability of inclusive development in agrichain to 32 partnerships in West and East Africa initiated by the 2SCALE programme. For these case studies of inclusive development (Vellema, Ton, de Roo, & van Wijk, 2013) the paper evaluates how and whether the conceptual framework enables development interventionists to assess the scalability of inclusive development already in early phases of development programmes.

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Innovation platforms and value chain: technological interactions and sustainability in Ivoirian plantain sector

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Introduction

Public policies to improve agricultural productivity in sub-Saharan Africa have rehabilitated in recent decades the need to create socio-technological networks (Doray and Lapointe, 1992) in order to support development projects designed to obtain food sovereignty challenges (Brunel, 2009 ; Charlier, 2017). Socio-technical networks in developing countries can also underpin organizational components that will constitute even the existence of a sector (Hugon, 1985) as a system. These networks would then be characterized by a grouping of several actors, categories of actors and institutions of an agricultural and / or food chain. In our work, these networks are polarized by innovation.

In Côte d'Ivoire, so-called strategic crops (plantain, maize, cassava, yam and rice) have been identified in studies on the development of a National Agricultural Investment Plan (PNIA) for their significant impact on poverty reduction and economic development (PNIA, 2010). The process has been carried out and is still being carried out by the Program WAAPP_CI, with a view to improving the productivity of these food crops. The diffusion of this improved plant material is supported by the creation of the Innovation Platforms in the main geographical areas of production of these food crops.

The classical and diffusionist model of technological and varietal innovation in this PED is based on the presence of technical rural development agencies (ANADER[4], INADES Formation) which disseminate (sale or free distribution) to producers, agricultural inputs developed by companies or research. The setting up of innovation platforms appears as an attempt to diversify this model to introduce the role of the market as an innovation steering institution (traders, distributors, consumers).

These new supports are therefore a means of renewing mechanisms for the transfer of knowledge and technologies through learning and capacity building through collective coordination of actors around an innovation process. These diffusion models differ from the old linear diffusion methods (pools technology) carried out by national agricultural extension and advisory agencies or by NGOs which provide various forms of technical and / or financial support, or by agri-food companies which draw up sales contracts with suppliers.

We examine in our study how these innovation platforms implemented in Côte d'Ivoire since 2013 play a role or not in the existence of a systemic dynamics focused on the innovations mobilized in the specific case of technological transfers. We propose in this work to evaluate how the designing of this experimental device in a diffusionist logic based on technologies, make the actors of the sector interact and finally reconfigure the system, therefore in itself, generate new organizational innovation.

This study uses the conceptual and theoretical framework of the economics of value chain (Temple *et al.*, 2011) to analyse an innovation process. It aims to provide an answer to the question of how the conception of technological innovations in a methodological approach in terms of "Value Chain" is more innovative in terms of efficiency of this network of selected transfers, contrary to that based solely on the sector of the production of a chain, privileged during decades in the PED.

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This article is organized into three sections. In the first, we describe the conceptual framework of the economics of the chain and methodological framework of the analysis which guided the data collection. Results are analyzed in the second section. In final section, we discuss the appropriateness of using a new approach that we call "Innovative Chain System, SFI". Recommendations and research perspectives will help to conclude the study.

Methods and Data

Theoretical and conceptual framework

In a theoretical frame of reference for the dominant development economy, which bases African agricultural development on the transfer of technologies developed in industrial agriculture (Badouin, 1975, Assidon, 2002), this study uses the conceptual approach of analysis in terms of "Chain System" and the methodological referential of " Meso-Analysis Chain, MSF" (Hugon, 1994). However, we propose to update the use of benchmarks for the analysis of chains in view of the recent development of "value chain" approaches (Temple *et al.*, 2011, Palpacuer, 2015) and "Innovation System "(Touzard *et al.*, 2015) to describe these new institutional arrangements.

Methodological and analytical framework

The collection of primary data was carried out in April 2016 during a fact-finding mission to the leaders and members of the five PIPs. Semi-directional interviews were also conducted between June 2015 and August 2016, with the Ministry in charge of agriculture and food safety, technical and agricultural advisory structures, research centers, executing agency Firca_Waapp.

On the empirical level, this objective will be tested on three improved varieties of plantain introduced successively in 2012 (Pita 3, Fhia 21) by the National Center for Agronomic Research (CNRA) and then in 2014 (Big Ebanga) by the Interprofessional Fund for Research and Agricultural Council (FIRCA), the agency in charge of implementing this productivity improvement WAAPP program.

Results

Impact of the PIP on the reconfiguration of relations between actors in chain

Five PIPs were set up in Côte d'Ivoire since 2013 to accelerate the diffusion of technological innovations: (i) PIP of YEBOYEKON in Abengourou, (ii) those of N'DÈ N'FENIN-TÔH of Agboville, (iii) WOYÈ of Adzopé, (iv) PIP of Issia and (v) PIP of NAWA in Soubré. The number of direct actors in this chain involved varies by implementation area and by groups of actors (Table 1).

Three relationships between the actors of the sector were most significant: relations between research and development institutions and management structures, those between management structures and producer groups, and then between professionals in the field and research. The PIP promoted the introduction of the Big Ebanga hybrid in 2014, the dissemination of three improved varieties of plantain and the transfer of technologies for plantain cultivation.

Return on the relevance of using an SFI approach to structure innovation

Taking the methodological framework of an SFI approach to structure an innovation process is based on a fundamental assumption that the complementarity between the different segments of the sector. In this study, two interdependent elements must be highlighted for the applicability of this hypothesis, namely: make good use of the concept of the sector in the concept of platforms to test innovation; and institutionalizing the sector to better manage the implementation of innovation.

From the incompleteness of the use of the concept of the value chain in the concept of platforms to experiment innovation

Initially, PIP produced remarkable results on the governance of the innovation process. Indeed, we have witnessed the performance of the PIP to drive the first level of innovation which is the experimentation

of the new varieties. These PIP then fostered the integration of the opinion of the target populations for a reorientation of the choices of the public policies in terms of selection of the varieties introduced taking into account the needs of plant material of the producers and the preferences of the consumers. In a second step, a gap in the use of the chain approach by innovation platforms is however to be noted since we recall that these are mainly industrial varieties witch destined much more for industrial use (flour, pastry, chips)..

To the lack of formal institutionalization to drive the implementation of innovation

For the chain to emerge as a guiding element of technological innovation it must be formally institutionalized with rules, standards and organizational forms, in which all players in the agri-chain recognize themselves, since they have contributed to their progressive development. However, for the moment it did not show any institutionalization of this Ivorian plantain value chain.

In order to achieve this, it would be necessary to establish networks of actors or colleges much more homogeneous and transversal to the 5 PIPs composed mainly of actors from each level / segment of the chain (production, marketing and processing).

Conclusion

This study examines how platforms have seized the value chain referential and mobilized it in the specific case of technological innovations in the food sector in Côte d'Ivoire. It therefore relies on the conceptual and methodological framework of the economics of the sectors to analyse an innovation process. It proposes to contribute to the definition of a new conceptual concept in terms of "Innovative Chain System, SFI" combining methodological approaches in terms of "Meso-Analysis Sector" and "Sectorial System of Innovation ".

Our results show that these PIPs are as successful as failures. Their success lies in resolving the stakes involved in coordinating actors in a sector around the experimental test for the introduction of plantain varieties. However, their failures are explained by the failure to respect the central hypothesis of the chain approach, which is to integrate all the actors. The designing and establishment of colleges of actors more homogeneous in the three segments of the plantain value chain will contribute to this institutionalization, which would take the form of a college and then become progressively regional.

Is the concept of "agri-chain" really adapted to integrate the different actors of socio-technological innovation in a co-construction process? Is it finally the right tool in the case of a secondary crop and mostly associated with perennial crops (cocoa, hevea) destined for export ?

The SFI itself is contextual to the creation of innovation platforms that establish a coordination structure. However, the question remains as to whether these platforms are diluted in relation to the external financing that supports them, whether these SFIs will continue to exist.

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How to support innovation processes in agricultural sector? Diversity and complexity of situations of innovation in Burkina-Faso.

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Rationale

Facilitate innovation processes is considered as one of the solution for improving value chains performances and accelerating agricultural development while meeting the challenges of population growth, climate change and environmental degradation.

The question of how to enable agricultural innovation has been largely discussed and researched leading to numerous recommendations but still without intended impacts. The prevailing view is about ensuring that conditions that nurture eclectic approaches to innovation exist, and that competitors join forces with each other to constantly adapt institutional and policy framework conditions for innovation (Hall *et al.,* 2007). Seeing innovation as the result of complex and multidimensional interactions as the dominant thinking (Klerks *et al.,* 2012) led to the implementation of innovation platforms and networks as a silver bullet (Kilelu *et al.,* 2013).

However there is a real lack of knowledge about tools, methods, incentives or skills which are suitable to organize exchanges and work within a diversity of innovation networks in order to make them efficient with evident improved capacities to innovate. The research of abstraction and generalization impoverished knowledge on innovation support mechanisms themselves.

Hermans *and al.* (2013) showed that helping the agency of specific individual or organizational skills within an innovation network in order to fulfill basic functions (knowledge co-creation, outscaling, up-scaling) is a key to successfully support agricultural innovation process. It raises new questions about the possibility to strategically manage multistakeholders' innovation processes. How to build a common vision and flexible institutional arrangements? How to ensure that all functions are performed? What is the role for monitoring and learning approaches? Regarding agricultural innovation drivers, can we manage any type of innovation process?

In order to address those issues, we proposed to identify and explore a diversity of situations of innovation in order to emphasize management practices which have a positive impact on innovation processes. The objective is to help set a framework for the characterization of different successful innovation support models.

Conceptual Framework

Our approach crossed two fields of literature, usually unconnected: organizations and management. First organizational studies mainly highlight the challenges for organizations to manage both exploration and exploitation processes in order to perform innovation (Argyris and Schön, 2002). Several managerial levers have been identified as key determinants (Crossan *et al.*, 2010): learning and knowledge management, organizational culture, structure and system features, resource allocation and explicit innovation strategy.

Second in the area of management studies, there are few empirical studies addressing the role of organizational designor inter-organizational cooperation (Brion *et al.,* 2008).

In order to bridge this gap, we built a framework which seeks to link managerial action with innovation as a process and outcome of organizational level, using network, learning and knowledge theories. We

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defined a situation of innovation similar to a management situation (Berry 1983; Girin, 2016), in order to empirically address ongoing innovation processes. A situation of innovation is a set of activities in interaction, associated with the idea of collective action and results which are submitted to a judgment. Individuals are considered engaged in a situation of innovation when they recognize that they participate, at various degrees, to the production of those results.

We made two assumptions: i) there are management practices that help agents of a situation of innovation to fulll expected functions (knowledge co-creation, out-scaling, up-scaling); ii) there are organizational factors which facilitate the implementation of those practices.

We combined two levels of analyse: i) the situation of innovation, which is composed of multiple organizations all connected via their contribution to innovation process; ii) the activity level of individuals. We consider indeed that innovative capacity of organization lies primarily at the individual level and is strongly related to praxis and practice of individuals.

From a literature review, we identified a set of prevalent explicative variables and items at each level (tab. 1 & 2). Then we operated in two steps. Firstly, an exploratory approach aimed at testing and validating these variables: how far the model described the diversity and complexity of different situations of innovation. Second, we evaluated the predictive use of our structural model: how the variables will behave if one of more of them are changed.

In this paper, we present the results of the first step of our research.

Methods and data collection

We developed our approach in Burkina-Faso. Based on a scoping study of the challenges at the level of national agricultural innovation system and based on participatory workshops with innovation stakeholders, we identified intensive innovation areas where development challenges are considered as priority. We then identified a diversity of innovation processes regarding three criteria: nature of innovation-product (technical, organizational, service, social), stage of innovation-process (initiation or implementation) and the main perceived obstacles to the success of innovation. Based on those criteria, six situations of innovation considered as representative of the diversity of innovation processes have been selected (tab 3). In order to collect data, we combined focus groups at the organizational level, workshop at the level of the situation of innovation and individual interviews (tab.4).

Results

The application of our method on three situations of innovation helped to fine-tune our explanatory variables and items. We added more synthetic variables at the individual level, addressing motivation and interessement issues, which have been identified as key drivers of the level of contribution to a situation of innovation. Results at the level of situation of innovation showed the diversity and complexity of the relationships between organizational factors and actual activities that constitute the fabric of innovation.

Discussion and conclusion

Considering the starting research project, results are mainly conceptual and methodological. Our results helped to deepen the understanding of a situation of innovation which is an invisible locus where innovation is managed in some kind of explicit manner depending on the profiles of individuals involved. However preliminary results let us think that existing management tools and procedure at both the inter-organizational level and organizational level did exist and helped to overcome the weaknesses of individual or organizational capacities for innovation.

Our approach is complementary to other approaches developed in the framework of AIS thinking which are very descriptive and fall short of helping the identification of concrete actions for facilitating innovation.

Considering the nature of management processes at the level of situation of innovation, we recommend to implement sort of support committees that will act as a management and investigation body in order to strengthen overarching innovation capacity of stakeholders, in a continuous and targeted manner (Lenfle S. 2004). One-size-fit-all and one-shot capacity development interventions are not suitable to support innovation. Further analysis of our results will help to identify composition, roles and tools for these committees.

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Tables and figures

Tableau 1. Evaluation of the capacity of an organization to contribute to a situation of innovation

Variables to be explained	Explanatory variables
Nature of actions	– Nature of engagement with partners – Level of acceptance of risk and uncertainty – Area of responsibility and expertise
Intensity of actions	– Level of motivation and interessement of individuals – Gap between own objectives and expected results – Innovation process duration – Level of understanding of challenges to achieve innovation process
Efficiency of actions	– Available resources

Tableau 2. Structural model to analyse the drivers of a successful situation of innovation

Variables to be explained		Items
Knowledge co-production function achieved		– Main areas of new knowledge – Knowledge producers – Partnerships dealing with knowledge co-production
Outscaling function achieved		– Level of understanding and ownership of innovation process by all actors involved
Upscaling function achieved		– Degree and modalities of implication of politics
Explanatory variables		**Items**
Organizational factors	Degree of inter-dependence between organizations	– Nb of formal or informal agreements – Duration and flexibility of agreements – Nature of mutual constraints – Intensity of inter-personal relationships between organizations
	Redundancy of each supports innovation function	– Nb of organizations involved in each function
	Degree of representativeness of NAIS stakeholders	– Nb of organizations of each category
	Innovation capacities of each organization	– cf tab.1
	Common knowledge and understanding of achieved results and objectives	– Level of knowledge of each organization
Existing management practices	Existing mechanism of affirmation innovation identity	– Discourses and events
	Existing tools or procedures enabling the re-orientation of activities and objectives	– Description of examples of shift in objectives, activities, or other collective action.
	Existing mechanism for monitoring and learning	– Description of methods used for monitoring and learning
	Existing mechanism for evaluate/select individuals or organizations engaged in the situation of innovation	– Description of modalities of choice of organizations and individuals, and also modalities of disengagement or partnership rupture

Table 3. Selected situations of innovation in Burkina-Faso

Stage of innovation	Selected Situations of innovation	Main challenges
Initiation (data collecting and development of suitable resources for implementation	Micro-irrigation systems for small family farms	Technological lock-in, marketing issues
	Development of sunflower production	Technological lock-in, value chain issues
	SPG label for organic farming	Institutional and political lobbying, value chain issues.
Implementation (use, modification and adaptation of an innovation)	Farm advisory services provided by farmer's organizations to their members	Scaling-out Increase impacts Appropriation by end-users
	Small innovative family businesses in food processing	
	Local land charters for municipalities	

Table 4. Methods for data collection

Levels	Objectives	Methods
Individual	– Motivations and skills – Practice and praxis in relation to the management of innovation	Semi-structured interviews
Organization	– Identification of individuals who are engaged in the site situation of innovation – Nature and timeline of actions and results that contribute to innovation process – Level of knowledge and understanding of innovation process – Nature and modalities of partnerships with other organizations of the situation of innovation – Identification of innovation management mechanisms at the inter-organizational level	Focus groups
Situation of innovation	– Engagement in the research and development project – Characterization of the situation of innovation: composition, challenges, obstacles	Participatory Workshops

The case of Myanmar: after 50 years of dictatorship, making the leapfrogging possible in agriculture

Ei Khin Khin[1]

Myanmar situation after 50 years of dictatorship

Myanmar (Burma) is getting rid of several decades of isolation. Due to international sanctions and an inadequate development model, characterized by political as well as economical constraints, the country is lacking of infrastructures while the people is lacking of competencies. Since 2011 and the opening of the country, investments are progressively coming, and so the threats to its rich diversity. The risk is important to see the country being developed without any environmental or social concerns.

While the last election (8 November 2015) has given majority to the opposition (NLD, Aung San Suu Kyi's party) and made the country a living democracy in being, the political debate seems to focus more and more on which most relevant development model to be adopted. If some are pushing towards a business-as-usual model (exclusive, export-oriented, short-term profit, and resources-spoiling), many from civil society as well as business people) are arguing in favour of a model that is harmonious and respectful to the environment of the country and its people.

As in any other country, Myanmar's development will pass by development and mutations inside its agricultural sector. But we must fight for a model that: prevents massive rural exodus, alleviates poverty, prevents major threats to the environment, prioritize quality and national needs first.

Agricultural sector is a powerful tool to alleviate poverty and also mitigate climate change (Myanmar is supposed to be the 2nd most endangered country in the world on that matter). But only if we develop a sustainable agriculture.

Myanmar's agricultural sector represents more than 35% of the GDP. However, it concerns more than 70% of the population and occupies more than 20% of the available lands. So the sector remains unproductive, many reasons: international isolation, lack of infrastructures, totally wrong (or absence of) policies, plundering of resources and people, abuses of all kinds, massive land grabbing by army or cronies militias, weak ownership, nearly no agricultural research. Poverty (26% of the people working in the agricultural sector), child malnutrition (32% of Myanmar's children), no mechanisation, no access to loans are also some of the major characteristics of the sector.

Agricultural sector has to be a priority in the country's development. But with which model?. Fortunately, wrong experiences around the world can help us, against the intensive agriculture model.

But the country already has bad records: the former government, and its Minister of Agriculture (that was the first burmese shareholder of the biggest pesticide chinese company!!), and the agro-business lobby with local and foreing lobbies, have all praised for the usual model: fully-mechanized, fully,-pesticides, large scale farming, farmers expropriation, export-oriented, with monocultures (rice, mainly) and very low quality. And then huge rural migration has already started.

Dramas has already started for years now: huge misuse of pesticides, leading to diseases and deaths by thousands, massive deforestation, land conflicts for 20% of farmers...

On farmers:

– the income of farmers is still the lowest in South East Asia, around 200 USD per capita ((OECD).

– in accordance with land ownership law, farmers cannot own formally the land, and all the property is owned by the State of Myanmar, so every one is borrowing the land, which makes landgrabbing so

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much easier. Nevertheless, the stakeholders are trying to enact a national land use law but it is still in a draft stage. Also, this policy must set out an efficient process for the investigation and return of confiscated land. These provisions are critical to protect the livelihoods and rights of small-hold farmers and to promote inclusive and sustainable development for the entire country. Over 90% of the farmers are running less than 2 hectares.

On climate change :

In Myanmar, as in countries like Bangladesh or India, farmers are strongly effected by climate change, floods and drought, which are very difficult to control. Most of the farmers and farm workers can be sometimes moving to countries like Thailand, Malaysia... for the hope of better earning, or to avoid losing dignity. Therefore, it is difficult to cut the poverty vicious cycle.

Myanmar has huge potential for a sustainable agriculture:

Of course, as Myanmar has different geographical landscape and weather/temperature system, there is a huge variety of products can be produced, and also thanks a one of the highest biodiversities in the world. different kinds of plants, herbs, trees species can be grown, as well as various kinds of seasonal crops. As rice is staple food, rice is the major crop in monsoon. Myanmar used to be a rice bowl of South East Asia in the 50s. Paw San Hmwe, Myanmar famous variety, used to be known as the best rice in the world. Other crops like sugar, maize, coffee, tea leaves, spices like pepper and turmeric, fruits like mango, tamarind and pomelo, medicinal plants like *tinospora* and *Ecliptaalba... many were big in numbers and can be back again.*

But the big potential comes also from the people and the political brand new situation.

First, the new government of Myanmar promises to listen what people want and need, and, surpringly, it can happen!

The current government looks committed to bring revolution in africulture (from the past policies) for the good of farmers. But they lack a clear strategy and knowledge, for now.

The claims of farmers are for inputs like seeds, fertilizers, agricultural machineries, skills and trainings, and the most import thing is money, difficult to access by small scales farmers.

Myanmar is a people of activists and resistants, and has an everyday bigger civil society, especially with the new democracy.

So many organizations appeared : Peasants Unions, Organic associations, Rural NGOs, Community-based organizations...

Foreign NGOs like GRET, GIZ, Green Lotus, WeltHunger Hilfe, Swiss Aid... and some local organizations supported by LIFT (a donors' program) are trying to promote organic agriculture in some areas like Shan State or Central Myanmar.

This tendency is also touching the international donors: with the assistance of ADB and FAO, the new Ministry of agriculture (which includes also Departments like Livestock, Fisheries, Irrigation, Rural Development) is right now leading pilot projects for "sustainable climate smart agriculture practices" in the four townships of the new capital, Nay Pyi Taw, in Central Myanmar.

...and for Organic farming & other high-value strategy:

Organic market in Myanmar is very new and quite small compare to other countries like Thailand. As middle class and upper middle class people are growing, demand for organic is booming, but a very small niche.

Here are the situation and constraints :

First, labellization for organic products: for the moment, there are three civil society organizations, well recognized, who are providing organic certificate, two for locally eligible and one for internation-

ally eligible through “Control Union” label group. Two local organizations are weak and not working together, and their certification is not strong enough to guarantee for international export, even if the standards are very good in seriousness and quality. Control Union is quite strong but expensive for local and small producers, even for export. All of this need to be acknowledged and organised by a competent and active government. But the Department of Agriculture still could not brought up strong, reliable system for farmers.

Anyway, we need to explain that – as Myanmar has mostly small scales farmers – organic farming is the most suitable way to develop a sustainable and profitable agriculture for all:

- For the development of organic market, to train the farmers to change their practices into climate smart agricultural system is the must. Distribution of skills should be through farmers’ field schools which are almost non existing in Myanmar at the moment. Through these schools, farmers can be taught farming skills, post harvesting practices and promotion of value chain and value-added products and farm related products.
- Second thing is to promote PGI (Protected Geographical Indication) in Myanmar who has a number of quality and well locally-identified products, with some famous through ages, but sometimes nearly forgotten. It is, combined to organic and fair trade labels, to change the image of the country’s agriculture in the eyes of consumers, citizens, farmers as well as politicians and business leaders. It is also simply to promote the value of the export products as well as the income of small-scale farmers. In Myanmar, local equivalent PGI are already existing like Tea from Pindaya (Shan State), Paw San Hmwe Rice from Shwe Bo (middle of Myanmar), famous Myanma Thanakha from Pakkokku (from dry zone), etc. PGI process is needed for each product to become well known and internationally recognized.

By promoting organic PGI, income for the farmers and farm workers can be brought up. Of course, transportation and logistics have to improve.

- Production of quality seeds for local products is key to bring to the attention of the current government. Reaching quality seed is one of the major difficulties, because the current seed law is a burden for local and small scale seed producers.
- Through organic farming, benefits for community forests can be created by united CBOs and villages so that they can face together against disasters like drought and scarcity of water.
- Our very last project : partnership & innovation

We are recently imagining and starting a “Pilot project for organic market” in Yangon, inside a famous Heritage compound made of former colonial classified buildings, called “The Organic Place”, and composed of many activities : training school, offices for organizations and unions, research center, vegetable gardens, restaurant,shops...

All this with organic farmers groups, organic experts, small business entrepreuneurs, CSOs leaders...and backed by / City of Yangon, Region of Yangon, Department of agriculture, hotels and restaurants in town.

We want this project to be really grassroots, and bring a real empowerment for our sustainable agriculture national Movement, with development of market strategy, development of quality products, promotion in international market, consumers knowledge-sharing.

It will be on all fields: food, health, cosmetics, handicraft, textile, furnitures

Transition in agricultural innovation and development: a case study of Bt cotton system in Burkina Faso

Eveline M. F. W. Compaore Sawadogo[1]

Since the end of the 2000s, science and technology appear in academic literature and policy documents as if they have some intrinsic attributes which are capable of improving the wellbeing of populations of developing countries, regardless of the socio-technical systems of their production and use. The exploration of this view was used to draw the attention of researchers and policy-makers to the importance of conducting debates about building scientific and technological capacities in developing countries at the same time as discussion about the relationships between scientific and technological progress, and poverty. Specifically, taking biotechnology cotton production in Burkina Faso as an example of an application of a science – and technology – based intervention in one of the poorest countries in the world.

Drawing on a broader definition of technology, this paper used the Actor Network Theory (ANT) analytical concept to chart the Bt cotton innovation system. Indeed, as constructivist approach, it assumes that events or innovations are better understood in action instead of attributing them abstract attributes (Callon,1986; Law, 1992; 2009; Latour, 1996; Cressman, 2009). It is a unique approach which sheds light on complexities by connecting people, artefacts, institutions and organizations. More explicitly, the heart of this theory is the assumption that reality or form of things depends on their involvement in interweaving relationships. The actor-network is the central concept in ANT. However, ANT is thoroughly processual, meaning that there is no guarantee that an actors of the network will remain the same throughout the process of the network building and its operation. Clearly, ANT "consists of four moments which can in reality overlap. These moments constitute the different phases of a general process called translation, during which the identity of actors, the possibility of interaction, and the margins of manoeuvre are negotiated and delimited" (Callon and Blackwell, 2007: 59). ANT theorists also assume that networks of relations may contain conflicts. Indeed, these processes could be seen in the case of Bt cotton technology in Burkina Faso and the extent to which, Monsanto the researchers, cotton farmers, policy makers, activists, Bt cotton have all entered into a network of relationship through different series of translation.

Ethnographic methods, including in-depth interviews with policy makers, farmers, Monsanto representatives, civil society actors and researchers, were used to gain new insights into the difficulties encountered by these actors when trying to implement Bt cotton. 60 interviews were analyzed against a backdrop of detailed historical studies, based on examining a large amount of grey literature, published between 1961 and 2016.

This paper argues that the introduction of Bt cotton into the agriculture system in Burkina Faso, has resulted in the devaluation of traditional knowledge and indigenous science, thereby displacing the control of national actors (research, farmers, state, civil society) over the ST-System of cotton in favour of private foreign actors and their allies, who use this control and maximise their economic gain at the expense of large numbers of small farmers and the national agricultural research system, thus challenging the new knowledge-centred development paradigm's optimistic abstract view about the role of science and technology in development. This thesis demonstrates that the debate on transfer or internal development of technology in developing countries should not overshadow an understanding of the forms of political control (both domestically and internationally) that science, technology and Innovation bring with them, and their local impact. In addition, the social inequalities among actors of the system in relation to their pattern of control are investigated.

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Findings show that the adoption and implementation of the Bt cotton innovation diffusion for socio-economic development in Burkina Faso was shaped by local actors competing for control of financial resources and power positions. The first key finding from the analysis is that in addition to the technological monopoly, Bt cotton represented an intervention in a context of commercial monopoly by the local industry. Before Bt cotton, the market was under the monopoly of industry (SOFITEX), constructed during the last century, the main characteristic of which was to control farmers. SOFITEX became the intermediary of Monsanto, which does not have any direct contact with the cotton small farmers. The relationship between farmers and the industries is characterised by the industries providing them with Bt cotton seeds, now provided in collaboration with Monsanto.

With the introduction of Bt cotton, the exploitive relationship has worsened from the perspective of farmers, who now take more loans due to the high price of the Bt technology. For instance, the Bt cotton seeds are about $55 per bag compared with conventional cotton which is $10 for the same quantity. In addition it is believed by small farmers that Bt cotton requires more, not less input. This means the financial spending of the farmers has increased with Bt cotton so there are no financial returns when one considers the amount of money spent compared to the amount of money gained. In contrast, large scale farmers have some advantages and privileges due to their position. These leading farmers are able to discuss different aspects of cotton growth with industries and researchers and formed, together with them, the Inter-Professional Association (AIC-B). The issues related to cotton research, prices, chemicals and insecticides inputs, cotton seeds, farmers' training, and so on are all discussed and agreed by this association (AIC-B). These farmers have some advantages such as meetings, seminars and workshops attendance which give them prestige and extract cash. Monsanto and industries use these extra advantages, which has the effect of reducing reported complaints and encourages and promotes Bt cotton cultivation to their farmer colleagues.

However, health and time saving are also potential advantages that Bt cotton technology brought. Nevertheless, whereas work release is directly measurable, the other health issues related to Bt toxin remain uncertain, as many experiences from farmers in others countries contradict Bt cotton producers' hopes in Burkina Faso. For example, in India, South Africa and Argentina, USA many farmers noticed some health-related issues from Bt cotton growth such as skin rashes and itching. Sometimes, Bt cotton picking resulted in dizziness, the death of animals and the destruction of consumable weeds.

Apart from these Bt cotton implementation has aggravated the exploitation of farmers by industries for Monsanto's benefit. The benefits for local researchers were individual rather than national. Monsanto trained some of them in its own laboratory in USA, which has allowed it to reduce its financial spending, to control not only what it does not want to be widely known (its technology), but also to control the modalities of the experimentations to its advantage. In this case at the local level, the benefits become individual; it does not have a positive effect on the development of local institutional capacity. Moreover, to control the sources of actual and potential resistance, Monsanto excluded researchers who could oppose its strategy from the research network. These researchers were the ones which were at the starting point of the negotiation (at the Cameroon meeting in 1999) and have an appropriate understanding of the research sector and relevant research expertise. Therefore, the weak influence of farmers as well as researchers on the institutional framework has limited their ability to act as countervailing power sources and press for a more equitable implementation of the innovation.

With respect to the current definition of development, the science per se does not lead to development. As the above findings suggest, the introduction of Bt cotton in Burkina Faso resulted in an overall growth of both productivity and financial gain. However, what they expected was, rather than just improving the careers of individuals, the new technology would strengthen national agricultural research capacities in a way which would lead to more sustainable scientific and technological research. Monsanto has preferred the less costly training of just a few researchers, although this was not what was negotiated at the beginning of the innovation project. As such, developing countries required help to build their own capacities paying attention to their socio-technical context so as to make the capacities acquired sustainable and

relevant for development goals. The focus of Monsanto on a few individuals, though positive for those individuals, is not sustainable from a development perspective. What one can see from this is rather a process of expropriation of local capabilities (local knowledge and technology, researchers, institutions) for the interests of Monsanto, the industries and some allied big farmers.

The role of science technology and innovation cannot be separated from the interweaving relationships within which scientific and technological resources are produced and used. It is these patterns of relationships which explain the above described distribution of benefits. The introduction of Bt cotton into the agricultural system in Burkina Faso has resulted in the devaluation of traditional knowledge and indigenous science, with the consequence of displacing the control of national actors (research, farmers, state) over the ST-system of cotton in favour of the interests and control of a private foreign actor, which has used this control to maximise its economic gain at the expense of a large number of small poor farmers and the national agricultural research system.

Researchers critical of Monsanto have been displaced, the regulatory framework has been captured, and the market has been monopolised. It is not adequate to impute this to a single actor, because as the analysis suggests, this process of expropriation has been collectively implemented; although Monsanto generally led the initiatives, it found key actors willing to co-operate, including higher officials of the state. May be the problem of development is a vicious circle!

Finally, in early 2016, Bt cotton was abandoned by Burkina Faso. At that time, the country counted totally 7 years of commercialization and more than 10 years in Bt cotton implementation. The main reason according to Dowd-Uribe, and Schnurr, (2016), is that there is a decline concerning the length of the cotton fiber which "has undermined the reputation of Burkinabè cotton and cut into its value on the international market. When coupled with the decline in overall lint due to the lower ginning ratio, the inferior quality characteristics of the Bt cultivars have compromised the economic position of Burkinabè cotton companies." (Dowd-Uribe, and Schnurr, 2016: Online). Burkina Faso which was spearheading of transgenic cotton in West Africa has decided to return to the conventional cotton. In addition, local news also revealed that the industry is suing Monsanto ($84 million) for compensation toward lost and damage caused by its technology. However, to my point of view the technical aspect of this reversal may not be actually the fundamental reason that has led Burkina Faso to abandon because, the adoption of the Bt cotton was not actually technical; as demonstrated by Compaore (2015), there was a functional conventional cotton system and the outcome in terms of productivity and economic gain were steady before Bt cotton. It appears to me that the reason for the suspension of Bt cotton could be political instead of technical. Recent intervention of policy makers on the matter reveals that Burkina Faso hasn't abandon the Bt cotton; instead, it *suspended* its growth for the time being in order to push further the reflexion through research, said the SOFITEX director early this year in local newspapers. Thus, this current trend on cotton growth system in Burkina Faso remains very interesting and open up new research paths to investigate.

The contribution of this article has been to provide empirical evidence from the implementation of an innovation in the agricultural sector in a developing country. it demonstrated that the debate on transfer or internal development of technology in developing countries should not overshadow the forms of political control (both domestically and internationally) that science, technology and innovation bring with them.

Roots to empowerment

Toon Defoer[1]

Thousands of smallholder farmers and mid-sized entrepreneurs have strengthened capacities to negotiate in partnerships along commodity value chains resulting to increased profits and benefits.

ICRA develops networks of actors in commodity value chains and strengthens capacities of farmers, input dealers, processors, traders and intermediaries to broker grassroots-level agribusiness clusters and thereby access different market outlets.

A network of ICRA certified agribusiness trainers in west Africa, strengthens the competences of local intermediaries called coaches to broker partnerships and build trust among cluster actors and accelerate inclusive business development for targeted markets and products. Below is an example of these interventions.

The cassava partnership in Nigeria, led by the starch processing company Psaltry Int. is one of the examples ICRA's intervention spheres in the 2SCALE project. Since about 18 months after the start of the project, Psaltry has increased its cassava processing capacity from 50-70 tons per day to 150 to 200 on its two production lines.

ICRA identified four major business issues, which formed the basis of the set-up of a capacity strengthening plan, including more than 600 farmers grouped into 6 agribusiness clusters. Before ICRA's intervention, farmers, traders, transporters and others in the value chain were only concerned about their individual issues. But good business should avoid having a chaotic scene where everybody seems to be grabbing one another by the neck. Farmers complained about high transport costs because truck loading was not optimal. There was delay in payment by Psaltry to farmers and transporters. There was also the problem of access to agro-services and credit. Equally troubling was the low farm productivity.

The work of Dr Gbenga, one of ICRA's trainer-mentor based in Nigeria and the team of coaches associated to the agribusiness clusters has now begun to bear fruits. The farmers formed groups united in an apex farmer organization that led to the review of transport prices with the transport union. They were able to negotiate transport costs down by 20% and instead of paying per trip, they now pay the transporters per ton of cassava loaded. A transport committee now exists at the cluster level to ensure that the business relationship between farmers and transporters remain transparent and cordial. Psaltry has also had to improve its transparency and farmers can now read the digital weighing counter. Psaltry's payment approach has been reviewed so that now, the farmer gets a credit alert on their mobile phone through Psaltry's electronic payment system almost immediately upon delivery of the produce.

Negotiations with Nigeria's First City Monument Bank on a credit, led to a decrease in annual interest rate from 24% to 9%.

Through sessions on good agricultural practices, farmers now are adopting best practices when it comes to planting and other management issues, and yield increases are expected from 12 tons to about 25 tons per hectare. In addition, they now plant the high starch producing variety of cassava that was introduced by the International Institute of Tropical Agriculture (IITA). The high price volatility of cassava has also made the clusters put in place modalities for setting up a price monitoring and forecasting team. The team will regularly negotiate prices with Psaltry and other buyers on behalf of the producers to get to a win-win situation for all the actors.

The activities above benefited from ICRA's work in the 2SCALE project, one of the largest agribusiness incubators in Africa.

1. International Centre for Development-oriented Research in Agriculture (ICRA), Wageningen, The Netherlands.

Organic agriculture and food security in Cameroon

Gerard De La Paix Bayiha[1], Ludovic Temple[2] and Syndhia Mathé[2]

The objective of this work is to evaluate the relationship between organic farming and food security in Cameroon. To achieve this, our study focused on field surveys through semi structured interviews in the Central and Littoral regions of Cameroon, a bibliographical review of gray and scientific literature, construction of the analysis grids; Definition of the typologies of organic agriculture and their potential consequences on food security based on a prototype developed in Benin as part of the ABASS project (Diversity of biological agriculture in sub-Saharan Africa and contribution to food security); Organization of two reflection workshops in the Central and Littoral regions of Cameroon, as these are the areas where most governmental and non governmental institutions and enterprises are located. These workshops were the occasion to mobilize a typology of actors because of their important contribution to the debates in progress on the models of agricultural development and that of organic farming in order to define organic farming in the context of Cameroon, To share knowledge bases on the topic among participants and to characterize its relationships or interactions with food security. These actors were:

- the current national research institutions (institutes and universities) or international organizations favoring emergence[3] organic farming;
- State structures, non-governmental organizations, extension structures capable of putting in place regulatory mechanisms for organic farming;
- contractors either in the agri-supply sector for the AB (bio-fertilizers, seeds, biological control agent...), or that of the production (farmer) and the agro-food processing of the products. At the end of this work, we arrive on the one hand to the result of the existence of three types of organic farming in Cameroon: “certified”, “natural”, “hybrid”. On the other hand, to evaluate the potential consequences of these biological agricultures on each dimension of food security. This evaluation has shown that each typology has more or less strong intensities with food security but with a better balance with “natural” organic farming. These results lead to proposals concerning the development of the organic farming sector in Cameroon, considered as a niche of innovation through the transition model developed by Geels. This model allowed us to highlight the different trajectories that it can take. In this way, we propose in a global way to introduce an organic agricultural law which would entail, among other things, the creation of jobs, the setting of government objectives and necessary actions as well as the financial support to achieve them, Destination of the international organic markets (niche market of innovation) source of obtaining foreign exchange for Cameroon, to support interprofessional and organizations to encourage the transformation and finally the setting up of a network with the IFOAM which will participate Probably with the Network of Organic Research in Africa (NOARA) to organize a Regional Conference on Organic Agriculture in Cameroon in 2018, etc.

The widespread innovation that will make organic farming attractive to producers will bring economic benefits and will trigger a new wave of reconversions requiring more funding for research and extension.

A reflection for future research seems to be emerging around the question of assessing the impact of these organic agricultural models on food security in Cameroon through field surveys highlighting Potential indicators (dietary diversity score and index of wealth, index of hunger) due to their ease of use. Indeed, this impact calls for reflection on the evolution of certified organic farming, “natural” organic farming and “hybrid” organic farming that deserves to be supervised.

1. Université de Yaoundé, Cameroon.

2. CIRAD, UMR Innovation, F-34398 Montpellier, France.

3. A window of opportunity to capture contracts, a place of experimentation on new technical fronts, a place of experimentation of new inputs produced locally, etc.

POSTER

Capacity for change: the common framework on capacity development for agricultural innovation systems

Christian Hoste[1], Abdoulaye Saley Moussa[2], Christian Grovermann[2] and Karin Nichterlein[2]

Agricultural innovation is key to feeding a growing population with changing diets, while reducing the pressure on the earth's resources. The Tropical Agriculture Platform (TAP) has been initiated by the G20 as a multilateral dynamic facilitation mechanism to promote the development of national capacities for agricultural innovation in the tropics, where most developing countries are located. The capacity gap is especially wide in this region, while capacity development efforts are often poorly coordinated among actors and too small in scale. TAP aims to pave the way for better coherence and greater impact of capacity development interventions in support of agricultural innovation that will better meet the demands of small farmers, small and medium-sized agribusinesses and consumers.

A key component of the TAP Action Plan is the Common Framework on Capacity Development for Agricultural Innovation Systems. The Framework focuses on 1) consolidating the diversity of capacity development approaches in support of agricultural innovation processes and systems; 2) promoting a shift of mind set and attitudes using an agricultural innovation systems perspective; 3) providing concepts, principles, approaches and tools to better understand the agricultural innovation systems architecture, assess capacity development needs, and plan, implement, and evaluate capacity development interventions; and 4) clarifying the role of facilitation, learning, documentation and knowledge management for enabling innovation.

The Common Framework was developed in 2015 through a highly participatory process, incorporating inputs from a wide range of experts chosen from donors, research, extension and education institutions as well as regional and international organizations involved in the field of agricultural innovation. After being approved by TAP partners in January 2016, the Framework is now being applied in eight pilot countries (Angola, Bangladesh, Burkina Faso, Ethiopia, Guatemala, Honduras, Laos and Rwanda) through the EU-funded project on Capacity Development for Agricultural Innovation Systems (CDAIS). This project is jointly implemented by Agrinatura and FAO and uses a dual approach of strengthening capacities to innovate and enabling policies at the local and national levels through policy dialogue and a range of needs-based capacity development interventions. Also as part of the project, a knowledge sharing system, called TAPipedia, is currently being developed to widely share the TAP Framework concepts and tools.

1. Agreenium, France.
2. FAO, Roma, Italy.

Exploring capacity to innovate concepts and its assessment in Cameroon

Sophie Allebone-Webb[1], Syndhia Mathé[1,2] and Bernard Triomphe[1,3]

'Capacity to innovate' is an emerging concept, especially in agriculture and rural development. There is no universally agreed definition for this concept, but many authors agree that it refers generally to the ability of actors to continuously identify constraints and opportunities, and to mobilise capabilities and resources in response – *i.e.* to produce and sustain innovation processes in a dynamic systems environment. Increasingly, capacity to innovate (C2I) is recognised as playing a critical role in successfully responding to a changing external environment. Facilitating and building this capacity through Research and Development (R&D) interventions is therefore crucial for building farming systems' adaptiveness and for improving the resilience and livelihoods of poor farmers and other rural actors. Yet there is no generally recognised set of metrics to assess C2I, nor is it clear how local actors understand and make use of C2I on the ground.

This poster presents the first results of a study that explores various components of C2I and how local actors perceive them, and aims to develop indicators to assess them. We looked at four interventions that have aimed to improve capacity to innovate in Cameroon (Table 1) to identify which capacities were developed and how the intervention approach facilitated that change (if at all).

A review of the literature was used as a starting point for developing an assessment framework to measure changes in C2I. We identified four 'core' capacities as being to a) envisage, create and be open to new ideas; b) to connect with others to access and understand new information and resources; c) to iteratively experiment, take risks, analyse and assess; and d) to work with others to achieve change. We conducted 61 semi-structured interviews and ten focus groups with producers, transformers, facilitators and researchers to explore these core capacities and their component sub-capacities. This included asking producers about specific times when having a particular capacity was essential, assessing stakeholders' perceptions of capacity development over time (at the individual and group levels), and the relative importance of different capacities. We also aimed to identify "smart" potential indicators for measuring C2I which local actors could relate to.

Initial results show that depending on the specific intervention, producer groups involved in them have developed different aspects of C2I (Tables 2A–D), and that this has implications for how new innovations are adapted and adopted. Priority capacities as perceived by producers may often be different from those prioritised by researchers or emphasised in the literature, with producers valuing highly the capacity to form partnerships (particularly those related to marketing) while viewing capacity to experiment as a low priority, and vice versa (Table 3). This difference may be explained by the fact that interventions tend to focus on the initial stages of the innovation process (having and adapting a new idea for example), while producers tend to emphasize the later stages of the innovation trajectory, such as marketing and scaling up. Furthermore, producers emphasize skills closely related to capacities of a group to get things done,which do not limit themselves to innovation.

We are currently testing a set of 20 quantitative and qualitative C2I indicators to assess 10 capacities and sub-capacities (Table 4) and the individual and group level in the four case studies in Cameroun. This is part of an on-going project that aims to explore how intervention approach affects the degree and manner in which capacity to innovate is built and the subsequent impact for development outcomes. A better understanding of how, and under what circumstances, interventions contribute to building C2I may help practitioners to improve the ability of R&D interventions to achieve large-scale impact.

1. CIRAD, UMR Innovation, F-34398 Montpellier, France.
2. IITA, Cameroon.
3. Instituto Interamericano de Cooperación para la Agricultura (IICA), Mexico.

Agriculture innovation partnerships in Angola: successful stories

Ana Melo[1], Joaquim César[2], Luís Mira Da Silva, Ana Henriques[1], Mpanzo Domingos[2] and Susana Costa[3]

Executive Summary

Angola is one of Africa's resource-rich countries with a great potential for agriculture, nevertheless the agricultural sector has not yet fully recovered from the de-capitalization experienced during the years of civil conflit, and agricultural exports are currently negligible. Thus, development of the agricultural sector is considered by the government as a national priority. In this study, we identified successful histories of agriculture innovation systems in place in Angola, that could be used as models and, along with the implementation of CDAIS project, could contribute to create a new mindset among the actors of agriculture's value chains, which will privilege networking actions to overcome functional and technical issues to foster the agricultural sector.

Angolan agriculture context

Angola, with a total population of 24.38 million inhabitants, covers an area of about 1.25 million km2 and is located on the Atlantic coast of south-western Africa. According to the 2014 population census, 52% of the total population are women and about 38% lives in rural areas[1]. It is also worth mentioning that about 37% of the population is below the poverty line and 85% of the poor are in the rural areas and depend on agriculture. Angola is one of Africa's resource-rich countries, with a large potential for economic growth based on many mineral resources, particularly oil and diamonds, but also with a great potential for agriculture.

Before the independence, in 1975, Angola was a successful exporter of agriculture commodities, with special emphasis to coffee being the third largest world exporter in the 70s.

After the independence, most of Portuguese farmers left the country and many of the former commercial farms and plantations were converted into state farms, which were progressively abandoned.

A civil war, between 1975 and 2002, resulted in a virtual collapse of the commercial production, as large numbers of rural inhabitants either fled or reverted to subsistence agricultural production. Infrastructures heavily suffered, with widespread destruction of roads, bridges, irrigation systems and warehouses, and the presence of thousands of land mines in rural areas[2] made agriculture impossible in many places. Moreover, agricultural education, research and extension institutions were seriously affected.

Despite an investment program in place since the end of the civil war to rehabilitate the main infrastructures, contributing to improve the situation, the agricultural sector has not yet fully recovered from the de-capitalization experienced during these years, and agricultural exports are currently negligible.

The agriculture sector, corresponding to 8% of the total arable land's (57 million hectares) use, contributes approximately with 10 percent of the growth domestic product (GDP)[3]. In addition, crop yields remain very low as compared to other countries in sub-Saharan Africa. The oil sector accounts for almost 45% of the GDP, 95% of total export value and 80% of total government revenues.

Nowadays, Angola imports most of the agriculture products consumed and with the decrease of the oil barrel's price, enduring since 2014, the situation is hardly bearable. Thus, a diversification of the economy is needed and essential, being the development of the agricultural sector a major national priority.

1. Universidade de Lisboa, ISA, Lisboa, Portugal.
2. IIA, Angola.
3. FAO, Angola.

Family farming is the dominant mode in Angola. Family farmers usually produce for their own consumption but also include products for the market. Depending on the way that farmers are organized in terms of production and land tenure, different types of family farms can be identified[4] (Table I).

National development priorities for agriculture 2012-17.

The National Development Programme PND (2013-17)[5] includes programs to support the agricultural activity, namely: Program to develop the family farming; Program to develop the National food security; Programs to promote the Agribusiness; Rehabilitation of the irrigated perimeters; Support Rural investigation; Programs to finance agriculture, by promoting the private investment in agribusiness; Programs to support the rural trade.

With the implementation of those programs the Government aims particularly to increase the production of cereals, legumes, roots and tubers, chicken's, cow's, goat's and sheep's meat, milk and sugar.

Global level policy interventions are also needed in the informal sector to provide development of local markets and to institutionalize economic activities targeted at people with potential for entrepreneurship.

The role of the Capacity Development for Agriculture Innovation Systems (CDAIS) project to enhance innovation in Angolan agriculture

The CDAIS project, funded by the European Commission and jointly implemented by Agrinatura[6], FAO, and Instituto de Investigação Agrária on behalf of the Angolan government, aims at making agricultural innovation systems more efficient and sustainable in meeting the demands of farmers, agribusiness and consumers, taking into account the different dimensions of capacity development (individuals, organizations and enabling environment) as well as its functional and technical capacities.

The CDAIS project identified three integrated learning and action–oriented processes expected to deliver results at the country level:

- Development of a global Common Framework on Capacity Development for Agricultural Innovation Systems that will guide the assessment and investments in this field;
- Co-assessment and development of country-specific Capacity Development needs, visions and action plans;
- Co-design and co-implementation of demand-driven and efficient Capacity Development interventions around priority themes and value chains.

The implementation of CDAIS will contribute to create a new mindset among the actors of agriculture's value chains, which will privilege networking actions to overcome functional and technical issues, empowering the agricultural sector.

The CDAIS project may not only create further awareness of the need to deepen the existing interactions among the agricultural sector and start new ones, but also promote activities that enhance these interactions and trigger the consolidation or start the coordination exchange mechanisms and networks among the stakeholders in the agriculture's sector.

Successful stories

Kukula Ku Moxi project at BIOCOM

BIOCOM is installed at SODEPAC in Malanje province, Cacuso municipality, with an area of 42.000 ha, which produces and commercializes sugar, ethanol and electric power produced from biomass; the sugar is entirely directed to the internal market, the energy to the National Energy Company (ENE) and ethanol to the National Company of Fuels (Sonangol). The company has several social responsibility interventions in the rural community, namely the "Kukula Ku Moxi" initiative that aims the development of family agriculture and wealth generation, in 20 rural communities. This initiative is an example of direct

interaction between the private sector and small-farmers, with knowledge transfer regarding agricultural practices and management.

The project is one of the agribusiness projects supported by the government, being mainly developed by the private sector and is considered a successful innovation case.

MOSAP – Market Oriented Smallholder Agriculture Project

MOSAP is a World Bank-project, supported since 2008, and implemented over the past years in three provinces (Bié, Huambo and Malanje). MOSAP was designed to increase agricultural production through the provision of improved agricultural services and investment support to rural smallholder farmers.

MOSAP produced changes in perception, behavior and communication language from beneficiaries. These beneficiaries have also acquired independence and raise new initiatives like the practice of interaction between associations of different municipalities to share difficulties, namely at the level of product commercialization.

In addition, there was political appropriation of this project, enabling it with a favorable environment.

SKAN -sharing knowledge agrifood networks

The main objective of the SKAN platform is to share knowledge and technology in an integrated approach among the actors of the Agricultural Innovation Systems, between Europe, Africa and Latin America. Specifically and currently, it is established in Cabo Verde, Mozambique, Angola, Brasil and Portugal. This platform may have a role in the future activities of Agricultural Innovation Systems, since it can be used as a tool to promote networking among the agrifood sector (research, academia, extension services, NGOs and private sector of the agrifood row). SKAN's integrated approach focuses on strengthening the partnerships between science and industry, integration of available resources (other platforms, scientific knowledge, funding sources, etc), enabling the environment for international projects in consortium and empowering local actors to ensure projects' sustainability. With this purpose, SKAN acts with a facilitation component, enhancing the potential for knowledge and technology transfer.

National Agricultural Innovation Systems' actors and Potential innovation partnerships

The stakeholder mapping exercise carried out during the inception workshop identified the key actors/stakeholders in AIS in Angola and discussed the roles and challenges encountered when making AIS operational and effective. The maps developed by the participants identified the following actors and roles as key in AIS:

- Government (to define policies to ensure sustainable national production, investments in infrastructures and communicates with all players of AIS).
- Universities and Research (to identify problems, to disclose information for the extension services and farmers).
- Extension Services (to link the Universities/Research and the farmers).
- ONG (to organize and to communicate among all actors in the AIS).
- Cooperatives of farmers (to identify the problems, document and try to solve problems by interrelating with other actors in the AIS).
- Rural schools (to disclose the knowledge between all the players of the AIS, more farmers focused).
- Banks (to finance feasible projects, to permit the access to credit and private investors).
- Fertilizer dealers (to perform market studies, and to develop a portfolio of products adapted to the local market, to improve logistics and communication among the players of AIS).

- Insurance companies (to create insurance's products that fit Angolan's farmers, to communicate with all players and to find suitable solutions).
- Media (to disclose information of the AIS to all players).

Consolidating the contribution of Agricultural Innovation Systems' actors during the scoping study and inception workshop, 14 potential innovation partnerships were listed and shared with a working group that will narrow it to 10 for a final selection of 5 to be decided by the national steering committee.

Final remarks

The Angolan agriculture system holds a great potential to turn the agri-food sector in one of the most prominent and profitable sectors of the country economy.

Nevertheless, its environment still requires the development of general and specific innovation policies and investments to achieve the optimization of the potential resources. In addition, mindsets need to be renovated creating more collaborative and networking attitudes to allow sharing knowledge and benefits among sector stakeholders.

The agricultural sector of Angola is aware of the need for further mechanisms of national coordination for sharing ideas and common difficulties.

To respond to the need of further and effective mechanisms for coordination and exchange among the agriculture sector actors, many networks are trying to consolidate or emerge, such as the AIA – Industrial Association of Angola; CAFANG – Association of producers of coffee in Angola; APA – Angolan Association of Producers (being designed); SKAN-Angola – Sharing Knowledge Agrifood Networks.

Most challenges raised by the actors are similar and related to the environment level. These can be mainly grouped by: i) general agriculture policies and investments; ii) agricultural innovation policies and investments and iii) cultures, behaviors and attitudes.

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A Consortium of 31 European Universities and Research Institutes (http://www.agrinatura.eu) working in agricultural research, education, training and capacity strengthening for development.

POSTER

Government *vs* private sector led innovation partnerships in Ethiopia: challenges and opportunities for capacity development

Amanuel Assefa[1], Hanneke Vermeulen[2], Gizachew Lemma[1], Yirga Chilot[3] and Abdoulaye Saley Moussa[4]

The Agrinatura and FAO supported Capacity Development for Agricultural Innovation Systems (CDAIS) initiative has triggered tremendous interest in Ethiopia to learn how innovation partnerships could be best supported and managed to achieve anticipated results. In the mainstream Agricultural research and development systems in Ethiopia, innovation is mainly perceived as a new technology developed to improve agricultural production and productivity. This though has dominated the country for many years and the institutional behaviors of research and extension agencies were firmly founded on the transfer of technology model. This has had its own benefits and disadvantages too. However under the changing context in Ethiopia, where the role and participation of the private sector and non-governmental organizations is increasingly growing and farmers' organizational capacity developing to voice the needs of their members, a need for a new partnership business model for innovation is emerging. It has been witnessed that a number of value chains are developing quickly and the traditional and restricted partnership of research, extension agents and farmers could no longer address the emerging needs and complexity of the innovation systems. Farmers are taking their own initiatives to partner with processors and input suppliers. The private sector actors are also engaging with smallholder farmers in the production and marketing fronts. Agricultural innovation is therefore becoming not a function of the relationships of farmers and extension workers alone, but a joint and interactive process of learning and partnering with many actors in the value chains. This calls for an approach to facilitate innovation, which is now not understood as a technology perse, but a process of creating new values as a result of interaction of relevant actors in a specific domain (*e.g.* technological, institutional, organizational and policy). With the CDAIS project a scoping study was conducted countrywide and several innovation niches/partnerships were identified and selected to pilot the capacity development approach. The government led Agricultural Development Partners Linkage Advisory Council (ADPLAC) and the Ethiopian Milk processor industries Association initiative for a national task force to stimulate demands for dairy products are two examples in which systematic learning is taking place. The ADPLAC is structured at Federal, Regional, Zonal, and District level to facilitate learning and sharing as well as providing feedback on approaches, policies and regulatory issues. The private sector platform is on the other hand interested to counter challenge the low level of milk consumption in Ethiopia, although there is a growing trend of the industry for fresh and pasteurized milk and a remarkable increase of middle-income segment of the society. The joint platform, which includes diverse partners, is therefore working on opening up new and sustainable markets. This paper provides an in-depth analysis of the two initiatives and draws lessons on the challenges and opportunities for building innovation capacity and how to make innovation platforms more robust and functional.

1. FAO, Ethiopia.
2. ICRA, The Netherlands.
3. EIAR, Ethiopia.
4. FAO, Roma, Italy.

Session 6

Private standards in agri-chains: evaluating their outcomes and assessing their impact

The role of certification on hired labour in banana plantations – cross country analysis of economic, social and empowerment benefits

Fedes Van Rijn[1], Ricardo Fort[2] and Ruerd Ruben[1]

Background

In the last three decades NGOs, traders, consumers and retailers have become increasingly involved in initiatives to improve social and environmental conditions under which tropical products are produced with certification as an important tool. While the evidence on the impact of certification among smallholder continues to grow, there is very little rigorous evidence on the effects of certification on wageworkers at plantations. While a few recent papers try to address the potential contribution of certification as a tool for improving wage workers' welfare (*e.g.* Rayolds 2014; Makita 2012), we only know two research projects that aim to address the net effects of certification at plantation level (Ostertag 2014; Cameron *et al.* 2014) covering the cocoa, coffee, flower and tea export sectors in Ecuador, Ghana, Ethiopia, Uganda and India. However, these few studies are far from conclusive on the role of certification in these supply chains.

Meanwhile the need for evidence increases given the significant, and increasing, share of households in developing countries being involved on a plantation as a wageworker. There seems more evidence on the (potential) role of labour certification in global manufacturing. Based on various studies (Barrientos and Smith 2007; Locke *et al.* 2009; O'Rourke 2006; Seidman 2008), Raynolds' (2014) describes a recurring finding that day to day context of workers is strongly shaped by (inter)national laws and (written or unwritten) norms of conduct– both are difficult/challenging to audit and to influence. In other words: the potential of certification as an instrument to sustainable and improved well-being among wageworkers at plantations is not at all clear.

One of the actors active in this field is Fairtrade. Fairtrade's vision is a world in which all producers can enjoy secure and sustainable livelihoods, fulfil their potential and decide on their future. They aim to do this through various interventions, such as setting standards for hired labour organisations. Workers on farms and in factories are among the most vulnerable people in global trade. Fairtrade works to improve the lives of workers by requiring that their employers comply with Fairtrade's hired labour standards which was developed to make sure workers receive a fairer share of the economic benefits of trade.

Based on a recent research project conducted in the hired labour banana sector in 2015 for Fairtrade International and the Fairtrade Foundation, this paper analyses the contribution of certification in the banana hired labour sector by focusing on economic, social and empowerment benefits in a cross country analysis. Bananas is one of the most highly traded fruits in the world and a product that makes up a significant percentage of the export revenues of many Latin American and Caribbean countries. It is also a significant product within the Fairtrade system – both in terms of market demand and producer coverage. In the last decade Major supermarket chains have become important players in the global banana trade due to the increasing concentration of market power in the retail markets of the main banana consuming countries and because large retailers are increasingly purchasing directly from growers or smaller wholesalers.

The study focuses on two countries in Latin America that are very important in terms of FT certified banana production: Dominican Republic and Colombia. The differences in terms of institutional settings, work regulations and labour unions, make the analysis of FT effects more challenging but also more interesting.

1. Wageningen University and Research, Netherlands.
2. GRADE, Peru.

Methodology

This study compares the situation of wageworkers from Fairtrade-certified plantations to the situation of wageworkers from similar but non-Fairtrade certified plantations. The main body of evidence is survey-based, accompanied with in-depth interviews and structured plantation observations. Given the large difference in the number, size and type of plantations, the applied sampling strategy differed by country. Factors that were taken into account in selecting plantations included, but were not limited to, plantation size, location, length of certification, supply chain and compliance with other certification standards.

A total of 20 plantations were included in this study: twelve out of the twenty plantations are Fairtrade certified and eight are non-Fairtrade certified. The four plantations left are very recently certified Fairtrade plantations. In total 410 wageworkers were randomly selected to participate in the worker survey. Dominican Republic 11 plantations were included of which five Fairtrade certified plantations, one Fairtrade applicant and five non-Fairtrade certified plantations. In total 369 wageworkers were randomly selected to participate in the worker survey.

In analysing the contribution of Fairtrade certification on hired labourers in the banana sector, the study focuses on three key areas of benefits: economic, social benefits and empowerment-related. While the first two issues are often prevalent in impact evaluation research of certification, the latter is not commonly addressed and we believe it is important from a plantation level perspective. To truly change codes of conduct at that level on the long term, bottom up changes may be needed, rather than top-down reform (see *e.g.* Raynolds 2015)

Each theme covers various sub-themes, and each sub-theme includes various 'topics of analyses', in line with Fairtrade's theory of change. While translating the topics of analysis into specific questions for the structured worker survey, we built as much as possible on existing indicators, definitions and instruments (ILO, PPI by Schreiner (2014), HFIAS by FAO; Anker and Anker, 2013; Fort and Ruben, 2008; Ostertag *et al.*, 2014; Smith, 2010; Nelson and Martin, 2013; Lyall, 2014). For some indicators we have added recall, self-assessment and attribution questions.

Differences and/or changes might be the result of factors other than Fairtrade certification including differences in observable characteristics such as education, age or gender. These factors are controlled for using a mix of statistical models including regression models and propensity score matching. Non observed were accounted for as much as possible in our methodological design.

Results

Dominican Republic

The contribution of Fairtrade in terms of economic benefits seems high in Dominican Republic. First, results indicate there is no observed difference in wages between Fairtrade certified and non-Fairtrade certified plantations. Second, Fairtrade certification has a clear positive influence on in-kind benefits in terms of adult education, transport, health care and schooling for children traceable to the Fairtrade premium. Third, there are signs of a positive impact of Fairtrade certification on a plantation workers sense of job security with workers on non-Fairtrade certified plantations reporting much lower levels of job security. Fourth, wageworkers from Fairtrade certified plantations are more food secure and have more savings.

Contribution of Fairtrade to labour conditions are unclear, but high on social dialogue. First, the (potential) impact of Fairtrade on working conditions in terms of worker rights and health and safety measures is still uncertain. This is in large part due to the difficulties associated with collecting reliable data on the actual worker rights that plantation workers receive or have access to. Second, while the awareness of grievance and sexual harassment policies is still low, it is higher among workers on Fairtrade plantations. This result is considered to be a direct result of Fairtrade policy in this area and is supported by anecdotal

evidence. Third, workers on Fairtrade certified plantations appear to be more easily able to present their concerns to their supervisors and plantation management than workers on non-Fairtrade certified plantations and also have the feeling that their concerns are listened to.

Fairtrade seems to have a large potential to empower wageworkers. First, Fairtrade workers are found to score higher on a number of empowerment-related indicators including living wages (through in-kind benefits) and the amount of training received. Second, the higher percentage of workers represented by a workers' union is also linked to the requirements of Fairtrade. Anecdotal evidence also indicates workers they feel better able to communicate with plantation management due to the existence of the various workers committees; feel more competent due to the technical training that they receive and are more positive about the effects of joining a worker.

Colombia

Fairtrade seems to have a high contribution in terms of economic benefits as a result of the Fairtrade premium. First, results indicate there is no difference in the primary wages received by workers on Fairtrade certified and non-Fairtrade certified plantations. This is not unexpected in the Colombian context given that union representatives are responsible for negotiating wages with individual plantations on behalf of all workers in the region. Second, Fairtrade certification has a clear positive influence on in-kind benefits through the premium use especially in terms of housing and education for young people and adults. Third, while there are signs of a positive impact of Fairtrade certification on a worker's sense of job security – workers Fairtrade certified plantation report a lower level of job security. Exactly why this is the case is an interesting topic for future research. Fourth, despite the higher in-kind benefits in terms of housing and adult education, the role of Fairtrade certification in improving a worker's standard of living is not evident. This despite the fact that workers have been employed by Fairtrade certified plantations for 12 years on average and most plantations have been certified for more than two years. A second wave of data is needed to confirm these results and explore their implications in more detail. Contribution of Fairtrade in terms of social benefits is inconclusive. First, survey evidence indicates that the (potential) impact of Fairtrade certification in terms of social benefit is limited as banana plantations are already required to comply with many of the working conditions required by Fairtrade and/or Rainforest Alliance certification, either by law or through collective bargaining agreements. Second, the (potential) impact of Fairtrade certification on Occupational Health & Safety remains unclear. Third, while awareness of grievance and sexual harassment policies is generally good across all Colombian banana plantations, it is even higher on Fairtrade certified plantations.

Fairtrade may have large potential to empower wageworkers The vast majority of surveyed workers were satisfied with their personal situation and progress at work and they credit Fairtrade with playing an important role in that. The higher in-kind benefits and specialised training in particular appear to be the mechanisms through which workers feel more empowered. One important point to mention is that a number of banana plantations in the sample have been Rainforest Alliance certified since 1998 with two in the comparison group obtaining Rainforest Alliance certification in 1996. It is important to be aware that this may exert downward pressure on the estimates of the (potential) impact of Fairtrade certification.

Conclusion

This study addresses the need to gain more insight into effective strategies to increase the sustainability of products originating from developing countries in a wageworker context. This study indicates that Fairtrade certification has a potential contribution to improving the situation of wageworkers in such chains. However, the effects depend not only on the type of benefit but also on the institutional context. Bottom-up empowerment may be a necessity to change norms of conduct and guarantee a true impact on labour conditions on the long term. Benefits of (Fairtrade) certification, but also other interventions with a similar purpose, might therefore not be discerned in terms of primary benefits such as wages or

basic labour conditions that are under direct control of (inter)national law, but they should be identified in terms of secondary benefits (*e.g.* access to and satisfaction to sanitation, healthcare etc.) especially in terms of improved norms of conduct for wageworker empowerment (*i.e.* tertiary effects or benefits). The focus of Fairtrade on empowerment is clear in its the revised labour strategy. The study also illustrated the importance of context: formal institutions (national and international laws – formal institutions) differ by country as do norms of conduct (informal institutions). An instrument such as certification might have more scope for impact in an environment with weak formal institutions and/or perverse norms of conduct, but also less chance to succeed on the long term because it is not aligned with existing culture (which seems to be the argument in the literature I referred to before)). Both topics require further in-depth research.

Fair deal or ordeal? Enquiry into the sustainability of commercial banana production in the Lao PDR[1]

Vongpaphane Manivong[2], Sengphachanh Sonethavixay[1],
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Introduction

Since the launching of the New Economic Mechanism in the late 1980s, the government of the Lao PDR has been promoting commercial agriculture through the promotion of contract farming and foreign direct investment (FDI). Lao agriculture sector has relatively small and inexperienced agribusiness enterprises. With large areas of fallow land, and a lowly productive agriculture still dominated by smallholder subsistence farming, the Lao PDR has also been targeted by agribusiness investors from neighboring countries (*e.g.*, Vietnam, Thailand, China) seeking free agriculture land. The very rapid expansion of commercial banana production since 2005 takes place within this context. In 2014, banana production covered a total area of 22,920 ha, while banana exports reached 260,000 tons representing a total value of 45 million US$. 88% of the bananas exported were sent to China, while the remaining 12% were exported to Thailand. However, Lao bananas were not identifiable on global and regional markets as most banana exports were informal (they came with no certificate of origin or phytosanitary certification). While several local varieties of bananas (*kluay nam*) are cultivated using traditional farming methods and consumed within the country, Cavendish bananas are mainly grown using non-traditional farming techniques (*i.e.*, on larger surfaces, using chemical inputs and wage work), and mainly commercialized abroad.

The main objective of this research is to better understand the drivers, pathways and impacts of change (at the level of both rural communities and production basins) of the expansion of commercial banana production in Northern Laos. Our main hypothesis is that a better understanding of the social and economic forces at work behind the current expansion of banana production is crucial to help both local communities and government agencies develop alternative pathways for sustainable development. Such alternatives may take the form of more sustainable banana production systems or the identification of more suitable (in economic and environmental terms) crops. From a government perspective, this research could help fine-tune policy options to ensure that commercial banana production benefits all stakeholders (*i.e.* from the investors to the workers).

Rationale and implications

In the absence of any systematic information on commercial banana production in small, medium and large plantations in the Lao PDR, it is necessary to describe carefully the different production arrangements (*e.g.*, land concession, land leasing, contract farming) developed in the context of global, regional, and domestic markets for bananas and processed banana products. It is also important to evaluate the social, economic and environmental impacts of commercial banana production and to develop practical measures to mitigate those impacts. Indeed, despite immediate economic gains, some of the business models developed for commercial banana production might be more harmful than beneficial to rural communities, as well as detrimental to local land-based resources.

Moreover, it is essential to clarify the roles and responsibilities of the various stakeholders involved: 1/ at the government level, a proper regulatory framework and adapted procedures are necessary to improve the management of foreign investment. Namely, there is a need for improved standards/criteria to help

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select FDIs in the agricultural sector, keeping in mind the need to establish fruitful partnerships between the government and responsible investors. Such standards should not consider only the financial return on investment, but also the expected social and environmental impacts on local communities; 2/ at the investors' level, practical and cost-effective production and field management measures are needed to mitigate the socioeconomic, environmental, and agro-ecological impacts of commercial banana production. Practical and financially feasible mitigation measures are also needed to compensate for negative socio-economic, environmental, and agro-ecological impacts of commercial banana production on agriculture land concessions and land leased from smallholder farmers.

Materials and methods

A mixed method approach was used for data collection and analysis. Field observations were made by the researchers during the visits of various types of banana plantations in five provinces of the Lao PDR (Luang Namtha, Oudomxay, Phongsali, Salavane and Bolikhamxay). Qualitative surveys (semi-structured and groups interviews) were also carried out with key stakeholders (government officers at the provincial and district levels, plantation owners, smallholder farmers, etc.) to understand the perceptions, practices, and future plans for banana production. Finally, a quantitative survey was carried out with: farmers who leased their land to banana plantations, independent banana farmers and workers employed on banana plantations. This survey aimed to assess the economic returns to banana production and farmers'/workers' knowledge and perception of issues related to the use of chemicals on the plantation.

Main results and findings

The recent development of banana production in the Lao PDR can be explained by pull factors in the Lao PDR (*e.g.*, appropriate conditions of production such as good weather and fertile soil, the low price of land and low labor costs); and push factors in China (*e.g.*, strict measures in favor of clean production, higher production costs, pests and diseases, decline in soil fertility in banana production areas). These conditions brought investors to look for new production areas to reduce production risks and to increase their profits.

The Lao PDR offers unscrupulous investors a favorable environment for banana production that combines poor law enforcement, porous borders and vulnerable workers at the mercy of unscrupulous employers. Namely, the survey reveals a very heavy use of chemical substances in commercial banana plantations. Herbicides, fertilizers, nutrients, insecticides, and additives were used throughout the production process (around 40 times/production cycle). Between 105 and 140 different chemical substances were applied, sometimes mixed and sprayed together, thereby increasing their degree of harm. Farmers knew little about how those substances should be handled and used. Very few were able to read the labels on the containers, as they were often written in Chinese. Farmers rarely followed appropriate practices regarding the use of protective equipment when spraying, or safe spraying methods. Finally, there was no proper management of chemical containers after usage.

We also compare the economic returns associated with different business models and show that benefits from short-term land lease fees were higher than those of long-term concessions. Although land concessions provided lower benefits, they were easier to regulate, manage and control. On the other hand, banana production also meant lost opportunities in land use for other crops and increased the price of other crops, especially rice. Banana production required heavy investments in infrastructure (road, water system) and an intensive use of inputs (fertilizers, water), which pushed up production costs. Companies invested in infrastructure (*e.g.*, road access, electricity, health centers) and sometimes contributed to social activities at the village/district level (*e.g.* to support meeting, social events, etc.).

Finally, a survey of those employed on the banana plantations revealed that these workers were from very poor and vulnerable communities (ethnic minorities). In terms of health, 8% of the banana farmers/families in the North reported having been sick over the past six months. On average, banana workers

had been sick four times over the past six months (four days each time) but could continue to work normally. At the household level, increased expenditures for health care and the environment ſthe value of which is difficult to assess may outweigh the benefits of being employed in a plantation (*e.g.* employment opportunities, incomes). Finally, as those employed on the banana plantations belonged to poor communities living in vulnerable areas, they were especially at risk due to their low level of education and poor knowledge regarding the safe use of chemicals. Finally, children were also at risk as they would rather stay with their parents on the plantation than go to school, which posed further threats to their health.

Conclusion

Despite benefits in terms of income generation, employment opportunities or fiscal revenues, the impact of banana plantations on the environment and the health (of plantation workers and consumers) due to the intensive use of chemicals is potentially very high. In the Lao PDR, laws and regulations existed but were not enforced, especially the processes for approving investment in banana production, and for monitoring and evaluating banana production. There was no systematic coordination between the various agencies in charge of overseeing such investment at the central (ministry) and local (provincial and district authorities) levels. This study concludes by proposing concrete measures to better monitor foreign investment in the banana sector.

Evaluation of the FSC forest certification scheme in Brazil: a three level approach

Stéphane Guéneau[1,2] and Marcelo Carneiro[2]

Introduction

The Forest Stewardship Council (FSC), an international non-governmental organization, was created in 1993 in response to concerns over global deforestation. It is considered to be a pioneer of Voluntary Sustainability Standards and its forest certification scheme is one of the most important schemes implemented in the tropics. FSC emerged to counter the lack of legally binding international instruments on forests and the shortcomings of public forest policies (Humphreys, 2006) and as such has been recognized as a private forest regime (Espach, 2009; Pattberg, 2005). It can also be viewed as a component of an international environmental regime (Tikina and Innes, 2008).

The lack of evidence on the overall impact of FSC certification has led to intense debates among scientists and between different stakeholders involved in public action on tropical forests. Some government agencies and NGOs believe that FSC has a positive impact on conservation (Burger *et al.*, 2005; WWF, 2010). But others, including some NGOs involved in the creation of FSC, are much more circumspect or critical about the social and environmental performance of this scheme (Counsell and Loraas, 2002; Sahlin, 2013). Therefore, some civil society organizations, foundations, private companies and government agencies have begun to wonder if their investments in supporting FSC activities are worthwhile (Cashore and Vanderbergh, 2010). In view of these debates, it seems important and relevant to assess FSC's true impact.

After a critical analysis of the methods undertaken so far to evaluate the FSC impacts, the paper lays the foundation of the three levels framework we propose for evaluating FSC's effectiveness framework, and shows some results of its application in the Brazilian context.

Methodology

The methodology we used rely on our participant observations as members of the FSC entities and consultancies. We have also conducted a field research in a natural forest area in the Pará State in Brasil (Santarem region). The fieldwork was supplemented by a series of semistructured interviews with key players involved, at the Federal and local level, in the development and implementation of forest policies and certification in Brazil. Finally, the methodology was complemented by an extensive literature review of the evaluation of the forest certification schemes.

Assessing the effectiveness of forest certification schemes: a critical review

Recent studies have taken stock of what we know and what we don't know about the assessment of forest certifications (Cashore and Auld, 2012; Romero and Castrén 2013; van Kuijk *et al.*, 2009). These surveys reveal the difficulties in assessing the overall environmental impact of FSC or, in other words, the extent to which FSC contributes to alleviating the problems it addresses (Gulbrandsen, 2010; Visser-en-Hamakers and Pattberg, 2013).

At the micro-scale, many of the existing evaluation studies have chosen to assess the effectiveness of certification schemes using a counterfactual. This remains a huge challenge because the evaluation must be based on a credible counterfactual, a configuration that is rarely observed in reality (Blackman and Rivera, 2010). For this reason, a lot of research are not based on indicators of impacts, a dimension that weakens the findings of evaluations. Despite these difficulties, the studies that have applied this meth-

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odology generally show that environmental management is more effective in certified forests than in non-certified ones. For instance, in Brazil, a study was conducted in a community forests in Acre State through a survey of local perceptions regarding a series of parameters such as the signs of forest degradation (deforestation, forest fires, game hunting, etc.) and the local people's environmental awareness (waste storage, knowledge of regulatory measures, etc.). The study reveals that 87% of the certified communities' members said they implement wildlife protection measures – such as not hunting with dogs, catching game only for their local consumption, respecting a hunting calendar, and preserving trees that provide food for wild animals –, whereas only 44% of the non-certified control group members said they took such measures. (de Lima *et al.*, 2008).

Approaches comparing situations before and after obtaining certification clearly reveal the improvements resulting from certification. This methodology is generally based on the analysis of the corrective action requests (CARs) issued by third-party certifying bodies. (Blackman *et al.*, 2014; Cubbage *et al.*, 2010). However, these assessments do not prove that the FSC standards actually refer to a "solving problems" goal. They only indicate that the operator complies with a certain standard of certification, which itself only reflects a compromise between different and sometimes incompatible interests (van Kuijk *et al.*, 2009). Moreover, several authors stress the fact that standards are vague and subject to interpretation, which results in the implementation of insufficiently stringent heterogeneous management measures (Elbakidze *et al.*, 2011; Schulze *et al.*, 2008).

The first level: defining a focal point

For the evaluation to be truly relevant, it must measure the gap between the present state of affairs and the situation that should be achieved in order to solve the environmental problem that justified the creation of the scheme. We have applied a strategic environmental management analysis approach (Mermet *et al.*, 2010) in order to "transcode" various information (scientific papers, societal demands, international commitments, etc.) into a benchmark that includes four major management objectives (Guéneau, 2011): avoiding large-scale conversion of natural forests, conserving key natural forest habitats, restoring the forest ecosystem and maintaining the ecosystem functions of production forests.

We have analyzed whether the FSC-Brazil standards are consistent or inconsistent with this benchmark. Our results show that the Brazilian standards for Amazonian forests include additional criteria that are intended to fill gaps in the Brazilian legal framework as it applies to the Amazon, especially with regard to illegal logging and the status of forest communities. However, the full implementation of these standards remains contested, as many socio-environmental conflict have been observed. The Brazilian standard for plantation forests reflect a more business-oriented vision as it has evolved in a direction that allows companies to convert some natural areas into plantations, although it is limited.

The second level: assessing indirect impacts at the landscape level

To demonstrate the effectiveness of certification schemes, it will be necessary to assess to what extent the strengthening of environmental management measures in the certified forest unit may lead to the shifting of harmful activities to adjacent areas. At the landscape level, it is also relevant to assess whether the certified company deals with the impacts caused by log transportation from the concession to the industry. In the Pará State, several conflicts between traditional communities and logging companies have been notified regarding the wood trucks impacts in the villages or in the areas of traditional activities. Finally, the evaluation at the landscape level has to deal with the social transformations induced by the logging activities. For instance, the new forest roads can bring in new farmers to forest areas that were hitherto relatively undisturbed.

Some FSC-certified companies in Amazonia have to face several challenges regarding the legalization of land tenure and land procurement by new migrants. In the case of Brazilian certified forest plantation, the risk of social and environmental impacts caused by a large quantity of workers from various Brazilian states can't be neglected.

The third stage: policy implications

Forest certification can have policy and institutional implications for other processes that may help solve the problem or, on the contrary, worsen it, irrespective of the effects observed in the field, on the forest certified unit and on its immediate environment (Auld *et al.*, 2008). One of the key points that any assessment must be able to determine is to what extent FSC certification acts as a vector of social transformation, or on the contrary, whether it is a "green marketing" instrument in line with the neoliberal governmentality principle.

Although some FSC supporters have used their positions in the Federal government to implement forest policy reforms in Brazil, the FSC has not succeeded in transforming the forest sector and promoting the emergence of forest management alternatives. The number of forest communities that have obtained a forest management certification is dramatically low, and these communities have many difficulties to comply with FSC standards.

Conclusion

A lot of studies conducted at the micro-level showed the positive effects of certification, including in Brazil (Basso *et al.*, 2011; de Lima *et al.*, 2009). The application of the three level framework evaluation of the FSC in Brazil reveals that the technocratic and optimistic vision of the FSC improvements on the ground, that rely on the stringency and the rigorous implementation of standards at the management unit scale, can be counterbalanced by negative environmental, social and policy effects on a wider scale. These findings suggest rethinking the research on the impacts of forest certification that focus primarily on the end of the policy cycle, by integrating the analysis of the construction of the standards in any evaluation methodologies.

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Smallholders and the inclusion debates in certification schemes: perspectives from palm oil certification in Thailand and Malaysia.

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Introduction

Nowadays, voluntary sustainability standards that aim to implement "good environmental and social practices" in agri-supply chains are no longer regarded as a marginal phenomenon but as a significant component in the governance of global values chains. For a growing number of academics, these standards are considered as the main institutional innovations of recent years. [Bartley, 2007; Cashore, 2002; Pattberg, 2007].

Indeed, long confined to the realm of the responsibility of public authorities or professional bodies, the definition of "good practice" is now increasingly based on partnership between private operators, namely stakeholders within the supply chain (farmers, processors, traders) and beyond the supply chain (NGOs, bankers or investors...).

The development of voluntary standards has contributed to frame a rising market of sustainability management, bringing up new managerial skills and economic players (consultants firms, social and environmental auditors, certification firms, etc.). In some cases, it has also accelerated the transformation of NGOs or social enterprises from non-profit advocacy actions to market oriented services delivery entity [Roberts & al., 2005].

This paper addresses one component of this sustainability market by focusing on the technical assistance to support the certification process of independent palm oil smallholders in Thailand and Malaysia.

Driven by growing demand, the expansion of palm oil has generated positive economic benefits in producing countries while causing at the same time negative environmental and social impacts.

Voluntary standards-setting and certification initiatives emerged to address these sustainability issues, the first and most widespread initiative being the Roundtable on Sustainable Palm Oil (RSPO).

Operational since 2004, RSPO certified oil palm represents today 17% of the global palm oil [RSPO Website, accessed August 2016].

Until now RSPO certification has almost exclusively targeted large scale production units. But smallholders' certification is becoming a priority.

Three million of farmers worldwide fall into the category of smallholders as defined by RSPO (family farming area less than 50ha). They produce 40% of the World palm oil.

Environmental and social impacts of farming are among the key issues of this renewed interest for smallholders alongside with the assumption that better farming practices will increase yields and income. But smallholder certification has also a legitimizing dimension for RSPO as it aims to promote an inclusive value chain.

Based on surveys assessing pilot smallholders RSPO certification projects in Malaysia and in Thailand, this paper aims at analyzing the political dimension of technical assistance provided to farmers. Our

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focus is on the underlying political rationalities of the projects, the operation of the technical assistance conceived as technologies governing economic and social space, and finally, the local reception of the projects by farmers.

Methodology

Four RSPO smallholders' certification schemed have been analyzed.

In Thailand two schemes previously initiated and supported by the German cooperation (GIZ) located in the southern provinces of Krabi and Surat Thani. 80 semi-structured interviews were carried out (40 in each province) with certified farmers. These interviews were complemented by 26 others with technical assistance staff to certified farmers, and public extension services officers, millers, ramp owners and government officers.

In Malaysia we analyzed two certification pilots projects located in Sarawak and Sabah states of East Malaysia.

In Sarawak, 76 semi-structured interviews were conducted with farmers, "longhouse" head of families, extension officers, millers and consultants assisting farmers.

In Sabah, 100 semi-structured interviews have been carried out with the same stakeholders.

Before and during the field surveys, we reviewed the literature produced by or on the various projects.

Results

Independent smallholders' certification projects are contributing to the privatization of agricultural extension services.

In Thailand, the smallholder certification pilot program supported by the GIZ, was designed to achieve compliance of the certified palm oil with the sustainability criteria applicable to biofuel sector in Europe.

The Malaysian pilots' projects were initiated by mills owned by large companies (Wilmar and PPB Palm Oil Berhad).

However, the implementation of private technical assistance is carried out in different institutional contexts.

In Thailand, although government agricultural extension services are operating, they provide little support to farmers on the ground. Certification pathways are demanding for the implementation of "the best management practices" prescribed by the standard, and require technical and managerial skills among others. Many smallholders are newcomers in the oil palm farming that has followed government incentives to agricultural conversion. For these farmers, access to competent and available technical assistance, remains the main motivation for their involvement in the certification program.

Compare to Thailand, palm oil farming extension services are far more organized and provided by public bodies, but these bodies do not support on the ground the implementation of the RSPO. This is how independent smallholder certification programs have opened a market for specialized private operators

Our surveys show also the vision of farmers organization conveyed by certification.

Compliance to the standard is challenging for independent smallholders as they have to create group certification to be eligible. But group certification refers in that case to a market-oriented conceptualization of farmers' empowerment, focusing on economic functions to minimize certification cost and improve internal control. Not only is this approach to farmers' organization not based on existing solidarity but it may endanger the rise of new solidarities.

However, although key discursive elements of neoliberal governance and attempts to forge behaviors for the market are at the heart of smallholders' certification technical assistance project, our survey highlights also how such a project are redefine by smallholders.

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Fair trade for all on smallholder farmers and farmworkers

Martha Lilia Del Rio Duque[1,2,3]

Introduction

In 2011, Fair trade USA has parted ways from Fairtrade International, which had organized Fairtrade (FT) into a single global system up until that moment (Raynolds 2012b). This decision rooted on the desire to integrate coffee estates and independent smallholders in the FT system, through an extension of the original certification scheme, known as Fairtrade for all (FT4ALL). The aim is to serve also farm workers who do not own land and independent famers who are not organized into cooperatives or associations. The standard is based on four principles which aim to increase (1) empowerment and (2) economic development and to ensure (3) social responsibility and (4) environmental stewardship (Fair Trade Certified, 2015).

Fair Trade USA's model works to bring the benefits of Fair Trade to workers, farmers and communities across the world, allowing them to participate in international markets in ways that are fair and equitable today as well as to help them to progress and acquire greater business capacity over time. These principles are in line with the Sustainable Development Goals (SDG) of ending poverty and hunger, protecting human rights and empowering women that the United Nations aim to reach by 2030.

As a response, several intervention programs in the agricultural sector are focusing not only on improving the level of productivity, but also on finding tools to reduce extreme poverty. In such a context, food standards represent a good example of how SDG could be attained. Several strategies could be adopted to pave the way for the reduction of poverty and for a sustainable development. Among all, it is essential to provide facilitation of access to basic services and to the labour market and to prepare the ground for the improvement of income and well-being (Andrade, 2010).

Relation between food standards and the improvement of workers and smallholder producers' livelihood.

The use of food standards and certification schemes as a mean to overcome poverty had strong influence on the rural policies of several countries. For this reason, nowadays there is a growing interest in understanding the effectiveness of certification schemes, which promote increasing welfare for certified producers and higher level of environmental sustainability. In rich and emerging economics, consumers are willing to pay higher prices for coffee, cacao and other agricultural products which own a certification which guarantees the sustainability of the production process, as they see it as a way to contribute to the improvement of producers and workers' livelihood (Chiputwa, *et al.*, 2015).

However, the impact of food standards and certification schemes on the welfare of rural workers has been widely discussed and is still subject of an ongoing debate. Indeed, the effects of certifications are not generalizable and could be either positive or negative (Hansen & Trifkovíc, 2014). For example, Méndez *et al.* (2010) provide an explanation of why the positive impact of these certification schemes might be limited. In their opinion, while the higher prices supplied by the certifications leads to an increase of the gross income received by farmworkers and producers, the quantity of coffee sold under the certification is low. Therefore, only part of the coffee produced is sold at the price of the certification, limiting the beneficial effects that it might have on farmers' welfare. Moreover, Reardon *et al.* (2009)

1. Stefania Sellitti, Italy.
2. Carolina Gonzalez, Colombia.
3. Marc Lundy , USA.

brought into light the problem of the high costs that producers have to bear, in order to comply with certain requirements and security standards to obtain the certification. As a result, the poorest producers might not be able to satisfy the prerequisites of quality, consistency, volume of coffee, etc. and risk selling in less profitable markets and become further marginalized.

Methodology

In this paper, we analysed the economic and social situation of independent smallholder farmers in Honduras and of workers of estates in Nicaragua and Brazil. In particular, we explored the production of coffee, as it represents one the most important crop in each of the three countries both in terms of level of exports and of number of people employed in the sector. In fact, coffee is the fourth most exported product in Nicaragua, the first in Honduras and the seventh in Brazil (United Nations, 2015). Moreover, the proportion of people employed in coffee production is between 20% and 40% of total rural labour force in Nicaragua (Vakis, Kruger, & Mason, 2004) and 5,8% in Brazil. In the case of Honduras 1 out of 10 workers is employed in the coffee sector (World Bank Group, 2015).

Our main question is how coffee certification schemes can be used as an instrument to contribute to the accomplishment of two of the sustainable development goals: *No Poverty and Zero hunger.* To address our study we conducted surveys in each country, 550 in Nicaragua, 625 in Brasil and 506 in Honduras. In particular, we intervieved 199 households working in certified estates in Nicaragua and 351 households working in not certified estates. In Brasil we conducted 425 surveys in certified farms and 200 in not certified farms. Finally, in Honduras we interviewed 111 households in certified farms and 395 in not certified.

To find an answer, we conducted a cluster analysis to evaluate the different situation of smallholder farmers and farm workers with and without Fairtrade certification. The cluster analysis aims to provide objective and stable classifications. Objective in the sense that the analysis of the same data using the same sequence of numerical methods produces the same classification; stable means that the classification remains the same under a wide variety of additions of new characteristics describing them (Everitt, *et al.*, 2011). To grasp poverty impact, we included in our study economic variables, such as income generated through activities related to coffee, other income coming from other agricultural activities and income generated through activities not related to agriculture. Besides, we analysed the probability of being under the poverty line, by using an indicator created by the Grameen Foundation, the *Progress out of Poverty Index (PPI).*

Furthermore, we used the *Latin American and Caribbean Food Security Scale* (Escala Latinoamericana y Cariben˜a de Seguridad Alimentaria, ELCSA), which is an indicator used to diagnose and monitor hunger and food insecurity inside the region. This instrument is one of the qualitative methods used nowadays to detect hunger and built on the basis of households' experience of food insecurity (Ballard, Kepple, & Cafiero, 2013 and FAO, 2012). In this work, we will focus on the effects of FT certification on the workers of estates in Nicaragua and Brazil and on smallholder farmers in Honduras.

Expected results and policy implications

With our work, we give a relevant contribution to the existing literature about FT, by studying for the first time FT4ALL. In particular, we expect to discover if a relation between poverty level, food security and FT4ALL occurs. Through the analysis of groups with similar characteristics, we want to explore whether FT certified workers and producers perform better in the PPI and ELCSA indicators, compared to those who were not certified in the past three years.

From the data we collected, it results that in Nicaragua the percentage of people living below the poverty line is on average 49% in the certified farm, 52% in the farm with any certification and 49% in the farms with certifications different from FT. As for the ELSCA indicator, on average 16% of the worker in certified farms experience food security, while values in farms without certification of with other certifications are respectively equal to 11% and 25%

The situation appears to be better for Brazilian workers. The probability of being under the poverty line is on average 18.2% for workers in the certified estates with full investment of the FT premium, 15.1% in the certified estates with less investment of the premium and 20.4% in estates without certifications. On average 77.5% of workers both in the certified and not certified farms experience food security, while this values is lower for farms with less investment of the FT premium and equal to 69.1%.

Finally, in Honduras the average probability of being under the poverty line is 55.4% in certified farms and 62.8% in not certified farms, while the ELSCA indicator reveals that on average 46.9% of people in certified farms have food security, while this percentage drops to 23.6% in farms without certification.

Promoting sustainable livelihoods in coffee states and independent smallholder producers remains challenging. Through this study, we want to assess whether coffee certification schemes represent a valid tool to overcome poverty and hunger and whether it is worth to promote this kind of interventions.

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Session 7

Institutional innovations for sustainable food systems: practitioner experiences in 'transitions in the making'

Developing a biocultural heritage indication labeling system

Krystyna Swiderska[1]

This presentation is proposed for the session on "Institutional innovations for sustainable food systems: practitioner experiences in 'transitions in the making"' organized by FAO, INRA, IFOAM, URGENCI, IIED and CCAP. The session has been approved. The presentation falls under the theme of "Institutional innovations for and with indigenous and ethnic communities". The session focuses on SDG 12 on sustainable production and consumption, and this presentation also focuses on the SDG 2 target on maintaining genetic diversity, and SDG 1 on ending poverty and building resilience.

Krystyna will introduce the concept of multi-actor innovation platforms involving indigenous communities and specifically a Biocultural Heritage Indication for indigenous and traditional products that IIED is developing with partners. Many indigenous farming communities still sustain traditional agroecological production systems which conserve much of the world's remaining food crop diversity in the field, where it can continue to evolve for climate adaptation, unlike genetic resources in gene banks. Yet these sustainable, biodiverse production systems are facing a number of threats – including economic pressures leading to adoption of intensive farming and out-migration from rural areas. At the same time, markets for organically produced food are growing, along with awareness of the importance of biological and cultural diversity. Developing value added products and services from unique biological and cultural diversity – such as traditional foods and drinks, personal care products, crafts and landscape tourism – provides a means of enhancing the economic viability of indigenous production systems. Tourists and local people with disposal income are often willing to pay a premium for high quality local products provided they carry a guarantee of origin and authenticity. But such guarantees are often lacking.

While labeling and certification schemes exist for ecological and fair trade products, it seems that there is no such scheme that specifically seeks to protect products derived from biological and cultural diversity. Existing intellectual property tools such as collective trademarks and geographical indications could be used to protect collective rights over biocultural products, but they have proved difficult for indigenous peoples to access and have not always benefited indigenous producers or biodiversity.

IIED, the University of Leeds and Asociacion ANDES (Peru) have therefore initiated a process to design a new labelling or 'Biocultural Heritage[2] (BCH) Indication' scheme for biocultural heritage-based products, which aims to be easily and widely accessible to indigenous peoples. The indication will seek a culturally appropriate approach to marketing that harnesses goodwill towards indigenous peoples and their "traditional lifestyles". Well-made local goods that are trusted as being authentic or are imbued with positive associations are likely to attract good prices and decent revenues can flow from the sale of quite small volumes.

The proposed Biocultural Heritage Indication (BCHI) will build on the basic idea of a geographical 'indication' which links a product to a particular territory and production process. The aim of the scheme will be to ensure that as much of the market value as possible is captured locally. Arguably, the best way to do this is to focus mainly on trading locally. The idea of "full benefit capture" is that producer communities should seek to take full control of the benefits by localising product value chains to the greatest extent. In other words, as much as possible of the sourcing of ingredients, cultivation, production, distribution, marketing and sale should be done and controlled locally without the use of intermediaries to ensure that most of the income generated stays with the communities.

1. International Institute for Environment and Development (IIED) – United Kingdom

2. Biocultural Heritage is the interlinked traditional knowledge, biodiversity, landscapes, cultural and spiritual values of indigenous and local communities – it reflects the holistic indigenous worldview and underpins the continuity of traditional production systems.

Experience with existing IPRs and indigenous labelling

The Association of Potato Park communities in Peru tried to register a Potato Park Collective Trademark but was unable to do so, because of the bureaucratic requirements (Argumedo, 2013). The name of the Potato Park representative on the statutes of association changed as a community withdrew from the Association, but the statutes of association could be changed within the 60 days required to complete the application, so the application was rejected. Indigenous applicants also face difficulties due to their often remote rural location, language barriers, and the need to register each product separately. Experience with Geographical Indications in India also indicates that GIs are often difficult and costly for indigenous peoples to acquire and enforce and that they have generated few revenues for indigenous producers.

However, the Potato Park has used its collective trademark informally since 2005 for products and services such as herbal teas, potato shampoo, creams, traditional weaving and eco-tourism. A survey in 2010 found that the collective mark has brought tangible monetary benefits – both higher prices and increased sales, and has helped to build the reputation of the Park and attract visitors. Use of the trademark also strengthened collective identity and pride in the Potato Park, and hence social cohesion for the management of biodiversity and landscapes. Other experiences with indigenous labeling have also shown promise. Early experience with the Maori Organics food label in New Zealand suggests that indigenous labelling based on self-regulation can contribute to economic, environmental and cultural goals, and promote access to foreign as well as domestic markets.

Key design questions to be addressed

The Biocultural Heritage Indication will be a graphical sign containing the term 'Biocultural Heritage', accompanied by the name of the relevant indigenous group, community or territory, and could be used alongside existing indigenous labels, to provide an independent guarantee. It will allow indigenous peoples to define the criteria for use of the label themselves, based on customary laws, with emphasis on self-evaluation and local monitoring. However, some independent oversight will be required to ensure compliance. This could be based on a set of biocultural heritage indicators developed by indigenous peoples.

A number of design questions will need to be addressed. Should the scheme be a label or a certification? While certification gives firmer guarantees for consumers, complying with detailed requirements is likely to be burdensome for small organisations, especially for a range of products. Labelling may be more appropriate in this case, as it places more responsibility on the producers to ensure compliance, although some independent oversight will still be needed.

Should the label be trademark protected? A collective trademark can be owned by a legally registered community-based organisation. This would provide stronger protection against unauthorised copying or sale of products through trademark infringement remedies, but trademarks would need to be acquired in each country where indigenous communities use the indication and renewed at least every seven years.

Which organisation should manage, monitor and review the scheme? Of key importance is that indigenous people are directly involved in running the scheme and feel that it is their scheme rather than one imposed by others. It could be an indigenous organisation or one which is trusted by indigenous peoples or which directly involves them (*e.g.* on a steering committee or board). The scheme must be institutionally sustainable: in other words, it should not be overly dependent on the active engagement of a small number of individuals working in a personal or voluntary capacity. It would also need to be financially stable, requiring continuous financial support to allow for monitoring, evaluation and review, site visits and field research.

What would the organisation do? It could provide independent monitoring of the Indication to ensure it supports biocultural heritage, manage payment of renewal fees (to keep registered trademarks in force), assess the impacts and effectiveness of the label, and monitor markets including preventing improper

assess the impacts and effectiveness of the label, and monitor markets including preventing improper use by third parties. A key question is whether or not it is feasible to have a single organisation entrusted with setting up and overseeing the scheme globally, which also monitors and reviews its implementation. If a legal trademark approach is chosen, another important role for the organisation would be to file trademark applications to officially register the Biocultural Heritage Indication.

Misuse by authorised users needs to be regulated by the organisation managing the scheme. Misuse can be deliberate or inadvertent, so the first step on being made aware of the situation should be to take a non-confrontational approach and consult with the concerned community or group. However, continued misuse needs to be prevented because it will erode the credibility of the scheme and will be detrimental to all users. Arguably, a light touch monitoring of proper use of the Indication is preferable, and withdrawal of the right to use the mark should be seen as a last resort measure, with the option to appeal.

A consultation process is being held to obtain feedback on these and other key questions, such as how the scheme will ensure positive outcomes for biological and cultural diversity[1]. Responses to date have highlighted the importance of ensuring the participation of indigenous peoples and local communities in managing the scheme for local ownership, and have suggested the establishment of local monitoring committees. They also highlighted the need to balance easy access to the indication with rigour to prevent unauthorised use. To this end, it was suggested that the indication should be trademark protected in at least three countries and that a website should be established listing all authorised users. While local or national markets should be prioritised initially to minimise the use of intermediaries, direct links to global markets could also be established via internet marketing.

1. The survey is available here: www.surveymonkey.com/r/BCHIsurvey

Introduction to institutional innovations

Allison Loconto[1], Anne-Sophie Poisot[2], Pilar Santacolom[2] and Marcello Vicovaro[2]

Introduction

To build sustainable food systems, a transition must occur from current norms and practices to future ones that are more sustainable. Innovators in developing countries have long been linking diverse agricultural production to sustainable consumption, but few of these initiatives are documented or analyzed. How do farmers, communities, distributors, public authorities, researchers, and consumers build such systems and based on what values of sustainability? What types of innovations stimulate and govern these transitions? Answers to these questions can help us understand how interdependent system components realign around more sustainable practices; and how societal actors make changes in their technologies, networks, value chains, rules and daily routines – on the farm, on the road and at the table – to create sustainable, diverse food systems.

The socio-technical transitions literature has focused on sustainability (Grin, *et al.*, 2010, Markard *et al.*, 2012) and the epistemic controversies of agronomic knowledge (Sumberg and Thompson, 2012). It tells us that systems are faced with oppositional pressures from path-dependencies and socio-technical lock-ins; innovations must de-link from existing pathways so to re-direct them or create new ones (Geels, *et al.*, 2016) and their regulation must likewise accommodate multi-layered hybridity (van Zwanenberg, *et al.*, 2013). While early studies traced historical transitions, recent advances focus on the 'anchoring' of technologies, networks and institutions (Elzen, *et al.*, 2012) where linking novelties with existing structures and institutions is precarious. We are in the midst of diverse transitions to sustainable food systems at multiple levels, thus any analysis of them needs to capture their dynamics; we must study transitions in the making.

This requires a shift in the analytical focus from historical pathways to the practices of actors as they construct the pathways (Elzen, *et al.*, 2011, 2007, Steyaert *et al.*, 2016, Stirling, 2011). One area that remains understudied is the role of intermediaries (Howells, 2006, Meyer and Kearnes, 2013, Klerkx and Leeuwis, 2009, Callon, 1991). These actors are typically characterized as independent and disinterested parties who introduce new flows of knowledge and objects to existing networks or fill knowledge gaps in system failures. But recent work on sustainability in food systems found anomalies (Loconto, *et al.*, 2016, 2016). At times, knowledge is uncertain, contested or old; networks are not pre-formed; and interests and normative values are misaligned. Intermediation is thus not always performed by a designated third-party, but by an interested actor who takes up a new role within the system, stimulates learning processes and changes the rules and routines (Kilelu, *et al.*, 2011). In sum, there is a gap in understanding the role of intermediaries in governing the direction of transitions towards sustainable food systems.

Method

We will present the methodology and results of a research collaboration that began between FAO and INRA in 2013. It concluded the first stage of the collaboration with a study that documents innovative institutional approaches that enable markets in developing countries to act as incentives for the adoption of sustainable crop production practices (Loconto, *et al.*, 2016). The book, which covers 14 countries in Asia, Africa and Latin America, illustrates 15 good practices in setting up innovative food systems and describes the novel institutional arrangements that allowed the networks to succeed. Over this time, a network of innovators has developed and been kept engaged by FAO. In 2015, the team organized

1. INRA, France.
2. FAO, Panama.

a Researcher-Practitioner Workshop on Innovations in linking sustainable agricultural practices with markets in Bogota´, Colombia. During this workshop, capacity building needs were identified for a group of innovation intermediaries who are fundamental in creating bottom-up and social innovations that both promote sustainable practices and create markets for sustainably farmed products.

Following a method developed in a previous research project (Bryndum *et al.*, 2016) and used in the Bogota´ workshop, we held a co-construction workshop in Chang Mai, Thailand in July, 2016 in order to begin applying the lessons learned to date. The approach taken is a participatory-action approach that will rely upon close collaboration with the innovators who have been collaborating in our projects, to create generalizable advice to a broader audience of actors who play an intermediary role in transitions to sustainable food systems. The design merges conceptual elements and framings (*i.e.*, sustainable food systems) with a rigorous bottom-up approach of bringing in stakeholders' everyday experiences in implementing intermediation processes. The design requires careful stakeholder selection to balance gender, geographical representation, roles in the food system, and public, private and civil society organization affiliation. It takes an iterative approach in four phases of applied activities: exploration, presentation, investigation and concretization of guidance. Reflexivity and social learning are core parts of both transition management and intermediation, thus by stimulating these processes through co-construction workshops we generate both ideas for practice and data for qualitative analysis.

Our analytical approach focuses specifically on understanding how the actors in these transition processes define and put into action their own concepts of sustainability. One of the interesting insights from research on intermediation is that an important role for intermediaries is in problem identification, framing and solution finding (Steyaert *et al.*, 2016). Through the co-construction process with innovators, we will be working and testing a practical guide that will contain information on how to build local food systems in developing countries that are able to focus on the sustainability of the entire system, not only on the agricultural practices. Therefore, in our work, we will have specific discussions around how system changes will bring about specific types of sustainability (social, economic, cultural, environmental and nutritional/health) for the involved actors and for the system as a whole.

As the introduction to this special session, in this presentation we will focus on a brief overview of the work of INRA and FAO on institutional innovations, including the theoretical positioning if this work and the policy importance of these approaches for transitions to sustainable food systems. Focus will be placed on the results of a three year research project that examined how the different roles and responsibilities of actors in local innovation systems facilitated both the adoption of sustainable agricultural practices and the construction of markets for sustainably produced products. Current work on the co-construction of a guide for innovators on how to navigate through local food system transitions will also be introduced for discussion.

Results

Through the analysis of 15 case studies, we classified the range innovations into three core mechanisms:

Participatory guarantee systems (PGS), which are innovations in certification systems. PGS are institutional arrangements created within local communities gathering together different actors who collectively ensure the compliance with good agricultural practices (typically organic or agroecological) thus creating a local system of production and consumption. PGS therefore both ensure the diffusion of the innovation and are the means through which the innovation process is governed. PGS serve to provide a direct guarantee, through the formation of a market, for sustainably produced food and agriculture products.

Multi-actor innovation platforms (IP), which are innovations in ways to create and share knowledge. An IP is an institutional arrangement where stakeholders gather together to facilitate and to plan the activities connected with the adoption of a specific agricultural technology. There is no set configuration for an IP, it can be centralised or decentralised and focus on research and/or development activities.

Community-supported agriculture (CSA), which are innovations in community investment in sustainable agriculture and a local economy. A CSAis an institutional arrangement created on existing community structures that try to solve sustainability problems that are specific to a local socio-cultural context and to specific agro-ecosystems.

By adopting these institutional innovations, the following results were reported by the innovators: (i) Innovations enabled the development of new market rules and assured the sustainable quality of products. (ii) New forms of organization permitted actors to play multiple roles in the system, such as farmer-auditor, farmer-researcher, consumer-auditor, consumer-intermediary. (iii) New forms of market exchange were created, such as box schemes, direct marketing, public procurement and community seed exchanges. (iv) New technologies for sustainable agriculture were applied, such as effective microorganisms, biopesticides and soil analysis techniques.

Conclusions

These results provide important insights into how institutional and policy environments can enable local actors to innovate and transition to more sustainable food systems.

Promote learning-by-doing to enhance technical and market knowledge

Interactive learning was essential for adapting sustainable agricultural practices to specific contexts. The most frequently noted approach was creating and sharing knowledge via farmer-led experimentation. Knowledge about agricultural practices was adapted and applied through a learning-by-doing approach and participatory experiments in farmers' fields. Through this approach, technical knowledge was combined with traditional knowledge of local farming systems, and individual farmers' knowledge of the agro-ecosystem. These interactions enabled farmers to build social innovations for marketing their food through direct sales.

Strengthen farmers' innovations in strategic market negotiation

Farmers who engaged in strategic marketing did so by increasing their bargaining power in new and existing markets. They established semi-formal price-setting committees that included farmers, consumers, intermediaries and other value chain actors, used participatory guarantee systems (PGS) for certification, organized collective sales, and created physical spaces where new types of markets could be held. These institutional innovations increased farmers' capabilities in negotiating prices that reflected the additional value of sustainably produced products. Greater support for capacity building, infrastructure and investments that help farmers to become more strategic in exploiting market opportunities is crucial for improving farmers' capabilities to benefit from the monetary advantages found in new markets.

Encourage communication and trust among farmers, intermediaries and consumers, starting in the field

When farmers, intermediaries and consumers interact directly outside the market, they build trust that carries over into their market interactions. These non-market interactions occur through collaboration in participatory research, membership in PGS, consumer study visits to farms, and community events. When these approaches are combined with direct marketing or increased consumer knowledge about current farming practices, consumer demand expands.

Improve public infrastructure for value chain logistics

The consumers of sustainable products also look for other quality attributes such as freshness, reasonable shelf-life and safety in their food. Good management of logistics can make all the difference in ensuring that the food that consumers purchase meets these quality requirements. Logistics are also important for ensuring on-time delivery of sufficient quantities of the desired products, even for direct sales and particularly for box schemes.

Legitimate innovative initiatives so that they can be scaled up

Although most innovations are created by private actors and often rely on voluntary systems, public support is needed for their scale up. This support requires an enabling legal and policy environment that legitimizes both the sustainable agricultural practices and the marketing innovations. In the study, legitimization of innovations was found to be the most important role for public actors at the sub-national, national and international levels.

It is important to remember that flexibility should be integrated into all regulatory approaches that intend to encourage institutional innovation. Flexibility is needed in order to capitalize on the diversity of socio-cultural and agro-ecological practices found in each local context. Regulators should ensure that any new principles, laws, directives and programmes provide actors with the appropriate level of autonomy to adapt technologies and rules to their local situations. Governments and ministries can create dedicated public agencies and/or participatory platforms that serve as official spaces for debate, negotiation and elaboration of rules and incentive mechanisms that meet local requirements.

As with any transition process, institutional innovation is a long-term process that can be achieved only through cooperation among public, private and civil society actors. Enough time should be ensured to allow practitioners to experiment with different forms of innovations and researchers to accompany these processes.

Participatory Guarantee Systesms (PGS) as innovative institutional approach towards sustainable production.

John Mathew[1]

Rationale for the research

Alternative approaches towards sustainable food systems are producing a variety of institutional innovations that are implemented at different scales (Loconto *et al.*, 2016).

Our research is embedded in the sustainable development discourse, focusing in particular on the Sustainable Development Goal (SDG) 12, which aims at achieving sustainability in production and consumption patterns. In the contemporary agricultural paradigm, on one hand farmers are increasingly forced to engage with intensive unsustainable production systems and they are undergoing various pressures, constraining their control over their means of production. On the other hand, consumers are increasingly loosing touch of how their food is produced.

In the context of our research, we look at institutional innovations as set of processes that redefine roles and relationships between multiple actors along the food system. Thanks to the growing awareness about sustainable food production in the last decades, different types of institutional innovations have been emerging and have been increasingly trying to challenge the prevailing agricultural paradigm. Among the most innovative and successful ones are Community Supported Agriculture (CSA), multi-actor platforms and Participatory Guarantee Systems (PGS) (Loconto *et al.*, 2016).

PGS is an example of institutional innovation that offers a systemic approach to address sustainable agricultural production for small-scale farmers. As alternative certification methodology, PGS expands the horizon of guarantee systems in order to include in the process various stakeholders of the food chain: producers, consumers, retailers, traders and others such as NGOs.. PGS builds long-term trust-based relationships and accelerates learning processes through a more efficient and equal access to knowledge. Thus, it is a form of grassroots innovation that addresses social needs, but also contributes to economical and environmental sustainability.Creating a platform for social relationships and knowledge-exchange, they provide adaptable and localized services, in situations where the market is usually failing.

The evidence for the success of PGS is the pace with which this system has been adopted allover the world. Operational PGS are now found in 39 countries and they are endorsed by the government in Bolivia, Brazil, and India (FiBL & IFOAM-Orgnaics International, 2016). IFOAM – Organics International advocates for PGS since 2004 and recognizes the full diversity of production systems that are based on the principles of organic agriculture, including non-certified production.

During our presentation we want to highlight the role of PGS as a tool to implement institutional innovation in rural areas, with a particular focus on knowledge co-creation and exchange. We will address which types of actors are involved and how they can jointly learn and build new knowledge, find solutions and share responsibilities within their agri-food systems.

Theoretical framework

In social–ecological systems (Holing 2001), decision-making of farmers is conceived as a process where strategies are interpreted into day-to-day actions (Vanwindekens *et al.* 2013). This translation, from strategies into practices, is extremely complex because it is based on the ecological, economic and social environment, meaning that strategies and practices are continuously adapted according to external changes (Doré *et al.* 2011).

1. International Federation of Organic Agriculture Movements (IFOAM), D- 53113 Bonn, Germany.

Scientific literature has intensively researched the reasons behind farmers' choices when adopting or adapting new technologies and strategies (Pamuk *et al.*, 2013). We argue that the successful uptake of PGS as institutional innovation is linked to one of its main features: knowledge sharing and co-creation. The development of knowledge is realized through transdisciplinary approaches, where different actors generate socially robust knowledge through meaningful interactions, in order to try to solve problems (*i.e.* unfair prices from traders and middleman, low bargaining power, difficult access to quality markets etc...). This is an essentially collective process, based on interactive learning and encouragement of communication and trust and it provides an innovative tool for capacity building.

Methodology

This communication explores why and how PGS are tools for implementing institutional innovations in rural areas. We adopted a case study methodology. The empirical case studies that will be presented are two PGS supported by civil society facilitating organizations, the *Timbaktu Collective* in the Anantapur district and the one supported by the *Institute for Integrated Rural Development* (IIRD). Two other examples will be drawn from the framework of governmental organizations, Swadeshi, in the Bulandshahar district and the PGS supported by the APOF – Organic Certification Agency, in Bangalore.

Development project

Context of the study

Institutional innovations need public support or at least a favorable legal and policy environment that legitimize their existence. Even though in India organic farming does not officially recognize PGS, a voluntary framework for the domestic mark*et al.*ows recognized PGS to claim their organic status. India is among the most advanced countries concerning PGS development. PGS in India started with the intervention of national NGOs, FAO and government representation in 2006. The PGS Organic Council (PGSOC), a coalition of Indian NGOs built and promoted PGS throughout the country in the following years. Also the government took concrete action and since 2015 the National Center of Organic Farming (NCOF), linked to the Ministry of Agriculture, is officially supporting PGS as a low-cost alternative certification method. They launched PGS India, a government-run PGS program with an online database of all PGS initiatives. The relationship between the government and the NGOs is good as the government designed their program to build on the work and achievements of the PGSOC. This duality of government and

NGOs is important and quite unique; it should be encouraged since it allows the civil society to venture into new spaces and create their own frameworks. Altogether, more then 37.000 farmers have been organically certified for their products through PGS in India (NCOF, 2016) and India can be regarded as the leading country in the PGS movement.

PGSOC is a formal society consisting of 15 NGOs/VOs (Voluntary Organizations) working in various states of India, grouping around 25.000 farmers. It is a democratically run organization with council members electing the executive council and the managing committee. Each of these organizations works in various parts of India with small and marginal farmers. A total of 587 small farmer groups across India with 5.925 farming families were directly involved in certification and marketing under PGSOC. A variety of organizational and marketing models exist among PGSOC's members. The facilitation councils, composed by NGOs and VOs, play a key role in supporting at local level the management and the administration of the guarantee system inside each PGS.

PGS as tool of innovation

PGS not only represents an alternative to third party organic certification, but also contributes to foster access to markets for small-scale farmers, thanks to their set of intrinsic features: shared vision, trust,

horizontality, transparency, participation and learning process. Organic PGS initiatives adhere to strict organic standards, but the compliance mechanisms used are suitable to small-diversified farmers selling on local and domestic markets. In addition to the positive economic effects, PGS is a tool for developing innovations and community actions, based on high-level knowledge exchange between farmers, but also with other stakeholders along the value chain.

Participation: Redistribution of responsibilities along the value-chain

Due to their local adaptability, PGS initiatives exist in many shapes and contexts; however they share some basic key features. Participation is an essential and dynamic part of PGS. PGS is built from a shared vision, meaning that the key stakeholders collectively support the same guiding principles. Participation means that the stakeholders are engaged from the initial design. They contribute to decision making such as the choice of principles and standards that will be adopted by the group. PGSs are intended to be non-hierarchical and have a shared ownership. This is reflected in the overall democratic structure and through the collective responsibility of the PGS: engagement in the development process, understanding of how the system works and the communication between producers, consumers and other stakeholders.

The peer-review, a farmer-to-farmer approach, is a key element of PGS. Through this fundamental process farmers visit each other and review their practices. The equality between the inspectors and the inspected extends the possibilities of knowledge exchange. Peer review is not just a mere control for compliance against a standard, but becomes an opportunity to share challenges and personal experiences and to disseminate knowledge, which is an essential feature of farmers-to-farmers approaches (Tripp, 2006).

Knowledge exchange and co-creation

The organic/agroecological movements recognize the relevance of farmer knowledge, which is a combination of different type of knowledge resulting from farmers' activities and interactions with their own systems and the more traditional knowledge that some farmers or societies have developed over time (Doré *et al.*, 2011). Traditional Knowledge Systems (TKS) are a set of values and technical capabilities that exist within and are developed around specific conditions. They include technological skills, ecological relations and the awareness of the social impact of their activities (Twarog & Kapoor, 2004). In recent years there has been a re-evaluation of the importance of traditional knowledge and farmers have gained recognition as key actors in the process of knowledge and innovation development. The most common kind of knowledge, which is shared between farmers participating in the PGS, is organic farming techniques and practices, which include traditional and innovative knowledge. Therefore PGS is both a tool for preserving knowledge and to transfer innovation and it emphasizes the capability of local communities to experiment, evaluate, and scale-up innovations through farmer-to-farmer research and grassroots approaches.

Innovation and knowledge are shared and crated also through workshops, trainings and fieldschools, which are often organized by the PGS. Training might be organized to teach new members about organic practices and the functioning of the PGS. Sometimes technical workshop and training might be organized with the involvement of technical/research experts. The arrival of Intern*et al.*o in rural areas has changed consistently the style of communication: farmers have now access to online platforms and websites where data and information can be easily shared even on long distance, making knowledge sharing easier as well as allowing a better control over the integrity of the value chain.

Consumer-oriented transparency

PGSOC grants a logo to all PGS initiatives that are recognized to follow the organic principles and good organizational procedures. Along with the logo, a unique identification code is provided. PGSOC is opening collaboration with the governmental institution PGS-India to join their online platform. In such way, consumers can verify information about products, producers, and local groups via searching for the personal code of the PGS on the online portal, ensuring traceability and the integrity of the value-chain.

Innovations in transition

Agri-food systems are undergoing tremendous changes globally and farmers need increasingly to compete with agribusiness, urban expansion and corporate land-grabbers. To implement diversified and sustainable farming systems might be the most powerful tool for farmers and their families to empower themselves (Rosset & Martínez-torres, 2012). Empowerment means improving livelihoods, enhancing skills and knowledge and allowing continuous self-growth. Peasant agriculture follows a pattern typically based on short and decentralized circuits of production and consumption, with strong links between food production and local ecosystems and communities. PGS supports and enhances those characteristics and incorporates different socio-technical innovations inside a broader institutional dimension. At economic level, PGS opens new market possibilities, while socio-technical innovations are generated through knowledge exchange and co-creation between the stakeholders involved. New institutional structures are created to manage local agri-food chains with horizontal and participatory approaches, enabling meaningful social networks. We reckon that it is crucial to explore how those innovations influence the markets and how they change the socio-ecological environment towards more sustainable systems, since there is much potential for local changes to be replicated and scaled up throughout the different levels of the food system.

Multi-actor innovation platforms in Southwest China: participatory plant breeding, community supported agriculture and participatory guarantee systems

Dr Yiching Song[1] and Xin Song[2]

This presentation is proposed for the session on "Institutional innovations for sustainable food systems: practitioner experiences in 'transitions in the making'" organized by FAO, INRA, IFOAM, URGENCI, IIED and CCAP. The session focuses on SDG 12 on sustainable production and consumption. This presentation falls under the session theme of "Institutional innovations for and with indigenous and ethnic communities". The presentation also addresses SDG 2 on ending hunger, specifically target 2.5 on maintaining genetic diversity; and SDG 1 on ending poverty and building resilience.

CCAP will present its 15 year Participatory Plant Breeding (PPB) programme in Guangxi, SW China, which has linked poor ethnic mountain farmers with crop scientists at national and provincial level. Through PPB, new maize and rice varieties have been developed with both higher yields and improved resilience to drought and pests, resulting in greatly improved variety adoption rates, and many resilient local landraces have been improved and conserved. PPB has also enhanced awareness of the value of traditional knowledge and local landraces amongst farmers and agricultural scientists.

Based on these initial achievements, PPB farmers and communities have gained more interest in value adding to their own local quality biocultural products[3] and seeds. This has led to further institutional and technological innovations for Community Supported Agriculture (CSA), which are built up from traditional farming knowledge to meet consumers' increasing needs for safe and quality food. By linking PPB communities to a series of ecological/organic restaurants in urban areas, CSA has spurred a revival of agroecological practices such as duck-in-rice pest control; reversed biodiversity loss by reviving several heritage varieties; and significantly enhanced household incomes, tripling incomes in one community. CSA has been successfully facilitated by the NGO Farmers' Friend since 2005. However, some challenges emerged last year, as the restaurants' new manager cut their purchases from PPB communities, complained about the product quality etc., and shifted to other producers. The PPB communities experienced a big economic loss and disappointment.

The major reason for this 'up and down' case is that the CSA system mainly relies on individual trust, rather than on any formal or organic certification, and lacks institutions to provide guarantees of origin and quality as well as fair and equal benefit for farmers, for both consumers and producers. This is a challenge not only for the PPB communities in Guangxi province but for the whole country. There is a big increase in quality, local biocultural products due to environmental concerns and food safety issues as well as income increase in China, leading to growing consumer demand. Yet, certification and guarantee institutions are insufficient or missing, especially for local and biocultural products. Geographical Indications are popular in China, but are mainly used by local government for income generation through selected enterprises. Farmers and indigenous communities have benefited little.

To confront these challenges at both action and policy levels, the CCAP team is working together with PPB communities, scientific institutes, NGOs and policy makers, and has established a national "Farmer Seed Network" in China- a multi-actor innovation platform. Founded by CCAP, the Liang Shuming Rural Reconstruction Centre and the Third World Network in December 2013, the Farmer Seed Network (FSN) works through multi-stakeholder interaction, collaboration and dialogue, and includes farmers from across China, as well as leading crop scientists, and Ministries for Environment and Agriculture

1. Centre for Chinese Agricultural Policy (CCAP)
2. Chinese Academy of Science
3. 'Bio-cultural products' are products based on biodiversity, landraces and traditional knowledge

and private sector. The Network has started exploring guarantee institutions for biocultural products and other community-based products like PPB seed. Some exploration and open direct discussion has been carried out among different stakeholders around different subjects.

For instance, 3 PPB/CSA communities' biocultural products got rewards from Slow Food International and were listed in the 2015 list of Ark of Taste by Slow Food. However, the reward was originally designed for individuals only. Upon discussion, all the communities think such biocultural products are the result of accumulated and collective wisdom and efforts, and that the rights and pride should belong to all the community! So it was decided to change the award into the community's name. Upon invitation from Slow Food, 3 women farmers were nominated from 3 communities respectively to participate in the "Terra Madre" event in Turin, Italy, in September 2016.

At national level, the Farmer Seed Network (FSN) was formally registered early this year and a collective trademark has been designed and will registered through the FSN and owned by all FSN communities, for all biocultural products and even for PPB and quality seed produced by FSN communities. More work is underway to develop an appropriate PGS system with institutions of collective/group certification, collective labeling etc. for biocultural products and processes. This is essential not only to support the PPB and CSA work in Guangxi, but also its scaling up to Yunnan province (initiated by CCAP in 2012), and to contribute to green agricultural transitions in China as a whole. A PGS stakeholder workshop will be held in Guangxi in September, and the presentation will share the results. The presentation will highlight the critical role of multi-actor platforms in enabling green and pro-poor agricultural transitions for meeting the SDGs.

Community supported agriculture: innovative ways to share risk among producers and consumers

Judith Hitchman[1] and Fernando Nacpil[2]

Introduction

Bringing together citizens, small farmers, consumers, activists and concerned political actors at global level through an alternative economic approach called Local Solidarity-based Partnerships between Producers and Consumers.

It is a way of maintaining and developing small-scale organic family farming and of achieving local food sovereignty for each region and community worldwide.

URGENCI vigorously promotes and advocates for policy and the realisation of all forms of partnership between producers and local consumers, all kinds of Community Supported Agriculture initiatives as a solution to the multiple problems associated with global intensive agricultural production and distribution.

Farmers alone have been shouldering the risks of the increasingly ruthless global market that has forced millions of them from the land. Community-Supported agriculture offers one of the most hopeful alternatives to the downward spiral, and is the only model of farming in which consumers deliberately agree to share the risks and benefits with farmers. In the current period of climate change it also helps combat the effects by relocalising the food system, building resilience and recreating local food security and food sovereignty.

It takes many different forms in the various parts of the world based on the social, historical, geopolitical, agricultural and economic specificities of each country or region where it has developed. The members of URGENCI are united in their belief in the following 4 fundamental ideas:

Partnerships are characterised by a mutual commitment to supply (by the peasants) and up-take (by the consumers) of the food produced during each season.

Local means promoting local and territorial food systems. LSPCCs are part of an active approach to relocalising the economy.

Solidarity Partnerships are based on solidarity between producers and consumers and involve:

- Sharing both the risks and the benefits of healthy production that is adapted to the rhythm of the seasons and is respectful of the environment, natural and cultural heritage and health.
- Paying a fair price up-front that enables peasants and their families to live in a dignified manner.

The producer/consumer tandem is based on direct person-to-person contact and trust, with no intermediaries or hierarchy and no subordination.

It is the absolute respect and implementation of these four fundamental principles by URGENCI members that forms the basis for more general values.

Community Supported Agriculture, as a way of contributing to greater solidarity between urban and rural communities, is equally empowering for both the community and the farmers and providing solutions to common problems facing producers and consumers worldwide, including in cases of disaster recovery in climate change, such as the Pillipines:

1. Fair local food systems are an efficient tool to restore local food sovereignty for all regions and communities worldwide.

1. URGENCI, France.
2. Farmers Development Network, Philippines.

One of the main roots of the current food crises, as well as social unrest more generally, is that farmers alone have been shouldering the risks of the increasingly ruthless global market that has forced millions of them to leave the land.

CSA offers one of the most hopeful alternatives to this downward spiral, and is the only model of farming in which consumers consciously agree to share the risks and benefits with the farmers.

2. With other short supply chains, CSA schemes are a very efficient way of defending health through food and fighting many forms of malnutrition.

By establishing direct and trust-based relationships between farmers and consumers, people have access to fresh food from an accountable source: organic farmers producing healthy, safe, nutritious and minimally processed food without pesticides and various additives at an affordable price. This was what first motivated Japanese women in the 1960s to get together with small-scale farmers to create the first Teikeis to distribute food locally, when they were confronted by the dangers of industrial and agro-chemical pollution.

3. CSA represents a relevant locus for triggering civic responsibility in economic relations and for setting up a social network of solidarity between farmers and consumers, building more socially just and sustainable communities trading on fair terms both with neighbours and sometimes with people in more distant regions.

For CSA to be more than just another direct marketing scheme, the growers and the eaters, as they sometimes call themselves need to work together to create local social/economic forms, based on trust that encourage initiative and self-reliance, sharing the risks of agricultural production and information. They are human-scale and efficient and pricing is based on needs/costs (not market).

4. Addressing environmental and climate change issues seems to be an almost natural outgrowth of the CSA concept, as it is based on cooperation and harmony with nature.

CSAs are part of the economic relocation movement : this means fewer food miles, less packaging and ecologically sensitive farming, a radical reduction in energy waste and pollution. Consumers support the blossoming of organic family-run farms that do not depend on fossil or imported energy, and encourage proper land stewardship by farmers towards low or no chemical inputs, greater biodiversity, conservation of landscapes and cultural heritage, in particular for future generations and agroecology in the widest, political sense of the term.

Urgenci's members are strongly convinced that the flexibility of CSA allows for many inventive and meaningful combinations, building sustainable communities and constructive alliances among as many different groups and perspectives as possible.

Translating CSA to other landscapes and mentalities that are vastly different in scale, available resources and culture is a constant challenge.

The model has certain core principles based on sustainable, fair and ecological practises that are similar no matter where or how it is practiced but at the same time, it is largely an evolving and highly adaptative process.

Urgenci is eager to engage in cooperation with sustainable agriculture/small-scale farming movements from the global South, where shared goals are to empower even the poorest and smallest-scale farmers to become active contributors to and beneficiaries of local sustainable development and to offer continuous education to farmers and other stakeholders in the system.

Illustrated case study

What prompted the change?

Agriculture in the Philippines has long been marked by small-holders encouraged to invest in export-oriented cash crops, especially coconut oil and sugar-cane. The obvious risk for both local populations and the producers is a loss of food sovereignty and, in the worst of cases, a loss of food security.

This was precisely the situation that occurred when Hurricane Haiyan hit the Philippines in 2014, with an estimated loss of 700 million$-worth of agricultural production and infrastructure. 74% of fishermen and 77% of farmers lost their property and source of income, including in such sustainable producer-owned projects as seaweed farming. In recent years there has been strong development in the Philippines of a solidarity economy-based urban-rural movement, and there have been increasing linkages developed between urban and rural areas to both feed the cities and ensure producers have access to local markets that provide them with decent income. There is considerable interface with Local Authorities to ensure that local populations have access to healthy nutritious food.

What is the new model?

The Community Supported Agriculture model was promoted by the national solidarity economy movement, and Dr. Doy Nacpil (with their organization, Stargrass Coalition) is the leading force behind this young network. The aim of the network is to change the agricultural model of cash crops to small-scale fruit and vegetable production that will guarantee local food security/food sovereignty in the post-Haiyan period, thus ensuring that local producers and communities become food secure. Interestingly, this movement has been consumer-driven, rather than producer driven, but nevertheless ensures peasant producers are guaranteed access to specifically defined local markets.

How does it work?

Producers and local restaurateurs sign an agreement, with upfront payment at an agreed price to raise pigs, rice, goats and various vegetables. Most farms are less than one acre in size but Dr. Nacpil says "Even small farmers can earn well by diversified, integrated farming". This agroecological approach ensures that it is easy to avoid any outside chemical inputs. The system in place uses inter-cropping, and ensures that the production is spread over the season. The local varieties of organically grown rice have proven far more productive and resilient.

Who does it benefit and what are the outcomes?

As the network has rapidly developed a high reputation for the organic products grown by these producers, many local (medical) doctors are requesting delivery of fruit and vegetables for patients who are suffering from cancer. The network supplies food to hospitals, schools as well as restaurants. It has been developed as a holistic local development network to build locally resilient food systems and ensure that both producers and the local populations would recover from the trauma of the hurricane. The approach used was to work from provincial level to regional level to national, with a national consultation on Community Supported Agriculture, and the subsequent creation of a national network, (Philippine CSA Network (PCSAN).) The national solidarity economy network provided the means to do this. This project has now reached phase 3 in the Luzon and Mindanao regions, with provincial and national networks and a national coordinator. There are approximately 20 different organizations, each consisting of 20-30 farmers, each feeding around 100 families in their local communities. The farmers use the system of Participatory Guarantee Systems (PGS) as a low-cost participatory organic certification method. In the immediate post-typhoon period this also helped the producers to find help for the next growing season. The national legislation introduced in 2016 that supports organic production also has helped provide post-Haiyan relief for the producers.

Conclusion

This is a clear illustration of how alternative economic solutions to free trade can support the connection of small-holders to local markets, thereby developing resilience to climate change and violent weather events in high-risk regions like the Philippines as well as building national food security and food sovereignty together with an economic paradigm.

Geographical indications: what institutional innovations for a territorial construction of technical innovations?

Stéphane Fournier[1], Emilie Vandecandelaere[2], Catherine Teyssier[2], Clément Charbonnier[3], Giovanna Michelotto-Pastro[4], Dominique Barjolle[5], Olivier Beucherie[6] and Philippe Jeanneaux[7]

Rationale for the research

The TRIPs agreement (1994) recognize as intellectual property rights the Geographical Indications (GI), defined as a name associated to a geographical area that is used on products originating from this area and presenting specific characteristics or reputation linked to origin. Many studies have illustrated the potentials of GI processes as tool for enhancing food systems' sustainability. These processes may lead to interesting place-based development, thanks to producers' collective strategy to promote, defend and preserve their origin-linked quality product and the related natural and human resources. By improving producers' incomes (Dinopoulos *et al.*, 2010; Moschini *et al.*, 2008), GIs may allow some of the producers getting out of poverty and more broadly avoid a damaging agricultural intensification, which could be the only way for producers who receive low prices for their products.

The economic lever appears then fundamental for GI's contribution to sustainable food systems development. To consolidate the previous studies and establish evidences on GIs' economic impact, FAO has carried out in collaboration with four Universities[1] 10 case studies[2] in various regions all over the world and an analysis of the impact pathway (Barjolle *et al.*, 2015).

The analysis of these case studies has confirmed the GI economic impacts, but especially an important assumption: innovation plays an important role in GI processes and in their impact pathway. In all cases, minor and major innovation processes occur in order to adapt the practices to the requirements of the Code of Practices, or to change the product characteristics to sell it on new markets. For example, the Tˆete de Moine did start a spectacular growth after that a new tool for cutting slices of this cheese was invented and introduced: the "Girolle".

In two specific cases, changes have been particularly significant, as GIs' codes of practices have not been built based on traditional practice. During the setting-up of these GIs, the stakeholders pursued an upgrading of product's quality, while ensure compliance with international standards (including the sanitary ones).

Based on these two cases, Penja pepper in Cameroon and Vale dos Vinhedos wine in Brazil, the objective of this paper is to show that GI can stand by institutional and technical innovation processes and more generally their role in the construction of multi-actor innovation platforms.

Theoretical framework and methodology

Innovation has not very often been considered as a GI factor of success in the scientific literature. The main objective of a GI is to protect and add value to traditional products, by preserving the production techniques that make the product quality well known. Being defined in a code of practices, which may

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5. Swiss Federal Institute of Technology Zurich (ETH), Switzerland.
6. Olivier Beucherie Conseil, Angers, France ; ESA, Angers, France.
7. VetAgro Sup, UMR METAFORT, F-63370 Lempdes, France.

give the impression every condition is given and fixed forever, GIs have been repeatedly criticized for their supposed negative impact on the adaptive capacity of production systems, for the "*significant brake on innovation*" they may induce (van Caenegem, 2003) or the "*museums of production*" they may create (Bowen & De Master, 2011). However, several authors have shown that the innovation processes along the GI implementation and running may also have positive impacts (De Rosa *et al.*, 2015; Fournier, 2015; Barjolle and Paus, 2007). GIs are sometimes used specifically to introduce and develop local innovations (Durand and Fournier, 2015; Mancini, 2013).

In light of the case studies, we analyse GI processes as institutional innovation, as defined by Hargrave and van de Ven (2006) and Raffaelli and Glynn (2015). They encompass new rules and relationships between local actors and their environment. These new relations often lead to technical innovations. GI process may then appear as a "multi-actor innovation platform", developed to create and share knowledge (FAO, 2016).

The two case studies have been done during master thesis internships, in the frame of the FAO study of the economic impact of GIs. Each case has been studied during 2-4 months, and 30-50 semi-structured interviews have been conducted (Charbonnier, 2015; Michelotto-Pastro, 2015).

Main results

Penja Pepper

Penja pepper is cultivated in the Littoral region in Cameroon. The GI process took place under the PAMPIG[3] project, which started in 2008 under the African Intellectual Property Organization (OAPI) leadership, involving Cirad and the French Development Agency. The GI "Penja Pepper" was officially registered as GI at the OAPI level in 2013.

Pepper is not a traditional Cameroonian crop. Important plantations have introduced it in the 1950s. Until 2000s, the production stayed at this plantation level. The increase in pepper prices at the beginning of this decade had led local peasants to introduce pepper vines in their farms, developing a basic technical itinerary. Alongside, some local early entrepreneurs developed pepper plantations and adopted the technical itinerary developed within the historical plantations. With the support of research centers and thanks to sharing of experience between planters, a new technical itinerary has been set up from the mid-2000s, more labor and knowledge intensive and using chemicals inputs. It is now required for GI production in the CoP.

Since the GI process has started, this new technical itinerary has been popularized among GI producers widely and to a lesser extent among non-GI producers. It deeply positively influences both the efficiency and quality of the production.

The GI producers' organization has catalyzed these technical and institutional innovations, with the creation of an inter-professional body gathering committees for producers, nursery and retailers, inducing new relations between these value chain actors, to discuss and agree on the GI production and marketing strategy (Charbonnier, 2015).

Wines from the Vale dos Vinhedos

Vale dos Vinhedos is in the Serra Gaucha Region in the south of Brazil. A traditional table wine is produced since the 19th century. In 1995, after a first qualification process of the local production, wine producers and other local actors created the "Association of Producers of Fine Wines of the Vale dos Vinhedos" (APROVALE) with the initial aim for promoting the region and its wines. With a strong support from Embrapa[4], this organization that gathered producers and tourism operators, apply for a GI registration for wine of Vale dos Vinhedos, which became one of the first GIs registered in 2002. The code of practices includes technical innovations compared with local practices, but it has been widely adopted.

During this phase, strong governance has been established among producers. Various grape producers have created their own wineries, increasing quality of wines and producers' income. There was an important territorial development with the wine tourism development, APROVALE facilitating the interactions between the wineries (26 of its members) and the tourism enterprises (43 members). Upgrading of the local infrastructure and a diversification of activities did occur.

After that, a change from GI to a more qualitative (and exclusive) Denomination of Origin created some dissensions, but territorial development continues.

In this case, the institutional innovations started with the creation of APROVALE, which gives the producers a new role in the regional identity promotion, and has been strengthened with the GI process that gives them a new role in defining specific production and marketing rules for their wines (Michelot-to-Pastro, 2015).

Lessons learned

Both cases illustrate the efficiency of GI process in the diffusion of technical innovation in terms of rapidity (a few years) and level of changes (important differences between before and after in the production practices), thanks to institutional innovation. GI created a form of multi-actor innovative platform, giving new or enlarged roles to the value chain stakeholders and especially the producers, but under the influence of facilitators and public authorities, which provide the necessary knowledge on new technology and organizational device (Durand and Fournier, 2015). GIs appear then as efficient booster of innovation, being able to convince local stakeholders to adopt new practices, whereas other kinds of development projects do not meet such successes.

However, these two cases radically differ in terms of diffusion scale in terms of number of producers concerned, validating some "classical" factors regarding innovations' successes and failures, as an interesting cost/benefit ratio and a scale effect.

Finally, the objectives of the innovation processes may be diverse, and are not always oriented towards sustainability. GI construction is a negotiation process between local stakeholders, the final consensus being strongly dependant on the existing power relations. Support organizations have then important roles to play: to equilibrate these power relations and to highlight the stakes and the potential consequences of the decision taken in terms of systems' sustainability.

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ETH Zurich, Sustainable Agroecosystems Group; VetAgroSup, Clermont-Ferrand; Montpellier SupAgro and the School of Agricultural Studies of Angers (ESA) within the specific framework of the Food Identity MSc.

Futog cabbage, Serbia – Taliouine Saffron, Morocco – Manchego cheese, Spain – Ryukyu Awamori liquor, Japan – Darjeeling Tea, India – Tˆete de Moine (cheese), Switzerland – Penja pepper, Cameroon – Vale do Vinos wine and Costa Negra shrimps, Brazil – Colombian coffee, Colombia – Kona Coffee, Hawai'i, U.S.A.

Projet d'Appui à la Mise en Place d'Indications Géographiques

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Session 8

Participatory Guarantee Systems (PGS): a value chain innovation to boost smallholder quality management

Collaborative short food supply chain to make market inclusive for smallholder farmers: case of participatory guarantee system (PGS) in Vietnam

Van Anh Thi Truong[1]

With the majority of the world's rural poor engaging in agriculture as 75% of the world' poorest – about 880 million men, women and children-depend on agriculture and related activities for their livelihood, agricultural globalization is arguably the single most important global partnership for poverty reduction.

Whilst free trade systems increase the opportunity for agricultural production this production needs to be competitively produced both in terms of cost of production and in terms of meeting consumer demand. This is even more challenged in Vietnam where increasing agricultures factor productivity of land and labor is offset with the highly fragmented production systems due to the size of smallholder land holdings as well as the multiple plots that many smallholders rely upon. To enable the geographic expansion of value chain participation that meets a specified safe food standard, import standards in sufficient volume requires the coordination of a large number of producers. Therefore, small farmers are facing the high risks of exclusion of the high-value products supply chain due to the costs of coordinating production and the adoption of quality standards and certification system.

The Asian Development Bank's TA 8163: "Implementing Core Agriculture Support Program in Greater Mekong Subregion" promotes innovative agribusiness and farm management system to address these constraints and one of them is to adopt collaborative local supply chain using community based certification such as those that apply IFOAM' participatory guarantee systems (PGS). This report summarizes the findings of the TA' research group on the effectiveness assessment of PGS in Vietnam regarding as a coordination mechanism to establish inclusive collaborative supply chain for smallholders.

In 2008, the Agriculture Development Denmark Asia-Viet Nam Farmers Union (ADDA-VNFU) started working on organic vegetable value chains with a group of ten women farmers in Thanh Xuan Commune, 40 kilometers north of Hanoi. PGS is a community-based certification system that organizes farmers into groups and coordinates regular peer reviews or inspections of their members. The groups then come together and connect to consumers, traders, local officials, agronomists and NGOs working in the area. The groups are responsible for making certification decisions, maintaining the PGS standards and procedures, issuing approval seals, assuring compliance with ministry regulations, and publicly promoting the PGS system. Most of the work is conducted on a voluntary basis, which brings down the cost dramatically.

Several publications present the social and environmental benefits of farmers participating in this alternative system; particularly smallholder farmers who in principle adopt organic farming but cannot afford costly third-party certification system. However, less is known about the PGS as a coordination mechanism to form small farmers in groups to link them with market. Based upon works of other scholars on value chain development and organic certification, the study finds critical factors of PGS that make market work better for smallholder farmers. At the heart of value chain development is the effort to strengthen mutually beneficial linkages among chain actors so that they work together to take advantage of market opportunities. The internal connection in value chain is especially important to assess how able it is to link producers to the market.

In most of the cases, smallholder farmers cannot establish the necessary linkages to participate into the value chain is due to the high transaction costs presented by high standards and food quality. One option to reduce transaction cost is to use collective action to take advantage of the existence of the inverse

1. Asian Development Bank, Implementing Core Agriculture Support Program in GMS countries, Vietnam.

relationship between scale and transaction costs. Collective action including farmer organizations and cooperatives can be oriented toward improving production, marketing, or livelihoods in general. When trust, learning, and benefits are shared among chain actors (vertically and/or horizontally), there is a greater likelihood of generating collective efficiency and scale. For instance, the more that suppliers can be trusted to meet quality, quantity, and time requirements, the less time and money need be invested to monitor performance. However collective action brings with it a whole new set of transaction costs such as bureaucratic costs, mismanagement and free riding behavior. It is showed by many case studies that while there are examples that small farmers successfully participate in the market through collective action and institutional support, still there are many cases that farmers' income is not improved upon participation in a group.

Farmers first produced organic products due to their concerns on their health and environmental effects of chemicals used in conventional farming. Their practice is based on their local understandings of what constituted organic. Certification of organic production was a response to growing consumer interest in organically produced food during the 1960s and 1970s; as consumers and retailers needed to find a way of clearly identifying foods produced by farms that met clear standards. In other words, certification was generally unnecessary in cases of direct marketing in which consumers know and trust producers. As the products of organic agriculture moved into more anonymous markets, certification and inspection developed and became an industry with the involvement of several institutions. Multiple organic standards, private and commercial organic certification organizations emerged since the certification become value added, bring price premium to producers and retailers. However, these layers of standards continually move the templates that shape certification further and further from farmers.

PGS with its characteristics can help to address these challenges to include small farmers into high-value markets. PGS does more than an ordinary farmer group. It is a system where farmers are committed to follow agreed and locally adapted standards, quality control and certification system. PGS allowed a scope for local-level flexibility in setting standards based on basic organic standards set by IFOAM. It is also a system providing mutual trust and mutual control through trainings, peer reviewing, knowledge and skills exchanges and internal group inspection.

The direct linkages between Thanh Xuan PGS farmers with retailers help to establish a Collaborative Short Value Chain (CSVC) and to reduce intermediaries. Pre-adopting PGS without post harvesting activities, the raw products has been gone through farmers, local traders, wholesalers, retailers and final consumers in Hanoi market. With PGS adoption, farmers harvest the vegetables, sorting, handling, packaging and selling to retailers who have their own shops in

Hanoi markets. In this way, farmers create more value added and gain more profits. The data in 2011-2015 shows that each farmer get 38-41% income increased on average. Retailers participate in the system having frequent interaction with farmers, participating in the quality control and inspection and able to share production information with consumers. Therefore SFC also contribute significantly to make a transparent food chain that means the citizen who eats the food know exactly where the food comes from, how it has been produced, what the farming practices has been used.

In 2015 there are 245 PGS farmers producing 372.4 tons of organic vegetables on nearly 20 hectares nationwide. The average growth rate of total PGS vegetable sales from 2011 to 2015 is 35.3%. Currently there are two main PGS sites in Vietnam: PGS Thanh Xuan located in the Red River Delta region and PGS Luong Son located in the Northwest region. The differences in geography, social and natural conditions leads to the different performance of PGS groups between two sites. Compared the average yield of the period 2011-2015, production yield of PGS Thanh Xuan although following organic farming practice is 26.5% higher than production yield of conventional vegetable farming of Red River Delta while production yield of PGS Luong Son is 50.9% lower than production yield of conventional vegetable farming of Northwest region. It reveals that the soil and water quality, distance to the market, education of farmers, group leader's capacity and time spending on farm are critical factors for success in organic farming in general and PGS organic farming in particular. PGS as a form of collective action plus with

quality control, peer reviews and transparency is potentially beneficial to adopters but it is unnecessarily a guarantee for success. In term of land returns, both PGS Thanh Xuan and PGS Luong Son gain significantly higher return per hectare compared to the average land return of country planting areas. In 2014, while one hectare of planting area brought 79.3 million dong on average, one hectare of PGS vegetable brought 371.8 million dong and 114.5 million dong in Thanh Xuan and Luong Son, respectively.

Adopting PGS bring farmers an opportunity to have horizontal linkage with other farmers and at the same time vertical linkage with traders and retailers in the high quality vegetable value chain. In term of market linkage, the data collected from 2013 to 2016 shows that there are two main supply chain channels in place: (i) PGS sub-groups of around 10 farmers per group sell their products to retailers/traders in group basis, then the traders will sell PGS products at Hanoi market or to restaurants through their own stores or their own online marketing channels. The products are sorted and transported in bulk without packages to retailers who then use their own package and labels for the vegetables; (ii) direct sales where PGS sub-groups join as farmer cooperatives and the cooperative make transaction directly with retailers and individual consumers in Hanoi. The products are sorted and packaged with cooperatives labels and information and later transported to retailers.

In 2016, around 70% of the total vegetable sales are going through group-contract with traders while the remaining (28-34%) are sold through farmer cooperatives (direct sales). From 2013 to 2016, there is not much different in annual growth rate of the sales to traders and direct sales. Cooperative with its legal status as private entity is expected to be more beneficial to its members in terms of financial resources and input providing and outputs services compared to farmer groups, yet none of the farmers in sub groups want to move to cooperatives during past 4 years. There are several reasons including (i) people are risk adverse of changes, they rather stay with a system that they know well, (ii) the group of 10 farmers can do a better job of getting agreement among its members on its decision than a much larger group, (iii) traders are better at market facilitator compared to farmer cooperative.

It has been confirmed that farmer cooperative can take advantages of government and development organization programs, get access to financial support, gain economies scale in term of input supply and stronger bargaining power in trading with buyers. However, there is a need to strengthen cooperative leaders' capacity so that it is able to provide better services to its members as well as handle better the large groups of farmers in term of coordination in production, quality control and trading.

PGS is proved to function as inclusive collaborative short supply chain for smallholders; however, there are significant challenges with the system. The movement of the function played by middlemen or intermediaries back to producers. Successful association required management and entrepreneurial skills that many small producers with little education are less likely to have. Group leaders' capacity, strong commitment and responsibilities of PGS members as well as external support from public sector, private sector and development organizations are key determinants for success. In later 2016, the research team expects to get quantitative analysis of transaction costs and economic benefits of PGS adoption from questionnaire survey are being implemented. This analysis using propensity score matching to access PGS impacts will provide overall picture of economic cost of PGS and how it manage and develop market linkages. It aims to provide input to policy development for building safe food value chains in the fresh produce markets – both domestic and regional markets – that integrate smallholders (through horizontal coordination) and then link these to market demands (through market based vertical business relationships).

The building of agri-chains toward sustainable community development: experiences of applying PGS for organic and diversified agricultural production in Ben Tre Province

Mayu Ino[1]

Introduction

Traditionally most of the farmers in the world managed small-scale land by using local resources in a sustainable way. However, due to the expansion of the industrialized agriculture and globalization of markets, cheap agricultural products were brought ant sent across the border in many countries. This has created massive impacts on traditional small-scale farmers who used to produce small amounts of many different agricultural products and sold the surplus mainly in domestic markets.

In recent years, small-scale farmers also adopted the cultivation of cash crop, such as maize to survive in the era of changing international and domestic market demand. They started using F1 hybrid and GM seeds, chemical fertilizer and pesticides, therefore, production costs rose dramatically. The effects of climate change also became notably apparent, but traditional wisdom that has been inherited from ancestors, cannot often solve these emerging problems. Under these circumstances, small scale farmers cannot harvest enough to maintain their life in rural area and the number of farmers with a burden of indebtedness is rapidly growing.

In addition, natural resources which played the role of 'safety-net' for the poor households of the region, are degraded and disappearing through the residual effect of chemical pesticides, fertilizers and antibiotics. This problem made it difficult for poor households and small-scale farmers to obtain the resources necessary to life, such as food, medicine and fuel. Many young people and women in rural area go to factories and cities in the search of cash income. It has resulted in weak human relationship among family members, relatives, and neighbors in rural areas.

On the other hand, though the consumers can purchase cheap agricultural products, they have to worry about the impact of pesticide residues and chemical food additives on their own and family members' health. Because the process of production and distribution is not transparent. The consumers have only little information about agri-products that they buy and eat every day. Many children living in the city don't know how the vegetables and chickens are grown. Building mutual trust and cooperation among producers and consumers is urgently needed. Education must also be provided for children to make them aware about the relationship of humans and nature, as well as origin of our food production, processing, storage and transportation system for building the basis of sustainable and equitable development.

The same problems are evident in Vietnam. In Vietnam, nearly 70% of the population live in the rural areas, and around 50% of the population is engaged in agriculture. Vietnam is known as one of the world's leading exporter, of products such as rice and coffee. However, most of farmers are small scale growers and the lives of these farmers has not improved very much. One of the reasons is heavy dependence on the use of chemical fertilizer and pesticides or herbicides and a narrow selection of crops and vegetables. It has led to high cost of production and the degradation of natural resources such as soil and water and narrowing of biodiversity. The low quality of agri-products and lack of processing technology, are also serious problems. As for the consumers, the quality of food is the most important issue. Because many scandals regarding food safety has occurred in Vietnam, the consumers cannot trust the information available to them about agricultural products.

1. Seed to Table (STT), Tokyo, Japan.

In this paper, I report about the project for environment-friendly sustainable community development by enhancing cooperation among different stakeholders through the application of Participatory Guarantee System (PGS) in Ben Tre Province located in Mekong Delta. In this project, farmers, distributors, local government, schools, chefs and consumers work together to protect the natural environment and biodiversity of the region, and to improve the lives of smallscale farmers, help them deliver good quality agricultural products to the consumer, and ensure a safe environment and food to the children, our next generation. Thus, we aim to continue to build the foundation for sustainable society and environment.

Applying PGS for sustainable community development in Ben Tre Province

Ben Tre Province is located in the most downstream of the Mekong River. The primary activity is agriculture. Most of farmers manage a small piece of land, the average area of a farm is between 0.1ha to 0.3ha. Main crops are rice and coconut, integrated with vegetable production and animal husbandry. Recently, intensive shrimp farming is being widely practiced, and pollution of natural environment has become a serious problem. Furthermore, due to a serious salt pollution as the effects of climate change, people in Ben Tre province have been struggling to procure drinking water during the dry season.

Seed to Table has been working with Agricultural Extension Center (AEC) of Ben Tre Province to implement Organic Farming Project, aiming at improvement of the livelihood of small-scale farmers and simultaneously protecting local natural resources since 2012. PGS was introduced and applied in Ben Tre Province since 2013. Till dare, two Inter-groups and a Coordination group have been established, with five farmers group including 25 small scale farmers.

The members of the Inter-group and Coordination group include representatives of farmers' groups, agricultural professional organizations such as AEC and Plant Protection Office, Local government agencies, Department of Education, traders, and hoteliers. Regular meetings are organized and plans and problems are discussed.

The AEC plays an important role in our activity. They have been providing a series of trainings and advices on organic farming technology, ecosystem and biodiversity, and pest and disease prevention. Especially, The AEC staffs served as the representative of Coordination Group and Inter-groups to manage all activities regarding PGS for improving the quality of organic vegetables as well as securing transparency to keep consumers' trust on PGS organic vegetables. They are also responsible for coordinating different stakeholders such as government agencies and educational institutions.

In addition, the Communist Party and People's Committee of Ben Tre Province have started promoting organic farming since early 2016. For example, in cooperation with the hotel in Ben Tre Province, People's Committee of Ben Tre Province has tried to introduce various dishes made with organic vegetables, produced by the farmer groups that are participating in PGS, at the dinner party held by government agencies. Or Department of Agriculture and Rural Development in Ben Tre Province is preparing to organize regular Farmers' Market to introduce organic vegetables to people living in Ben Tre Province.

In Binh Dai District, where organic farming has been practiced since 2012, some farmers groups have been making effort to grow coconut and banana organically to diversify organic products. Furthermore, Seed to Table collaborates with chefs and experts of food processing in Ho Chi Minh City to develop sweets and another processed food by using organically grown coconut and banana. In this activity, we encourage poor households, especially women participate to obtain cash income for improvement of their livelihoods.

Another activity is providing environmental education for children. We cooperate with Department of Education and the orphanage in Ben Tre Province to established a school garden in order to carry out a training for children. Some events are also held to exchange ideas and experiences with local people on organic products and environmental protection.

TEIKEI – building mutual trust between farmers group and consumers group

In Japan, a producer group directly supplying agricultural products to a consumer group is very common. This type of cooperation is called TEIKEI. In Vietnam, TEIKEI has not been common yet. If there are relatives in rural area, consumers in the city asked them to send agricultural products on a regular basis. In PGS, it is widely applied that organic vegetables are distributed by traders. Because it is easy to manage the production and sales. However, in the case of PGS Ben Tre, the relationship between a local distributor and farmers groups was not so well, and farmers group were not able to sell their organic vegetables. We urgently needed to expand the sales channels in addition to cooperation with traders.

Under these circumstances, we had an opportunity to participate in the farmers markets that are regularly held in Ho Chi Minh City. The great thing of this event was promoting direct sales by producers. Three producers' groups from PGS Ben Tre joined and introduces their organic vegetables to consumers. The members of farmers' group learnt about the information on organic vegetables, about which the consumers were concerned. After joining first market, farmers from Ben Tre Province had more self-confidence and were motivated to produce good quality of organic vegetables. Through participation in this market, organic vegetables of PGS Ben Tre was gradually known and accepted by people living in Ho Chi Minh city. Every time, 200 kg or organic vegetables were sold out in one day and a lot of repeat-buyers began to enjoy the organic vegetables produced by the farmers of Ben Tre Province.

In this process, we met many traders and consumers who wanted to buy organic vegetables of PGS Ben Tre and discussed further cooperation. Of these, a Bin Dai District-born woman established 'Saigon Green Family Group (SGFG)' and started buying organic vegetables directly from Loc Thuan farmers group every week. The remarkable thing about this group is close communication with Loc Thuan farmers group, Inter-group and Seed to Table. For instance, every time the organic vegetables arrived, they checked the quality and packing method and if there were problems, told Loc Thuan farmers group, Inter-group and Seed to Table immediately and discussed about the best possible solutions. Sometime the members of SGFG with their children visit Loc Thuan farmers group to exchange ideas and discuss for further cooperation.

Through a partnership with this group, Loc Thuan farmers group try to improve the quality of organic vegetables and carefully pack vegetables and deliver to SGFG. The price for selling to SGFG is 60% higher than the price sold to traders. Currently, Loc Thuan farmers group built a good mutual trust with SGFG and help each other as family members. Other farmer groups also feel attracted to this method and have begun to seek a partnership with consumer groups.

Future plan

The most interesting part of PGS is building transparent and fair agri-chain by cooperation among different stakeholders. PGS is built based on mutual trust and self consciousness of people who participate. It is possible to issue a certificate of organic agricultural products at a lower cost, while also contributing to sustainable development of the region.

Future challenge for PGS Ben Tre is enhancing cooperation not only among farmers groups and traders, but also between consumers' and farmers' groups. Because the experience in Ben Tre Province showed that if a farmers group can meet a consumers group that sincerely hoped to understand about farmers' situation, environmental issue, and to cooperate with farmers for a long time, farmers would take responsibility with the quality of their product and their capacity would be improved. Also, for consumers, they can see the 'face' of producers and directly communicate with them to understand more deeply about what is the relationship between consumers' health and environmental protection.

In addition, developing food processing is necessary for utilizing all organic agricultural products, increasing income of small-scale farmers as well as creating jobs for poor women in the region. Through Inter-groups and Coordination Group, building and enhancing a relationship among different stakeholders is crucial to develop a strong foundation towards an environment friendly, sustainable community development.

I believe that these activities and efforts will contribute towards the achievement of some goals out of the 17 points declared as the United Nations' Sustainable Development Goals, such as No poverty, Zero hunger, Decent work and economic growth, Responsible consumption and production, and Life on land. At the same time both technical skills and feeling of community cooperation, especially among the participating women develops. Seed to Table will continuously work together with people in Ben Tre Province for building an eco friendly sustainable community.

Participatory guarantee system (PGS) the sustainability assessment for vegetable in Red River Delta – Vietnam

Dao The Anh[1]

The study focuses on the suitability of PGS structure and organization in Vietnam where smallholder farmers account for over 80 percent of agricultural producers. The manner of PGS organization is suitable for the production conditions in Vietnam because participatory approach enables farmers to run the system by themselves. The farming households have been provided with production knowledge, inspection skills, commercial skills, and negotiation skills. PGS has shown its economic efficiency over the years, with higher income compared with the conventional vegetable production. PGS-certified vegetables bring about US$100-200)/360 square meters/crop higher benefit than vegetables grown in conventional way. Meanwhile, the certification cost is low and affordable to the smallholder farmers about 10-15 Ú DS/household/year. Especially, distributors in the PGS network also join to share the burden of certificate cost about 50 USD/year. PGS has also established connections among organizations of producers, distributors and consumers. Thanks to PGS application in vegetable production, PGS has built up trust and attracted more stakeholders to the network. Currently PGS has been expanded in the existing production regions by local government finance and policies to improve the effectiveness of agricultural production.

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POSTER

Scaling up sustainable food systems in a local context: an experience of the freshveggies PGS scheme in Wakiso, Uganda

Julie Nakalanda Matovu[1]

In pursuance of sustainable livelihoods through organic agricultural production systems, Freshveggies, Uganda, has undertaken yet another inclusive approach to develop local markets for their organic produce within their PGS (Participatory Guarantee System). Amidst the existing challenges Uganda faces towards sustainable agriculture development, smallholder farmers have limited access to fair markets in this liberalized economy. Without guidelines on pricing agricultural produce, farmers often sell at very low prices. In the PGS approach; producers are able to reach out to consumers directly, respond to the consumer needs and these in turn with continuous interaction are able to appreciate the entire food production system in reciprocal. Such local innovations are in line with the global goals for sustainable development. Following established organic standards, this directly contributes positively to reduction in poverty, hunger and inequalities while also promoting economic growth at grassroots; sustainable cities and communities; responsible consumption and natural resource conservation for life on land and below water.

Since its inception, the initiative promotes healthy feeding and sustainable farming practices among members, but also sustainable household incomes from sales and delivery of fresh organic produce to consumers in the Kampala business district and the respective farming communities. Our vision of **"safe food in the garden and on the plate"** aims to have economically empowered, motivated and healthy farming communities able to produce and supply organic food to sustain a happy and healthy clientele in Uganda.

Our clientele has expanded currently to 50 households (about 200 consumers). To respond to the growing demand and the need for scaling up as reflected in the recently published findings by FAO (2016), the scheme has undertaken a Participatory Market Research (PMR) using a tool adopted from different existing marketing models but customized to suit the PGS mechanism. Hence, Freshveggies has targeted 250 households and aims to start with the first 100 households within the same geographical location of the Wakiso cluster, who commit to buy fresh produce directly from Freshveggies. Wakiso being a peri-urban district soon transforming into a city is a now a home to many new young families and old existing ones having about six(6) people each on average. This will see freshveggies serve about 600 new consumers within the next four months to scale up its consumer base and income among participating members in addition to the exiting clientele. Using the findings by FAO (2016), coupled with the inaugural one-year MAIL (Market Access to Improved Livelihoods) development plan implemented by two participants (Julie N Matovu – Freshveggies, Jane Nalunga – NOGAMU, [under the ending IFAD-funded three-year INOFO capacity building project, implemented by IFOAM and local partners, has embarked on planned production with appropriate technologies such as drip irrigation and intensive knowledge sharing through the INOFO trainings/interactions to produce the highly demanded scarce high value fresh organic fruits & vegetables within the communities of Wakiso District. Freshveggies has also attracted a membership of youth to boost production. In addition to the PMR, under Juls Consults, an affiliate of Freshveggies another "product" of establishing organic home vegetable gardens has been developed and well received to reach out to more consumers and avert the logistics limitations. The package has, an assortment of seedlings, a training session on basics is offered to a client to raise home-grown organic vegetables for a whole season of continuous harvest, while receiving free technical advice on management during this period. We are now recruiting interested youth to join the field

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training team that is technically able respond to growing demand, while improving consumer knowledge, awareness and appreciation of sustainable food systems. The later, coupled with the on-going Participatory Market Research are yielding promising results which we would like to share our experience, learn at this conference.

POSTER

Smallholder vegetable quality guarantee challenges of VietGAP adoption and alternative Participatory Action Research (PAR)

Pham Tho[1]

Vietnam has been facing a food safety crisis. In response, since 2008 Vietnamese Government has promoted a voluntary standard named VietGAP (Vietnamese Good Agricultural Practices) based on HACCP, ASEANGAP, GlobalGAP, and Freshcare (MARD, 2008). VietGAP has been perceived as unappropriated to smallholders due to technical, financial and marketing constraints. Above of those, VietGAP vegetables, which are certified by a third party; however, the certificate has not obtained a good reputation due to lacking of the transparency of accreditation as well inappropriate practices of the chain stakeholders. Low trust of consumers on VietGAP vegetables is also originated from their low trust on a weak system of quality control. Vegetables, which are mostly produced by smallholders but they are also excluded in the quality control regulations of Vietnam. Smallholders do not have to comply to compulsory technical requirements for vegetables (QCVN 01-132:2013/BNNPTNT, National Technical Regulation on Fresh Vegetable, Fruit and Tea – Conditions for Ensuring Food Safety in Production and Packing, 2013) while most farmers producing vegetables are at a small (occupying around 0.42 ha in Red River Delta of Northern Vietnam (VAAS, 2014)). Addition to that, sanctions for unsafe food producing and trading are not stringent. Obviously, once compulsory safety ensuring is not reached, a voluntary VietGAP vegetable would have to strongly compete with conventional ones in the market. As a result, most VietGAP vegetables with external supports have not been sold in high-end market at higher prices; have not improved smallholder's income, thus unstable

That context leads to a paradox in which farmers producing safe guaranteed vegetables could not improve incomes, traders would like to buy guaranteed vegetables but reluctant to trade certified products if they could not supervise the production, consumers demanding on safe foods but not willing to buy certified vegetables. In such a context, transparency is a key to the success. Related to that, safety, the most demanded characteristic, and one of credence attributes (defined as *environmental benefits, animal welfare benefits, social welfare extras, and special health benefits)* which are only known by producers and unknown by consumers or consumers could not check (n.a, 2010) should be well illustrated and trusted by consumers. In reality, there have been some effective alternative approaches to VietGAP such as PGS organic vegetables in the framework of programs of NGOs or specialist-shop-retailers coordinating the chain with groups of small farmers in quality guaranteed vegetables producing and marketing.

This study was conducted in the framework of a Ph.D degree (2012-2016) aiming at defining challenges of VietGAP adoption, using Participatory Action Research (PAR) as an alternative to VietGAP approach, which was designed and supported in order to apply in the chain. PAR was used to involve all key stakeholders in the process of choosing, applying and maintaining a suitable "standard" or "protocol" to ensure vegetable safety/quality and agreeing on marketing. By doing so, the study provides an insight to the issue of improving the safety of vegetables in Vietnam through a broader view of "standards" coincide with value chain development, which focuses on all key processes and stakeholder's perspectives. Therefore, the study contributes to scientific knowledge of PAR application to response to the problem of a particular context of unsafe vegetables in Vietnam and improves policy making procedure in a long term. In a short term, the alternative approach will bring incentives to involved stakeholders; and finally, the whole community will be benefited.

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Conceptual framework and methodology

Research processes

PAR is a process of collaborative research, education and action used to gather information to use for change on social or environmental issues. It involves people who are concerned about or affected by an issue taking a leading role in producing and using knowledge about it (Pain, Whitman, Milledge, & Trust, 2010). Pain *et al.* (2010) and (Kemmis & McTaggart, 2007) indicated that there is a continuing cycle of engagement moving through four phases: information gathering, planning, acting, and reflecting.

Time, financial and other limitations of the study has led to an application of PAR only in two phases (information gathering and planning). Value chain approach was also employed in those phases. The study design is described as below:

Stakeholder planning workshop

The aim of the workshop is to gather interested stakeholders of the chain to discuss how to improve quality and income of vegetables for smallholders through 2 main sections:

- Information providing
- Discussion

Information presented in the stakeholder workshop would consist of two main messages: the situation of VietGAP adoption and other types of quality guarantee by standards or mutual trust; and what stakeholders would like to apply in their chain (focusing on types of guarantee and marketing strategy).

Main results

Literature insights

Different types of quality guarantee

- Safety and quality, credence characteristics of food quality and the role of food standards and certificates.
- Overview of different types of food standards: public and private, compulsory and voluntary.
- Standards and Schemes

GlobalGAP – a schemes with *"numerical standards"* consisting of a limited amount of chemical residues and *"process standards"* having production procedure requirements and all written recording needed. Food schemes include food standards and also certifying and enforcing processes and sometimes the use of those two types are exchangeable.

- Third party certificate

A product certificate usually issued by a third party is a document to promise that the product meets specific standard criteria; therefore, the third party certificate is usually knowns as a mean to persuade buyers that the product quality is assured (Dankers & Liu, 2003, p. 8).

- Internal control system
- Participatory Guarantee System
- Standards and value chain governance:

Some private collective voluntary standards like GlobalGAP require a coordination of different stakeholders at different stages along the chain as well as a coordination of the same type of stakeholders (Hammoudi, Hoffmann, & Yves, 2009).

- Limitation of standards, specifically GlobalGAP to smallholders: Exclude smallholders in the export market.
- Opportunities to linking smallholders to market by upgrading quality

- PAR overview and application worldwide, strength and weakness
- VietGAP in a particular context of Vietnam (market situation, food law, and regulations)

Reasons for the challenges of VietGAP adoption

- Weak food safety control system: Food law, regulation (compulsory), ability to control especially the compulsory regulations exclude smallholders.
- VietGAP is a top-down approach: Comparison of VietGAP and GlobalGAP. Similar articles of "numeric standards" and "process standards", different in demands and management: GlobalGAP is from retailer's demand and VietGAP is from the Government strategy for food safety assurance.
- Governance of the chain: When applying VietGAP, the governance of the chain has not changed, still characterized as "spot market" that could not continue to maintain quality control and marketing of improved quality products when withdrawing supports from the Government.
- Technical, financial and market access difficulties faced by small farmers: costly, complicated, selling to conventional markets...
- Retailers' perspectives are not only buying VietGAP products
- Market situation including consumer's demand: Consumers have more trusts on market locations and retailers. Condition of land and water, pesticides and chemical residues are more prioritized. Therefore, in Vietnam context, complying public compulsory standards is more recommended than VietGAP, which is based on GlobalGAP ensuring safety and other environmental and social requirements.

Alternative approaches

The key massage from the challenges of VietGAP adoption is that food safety is difficult to solve by setting a voluntary standard to the chain to comply. It should be done by compulsory regulations or standards. If so, any types of voluntary standards and quality guarantee could be eligible to choose. In the context of low trust, the crucial goal of a voluntary standard is to create a transparency of the quality assurance process and to share benefits among involved stakeholders from an agreement on marketing plan.

Cases of building a transparent system within the chain

- Safe vegetables from farmer's groups linked to high-end market: No certificate issued but mutual trust and good coordination of retailers
- PGS organic vegetables and specialist shops
- Non-standard and moral trust: Online, direct selling, retailers hiring land and labors

Stakeholder's workshop results

Process of the workshop

- Information providing
- Group's discussion

Group 1: Producers – *Group 2:* Producers, wholesalers – *Group 3:* Retailers and consumers

Questions to the groups

- The kind of quality standard do you think is best and why?"
- For developing quality standard chosen from morning section – What are the different ways this could be achieved? How do you get there?"

Outcomes

"Safe standard", which is no longer the public voluntary standard, was chosen by small farmers and other traders to apply in the chain. "*VietGAP*" was chosen by the only one private production company

who has more than 5 ha of producing vegetables and other products. *"PGS organic standard"* is the most preferred standard as no chemicals and pesticides are used during production.

To achieve the goal of quality guarantee, small farmers and traders agreed on:

- Improve marketing and advertising skills
- Transportation mean needs to improve: cooling vans
- Clear information of vegetable origin and ensure the transparency of the whole process from production and marketing.
- Post-harvest should be improved to reduce lost and quality.

Implications

- VietGAP adoption has faced difficulties due to multiple causes. Technical, financial and marketing constraints might be foreseen as the approach of VietGAP is top-down, designed and promoted by the Government.
- The involvement of stakeholders during VietGAP application is passively receiving supports or plans from the program, leading to a failure of many models after subsidies are withdrawal.
- The success of current alternative approaches is from active involvements of stakeholders in linking small-farmer to high-end market, less costly process of quality assurance (mostly non-third-party-certified products).
- PAR application showed that VietGAP is not preferred by smallholders and retailers but only big scale company.
- From the discussions and decisions in PAR process of stakeholder's workshop, it is clearly seen that VietGAP is not the only option to ensure safety. The Government should consider other standards or approaches to the problem rather than focusing on VietGAP.
- Successful voluntary standards or other types of quality assurance in smallholder vegetable chain are based on a closed linkage between traders and farmers; sometimes, built up from mutual trust, long-term relationship, which is more credible than a third party certificate.
- Voluntary national standards would not solve the problem of unsafe food; that should be.
- Done from setting and controlling mandatory ones. That will be considered the long-term goal.
- PAR application showed that although retailers are buying non-certified vegetables (like safe vegetables), they still need to get a more informal assurance of the quality.

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Participatory Guarantee System, a management tool for value chain development – A lesson learnt from Vietnam

Nhung Tu Thi Tuyet[1] and Nhung Tu

Introduction

Since VietGAP has introduced by MARD in 2008, less than 0,5% of all vegetables produced in Vietnam are certified by VietGAP. Its may because of cost for certificate too high while the consumers still not trust enough though program under the big support of government,

The certification is the set of procedures from observation, registration, verification, reports and recognition that developed to obtain the guarantee for a specific product. The certification can be compulsory or voluntary depends on the product, the process involved and pertinent legislation. Getting through the certification process, producers obtain the advantages to aggregate value, access products to new markets and stimulate continuous improving in quality. It also help consumer to distinguish more easily between brands, products with the same appearance and different qualities, and provide security and warrant to guarantee the diversification of quality products.

The PGS is a participatory guarantee system already established in more than 50 countries around the world. Started in Vietnam 2008, PGS poses a highly viable solution for quality assurance in agricultural food products produced by small farmers. In support of the local government's intent to improve the overall safety of food in Vietnam and build consumer confidence through the certification products, there are some development organizations operating **in the country such as ADDA**[2]**, VECO**[2]**, Seed to Table**[3]**,ACCD**[4] provide interesting models of how farmer compliance organic standards in groups and provide consumers the products with a quality assurance in community certification system that they can clearly identify with trust. These initiatives have successfully adopted what is known as a PGS (Participatory Guarantee System) approach that make small farmer in the organization to produce quality products with fair stable income

What is PGS?

PGS is a system guarantees the product quality, which involves relevant stakeholders to the production value chain, including the producer, consumer, trader and the Government.. PGS is suitable for small farming households, adaptable to local situations, locally governed by farmers themselves, socially accountable through the cooperation of an alliance among farmers and other stakeholders

Just like third-party certification systems, PGS aims to provide a credible guarantee for consumers seeking organic produce, but the approach is difference in the direct participation of farmers, consumers and other stakeholders in the verification process. Costs of participation are low and mostly take the form of voluntary time involvement rather than financial expenses

Structure of PGS Vietnam

The PGS has a simple structure consisting of a number of "units", each having its own roles and responsibilities as illustrated in the following figure and the text below.

1. PGS Vietnam, Hanoi, Vietnam.
2. Agricultural Development Denmark Asia, Hanoi, Vietnam.

The individual farm family

To join a producer group the farmers contact the producer group leader in their area. The main roles and responsibilities of the farmers and their families include:

- Learn the principles and methods of organic farming
- Learn the PGS standards
- Fill in the Farm Management Plan (FMP) and update it regularly
- Make the pledge (and strictly follow the pledge)

The Producer Group

A producer group consists of at least 5 individual farmers who live in close proximity. The Producer Groups will:

- Make the production plan for the group and to promote the group's products
- Conduct the regular peer review (inspection visits) of all the groups members
- Motivate the group members to achieve goals and objectives of the group
- Ensure equality and avoid conflict of interest between the members

The Inter – Group

An Inter-Group covers a number of Producer Groups in a particular area. The members include the heads of all Producer Group as well as some outsiders such as consumers, traders, local officials, farmer-trainers or NGO staff, working in the Inter-Group area.

The roles and responsibilities of the Inter-Group are:

- To coordinate the process for farmers completing the FMP's and pledges and to make sure that the members understand the PGS standards
- Keep a database of members and their organic status and production activities that is updated each year
- To coordinate the peer review process
- Take the decisions on certification
- To take action on fraud and non-compliance
- To coordinate the production plans for all Producer Group within the Inter-Group and to promote the Inter-Group's products
- To report annually to the PGS Coordination Group as required

The PGS Coordination Group

The PGS Coordination Group is responsible for big issues that are common to the Inter-Groups as a whole. The members of the Coordination Group are volunteers who are selected for their technical competence at the PGS annual member's meeting.

Roles and responsibilities of the Coordination Group include:

- Protect the interests of the Inter-Groups, farmers and the PGS
- Maintain and update the PGS organic standards and approve the farm inputs guidelines for inspections and sanctions
- Issue certificates
- Responsible for the management of the PGS seal (trademark)
- Promotions and contact with mass media

Belgium NGO
Japanese NGO

Action Center for the City Development

PGS Vietnam formed in the functional teams with participation of stakeholders includes farmers, retailers, consumers, Farmer Union/Women Union or any local interest institution… At the local, there are at least 2 producer groups established to create the Inter-group for a linkage between. A system include action plan, regulations, check list, PGS manual guide, logo/seals ect… are developed. Training of inspection, leadership, accounting, planning, dealing and post harvest… are carried out to build capacity for farmers. Peer review process (monitoring/ auditing) which coordinated by Inter-group to take the decision on certification and send to PGS.CC for issue the certificate. In order to protect the PGS seal the Coordination Group will have the right to check the internal workings of both the Producer and Inter-Groups when required. PGS.CC will also issue the certificates and have the right to withhold certification.

Steps in the PGS Organic Guarantee Process for producer

Certification is open to farmer groups. There is a separate system under the PGS for managing the organic integrity of the certified products along the whole value chain to include processors, traders and retailers. Each step of process is implemented separately by each functional team and managed by the Coordination Group operators. Obtaining certification also allows the use to the PGS seal.

Step1: Farmer
The farmer must attend training on the PGS organic standards and then sign a Farmer's Pledge that s/he is willing to follow these standards and the PGS certification procedures.

Step 2: The Inter-Group will verify that the FMP is completed sufficiently and then will inform the Producer Group to carry out the peer review.

Step 3: To ensure consistency among the inspections, the PGS group inspection checklist must to be used.

Step 4: Based on the Inspection Checklist reports and other reports (*e.g.*, the soil and water tests), as well as a check on the Farmer Pledges and FMP's the decision is made by the Inter-Group Certification Committee on the certification status of the farm. The decision is sent to the Coordination Group including the actions required to address non-compliance issues.

Step 5: The Coordination Group enters summary information for each farmer into the database and sends a paper certificate to the farmer that is valid for 1 year from the date of the inspection visit to the farm.

Step 6: Farms will be re-inspected each year. The Inter Group Certification Manager will manage the re-inspection process. Prior to the inspection the farmers will update their FMP and check their records (inputs used and sales).

Step 7: The inspection, decision-making and approval process follows steps 3 -5 shown above.

Step 8: Each year, the Inter-Group Certification Manager will randomly select 10% of the inspection reports and Inter-Group members will re-inspect these farms and report their conclusions to the Inter-Group certification committee.

Develop market

When production is organized, develop the market for produce are very important to motivate production and keep farmer going on organic farming. A direct market shown it is not able to sell all products with premium price. PGS Vietnam focus on develop a value chain by linkage producer groups to retailers/traders for a further market in Hanoi capital. The business between traders and farmer groups are made under the contract. Organic PGS products sell through different channel in Hanoi market such

as: Special shops, home delivery, and online markets. The modern market like super markets was tried but it was unsuccessful. To raise the awareness of consumers/people and exchange knowledge, organizing the event as talk show, workshop, joining fairs, and propaganda via TV, media, organize Eco-tours of consumers, students, school pupils and kid are often organized by the retailers with support of PGS.

In PGS, traders who make direct contract with farmer groups have to register PGS. All PGS member include farmers and traders have duty to pay fee for operating PGS. The traders have committee not only doing business but also with farmers monitoring quality and support them when have difficulties.

Monitoring quality along value chain

To develop a sustainable system, ensuring the quality of products from farm to table must be taken. The nnetworks from grass-roots are developed for monitoring quality on farm together with a 5 volunteers often visit shops where selling PGS products to check the transparence. PGS with participation of the enterprises, local people and others stakeholders take action to manage quality along organic value chain from farm to the markets. The chain are systematically organized in cooperative /association/groups for cross check of products both in conversion also already certified.

A regulations and format for PGS packaging/labeling are agreed between PGS coordination Committee (PGS.CC), farmers and retailers. Only farms are certified by PGS can sell products as organic. Every PGS certified organic vegetable package thus can be traced back to group who supplied.

Growing interest

The interest of consumer in organic vegetable is growing that motivate farmer expanding production. Currently, more retailers are seeking organic products, and register as PGS member. Three Cooperatives of organic agriculture are established. Without any fund from outsource since project ended in 2012, farmers and traders all agreed to pay fee for running system and cover inspection and monitoring costs.

Important implication of PGS

PGS is an effective guarantee with low cost for small holders. PGS significantly raised the awareness and capacity of farmers and stakeholders on food safety issue. It created grass root networks where farmer working together to show up their responsibility for community and securing food safety as well as for people meet to share and learn. Joining in PGS, trader and farmer sharing responsibilities and benefits of monitoring and quality guarantee a long product chain. Not only increase stable income per month (50-100%) but also improve relationship among their community. Currently, more provinces of Vietnam are interest and expect to adopt PGS (Hoi An city, Ben Tre province, Ho Chi Minh city).

Constrains

- PGS is still very new and not many people know including government.
- Not yet recognized by government even it has showed many advantages for enhancing small-scale production.
- PGS has not yet to receive support from government as a local market guarantee.
- Limited consumer awareness of PGS/organic.
- Difficulty in scaling-up PGS without government support for land policy.

Lesson learnt

- PGS certification should in group where producer member share benefits and responsibilities.
- To links farmers with the market, forming a realistic chain with traceability is the optimum option that make farmer become more professional with premium prices for their quality products.
- To establish a successful PGS network, at least the existing group or network of farmers who want to produce organic products with the concerning of authority.

- Suitable land area that is tested or very likely to be free from chemical contamination at present and future.
- Local Government support for the PGS concept that make resources available to help PGS initiative start especially the policies for land using.
- Select retailers/trader who want to be PGS members must have strong committee not only to buy PGS produce but also involve in daily quality monitoring and sharing with farmer.

Short and small *vs* long and big supply chains: the case of Bac Tom

Manh Chien Tran[1]

Rationale

Short and Small Supply Chains of perishable foods for better information are growing quickly in Vietnam, particularly in big cities. Bac Tom is a pioneer which provides foods of high quality, including organic foods. When consumers purchase a product from Bac Tom, they can call back all necessary information such as production area, procedure, and supplier. These pieces of information are very meaningful for them, particularly in the context of no recordings in the farms and markets as majority.

In recent years in Vietnam when income is increasing, consumers like foods of high quality and with information of production. A lot of stores and supermarkets are claiming safe foods but with limited information due to their long supply chains with short term strategies of stakeholders involved. They want to sell a huge volume of a wide range of products in a short time with competitive prices. However when consumers ask about where the produce come from and how to control the quality, they are not answered. Their popular supply chain is as long as this, with no contract: Producers (~ 0.1 hectar/each) -> Collectors -> Primary Wholesalers (night market) -> Wholesalers -> Retailers -> Consumers. Additionally the buyers do not care about their produce before supermarket gates. Prices and appearance are two main elements for their purchasing decision. A couple of legal papers are required and available for consumers. However they do not trust these papers. Therefore the need to improve the trust from the consumers is at the first priority in order to sell foods of high quality

Objectives of new supply chains

To gain trust from consumers by providing them detail information of produce

Challenges of gaining trust from consumers for new supply chains

- Quality control and certification systems by government are not trusted by consumers
- 80% consumers do not trust official certificates by government
- No certification system for organic farming yet in Viet Nam. Ministry of Agriculture and Rural Development have been working for several years for this but no results yet.
- The majority of fresh produce in the market cannot be traced due to long supply chains and no recording from farm levels to the market
- Very small scale farming as majority in Vietnam, therefore reallocation is necessary and it takes a lot of time and energy
- Farmers are mainly women and old, who are normally poorly educated and therefore it is hard for them to learn new things and make a change
- Consumers get used to open and convenient market

Bac Tom as a pioneer in minimarts of foods: Small and Short

The chain stores were founded to supply consumers with products of good information about quality and control systems by direct contracting with small producers or collectors/groups. Bac Tom was founded as one of the pioneer in the market. Its name is sourced from “The cabin of Uncle Tom”. The idea is that we are always loyal to our host-customers, the same way that Uncle Tom was doing with his host

1. Bac Tom – Vietnam

family in the famous Novel of America in the mid of 19th century. The first store was founded in 2010 by a value chain specialist. There are 27 stores at the moment (August 2016) and regularly 1-3 is opened every month

These stores are all new in the market. Their supply chains can be displayed as simple as following: Farmer groups -> Retail Stores -> Consumers. Farmer groups contract with Retail Stores to make sure that they comply with the quality, the range of produce and the seasonality as requested. Therefore the information of farming is available to buyers.

To review our first step in contracting with farmers, it was a big challenge to make farmers happy with the volume and selling prices. It was not that case from the beginning due to the fact that farmers do not trust their buyers. Therefore it was very challenging to convince farmers to comply with PGS organic. Bac Tom had to go ahead with the contract and pay in advance or credit for small farmer groups of 5-10 members with ~ 0.5 hectare/ group. Additionally, training in advance is necessary to provide farmers with advantages of reallocation, new management styles and quality inspection system; market opportunities are also very important for farmers before making a shift. In order to do the above activities, partnership with NGOs and local government agencies is crucial. They help us build capacity for farmers promote them to get organized in groups.

In the meantime, the quality and detail information of farming must be exposed to consumers. In order to do so, the farm management team is responsible for inspecting the produce from the farm, while the quality team is responsible for checking the produce at the general store and retail stores. The information gathered is then displayed in retail stores and the media (website, facebook). Especially facebook is emerging as a powerful tool in marketing. It can be useful for small firms as it does not cost much and most of young people in Vietnam are get used with it. However, in order to disseminate our messages, staffing is crucially important. Our sales staff must be trained to understand very well about produce. Particularly they must go to the field and talk with farmers to gain deep knowledges of production.

Farm tours are developed for pupils and parents to disseminate the message of quality. They become very much interested in discovering the farms and the way producers manage the quality.

Regular meetings are also of an important tool for sharing experiences and reflect feedbacks from consumers. Satisfying consumers is always on our first priority.

In addition, the collaboration with NGOs is very important in making use of development projects. They have a good understanding about farmers. Therefore they help organize farmers in groups and empower them to work with the market. Working with NGOs is also good for retailers as consumers tend to trust NGOs more than traders who conventionally don't have a positive position in Vietnam.

Very recently our PGS network and retailers are working with digital traceability which help call back the producers and production procedure by code and smart phone.

Diversity of produce

When you gain trust from consumers, it does not mean that you are sustainable. Particularly it is true in vegetable supply chains. Why? Vegetables are cheap in Vietnam, and they are bulky. Therefore retail stores which sell vegetables only are very difficult to gain profits. They must expand to other products such as fruits and meat. Bac Tom was originally a vegetable store and had quickly diversified to a wide range of perishable foods. By that way, consumers can do shopping in one place and save time. This trend has resulted in a new type of minimarts which is specializing in fresh and perishable foods: vegetables, fruits, meat (pork, beef, chicken, duck, fish, sea fish)

Profile of stakeholders and produce

- 90% of our customers and staff are women; 85% of our customers and 95% of our staff are under 35
- 90% of our producers at farms are women; 80% are above 35
- 60% of veggie are organic and 40% are safe (natural)

Recommendations

- Re-allocation for larger concentrated areas per household
- Organic standards and certification systems should be available
- Standards are recognized in other countries in Mekong region for export opportunities and produce exchange
- Certification bodies should be empowered to be trusted by consumers, therefore they are used in third party certification
- Standards and certification systems for small farmers groups should be available in a way that the cost is acceptable and the recording is appropriate
- More investment in promoting and marketing instead of focusing at farmers and production level
- Farmers are empowered to be as tour guides on their farms and also a marketer for healthy foods. This will help bring in more customers to visit the farm
- Foundation of a group of sustainable agriculture enterprises for sharing experiences and products

Session 9

City driven food chains
and sustainable development

Transformation of the vegetable supply chain in Mar del Plata (Argentina) in the face of raising health concerns

Ophélie Robineau[1], Maria-Laura Viteri[2] and Roberto Cittadini[3]

Introduction

Urban food issue is taking more and more importance in the political agenda (Pothukuchi and Kaufman, 1999; Krausz *et al.*, 2013; Morgan, 2015). A new food equation (Morgan and Sonnino, 2010) is taking shape both in the global North and the global South (Blay-Palmer, 2010; Koc *et al.*, 1999) and the city scale appears relevant to build a food governance oriented toward sustainable food systems (Sonnino, 2009; Perrin and Soulard, 2014). The underlying idea is the design of more sustainable food systems that answer current urban food issues (Viljoen and Wiskerke, 2012; Mansfield and Mendes, 2013).

Agriculture and food systems have long been polarized in the scientific and the public debate by "conventional versus alternative" models (Beus and Dunlap, 1990). There are dual perceptions about the best suited model to go toward the construction of sustainable food systems. However, authors increasingly warn about the risk of restrictive views defending alternative as fundamentally good and conventional as fundamentally bad (Trauger, 2014). Recent research examine the porosity of both models (Deverre, 2011; Le Velly and Dufeu, 2016): intermediary forms and the coexistence of models in local territories is thought as a possible condition to build resilient and sustainable food systems (Visser *et al.*, 2015).

In Argentina, as in many Latin American countries, the dominant agricultural industrial model also identified as the "conventional" one – and the model oriented towards agroecology – the "alternative" one – coexist and confront (Altieri and Toledo, 2011; Cittadini, 2012). The conventional model is deeply rooted in the national foodscape whereas the alternative one developed in the last decades in a context of economic crisis, when various national and local programs aimed to develop agriculture for self-consumption (based on the principles of agroecology) in urban and rural vulnerable households. Then, from mid-2000s, rising health concerns have been put at the forefront of the political and media scene by environmental associations who are strongly challenging the industrial agricultural model because of its high level of pesticide use. The use of pesticides near urban settlements and their health effects are the main cause of conflicts that arose between producers and their neighbors in suburban areas (Pérez *et al.*, 2013). In many urbanized regions of Argentina, the lobbying of these associations resulted in the adoption of municipal laws prohibiting the use of pesticides in a defined perimeter around urban centers (Conti *et al.*, 2013).

This presentation aims at underlying how this kind of municipal order can be a lever or a break to the sustainable development of the vegetable food chains and more globally, of the urban and periurban territory.

Materials and methods

Mar del Plata (700,000 inhabitants), located at 400 km South of Buenos Aires, is surrounded by the second horticultural belt of the country. The city's agricultural belt is a patchwork of intensive vegetable production and intensive cereals and oilseed crops. An urban policy prohibiting the use of pesticides in a radius of 1,000 meters around urban settlements was adopted in 2008.

1. CIRAD, UMR Innovation, F-34398 Montpellier, France.
2. INTA, Area of Economy and Agrarian Sociology, Argentina.
3. INTA, Area of Economy and Agrarian Sociology, Argentina.INTA, LABINTEX, Argentina.

In order to understand the undergoing changes i) in the local territory and ii) in the vegetable supply chain we did field visits and we realized 40 open and semi-structured interviews with local actors (vegetable producers, actors of the commercialization, development practitioners and public actors), the study of projects/policy documents, and the review of existing literature.

Changes in the urban and periurban territory

The expansion of Mar del Plata led progressively to an encroaching of urban areas on agricultural land. As vegetable production got more intensive from the 1970s, urban settlements became each time closer. Until the 1990s, periurban dwellers were mainly poor and workers families. But the construction of semi-private neighborhoods in the outskirts of the city attracted middle and upper class families with new expectations toward their natural environment; the number of complaints regarding the spreading of pesticides near human settlements increased. As a result, environmental associations convinced the municipal council to vote an order that prohibits immediately the pesticides in the urban fringe. In front of the difficulty to implement such an order, the council then decided to step backward and to propose a more progressive order leading to the adoption step by step of more environmentally and health friendly practices through the creation of a Municipal program to accompany farmers toward the agroecological transition. Up to now, little means have been provided to implement such a program and very few technical agents are available to provide education on agroecological practices. However, the discussion that arose from the situation led to the implementation of quality controls on vegetables. Hence, there was a shift from agrochemical drift issue to vegetable quality issue.

In a country where the agricultural landscape is dominated by large scale and intensive production, there is very little systematized knowledge on production free from agrochemicals. Conventional producers commonly consider that producing without pesticides is not feasible. Hence, the ones located close from the city and who have the means to move are selling their land to avoid to be subjected to pesticide regulation. Rather than trying to reconnect with consumers, who increasingly distrust conventional production, farmers prefer to invest in other land farther from the city. Smaller ones do not have that the option to move and have to adapt to the changing regulation. Also, when located near urban settlements, farmers are enduring pressure from estate agencies. It order to convince farmers to sell their land, these agencies argue that soon farming will not be possible anymore due to the new regulations. As a result, land use could evolve quickly in the urban fringe.

Changes in the vegetable supple chain

The conventional vegetable supply chain plays a central role in the vegetable supply. It is characterized by intensive agricultural practices, the use of agrochemical inputs, and marketing activities organized for large volumes involving numerous intermediaries. Conventional producers represent the very large majority of the producers of the horticultural belt. Their profile goes from family farmers (most of them of Bolivian origin) having less than 5 ha farms, to entrepreneurs (European descendants) developing vegetable production on up to 70 ha farms. The share-cropping system is common in conventional production. Many Bolivian families enter vegetable production through the share-cropping system with the objective to become land renter or even land owner in the future – it is the process of “Bolivian scale” described by Benencia (1997). The existence of quality controls led to new preoccupations of producers regarding the use of agrochemicals. However, they make their practices evolve more for fear of control than for health concerns. Producers working with share-croppers often worry that share-croppers actually apply the right doses because in case the control, the producer will have to pay the fine. Indeed, share-croppers are sometimes trapped in an intensive productive model. Their objective is to save money to be able to rent land. To ensure satisfaying yields they tend to increase the doses indicated by the land owner. These discrepancies between technical advice and actual practice do not only characterize the share-cropping system. Still technical agents notice that some producers keep on applying too much agrochemical in order to secure the production. Moreover, a best price is given for better-looking vege-

tables, which encourages producers to develop a certain type of farming practices in order to reach those standards. Finally, the conventional vegetable supply chain answers expectations in terms of volumes but it engenders strong reactions from associations of the civil society regarding health issues.

Conversely the alternative model is positively perceived by the civil society. It is characterized by small-scale farming, short-circuits, and produces free from agrochemicals. It was boosted by programs fighting against poverty of which purpose was to ally food production with environmental preoccupation. However this alternative model has difficulties to expand in a context dominated by conventional agriculture. Many producers still need institutional support to keep on producing and selling their produces. Indeed, there is little systematized knowledge, little/no adapted input available in agronomy shops, few agronomists are involved, and the knowledge is mostly created through individuals and informal on-farm tests. Moreover, the consciousness of consumers regarding agroecological production is still low and there are no sufficient outlets to welcome more producers in this alternative model. Hence, the problem is twofold: it is hard technically for small-scale conventional farmers to do a transition toward agroecology and agroecological farmers are sometimes little willing to share their knowledge as each new agroecological producer might be perceived as a competitor. Finally, the alternative model is closer from the society's new expectations regarding food quality but it represents small volumes and it is not accessible to the large majority of consumers.

Intermediary forms emerge or get a greater legitimacy in the context of rising health issues. Two examples are interesting to underline. First, many small-scale vegetable producers find difficult to get interesting incomes through the conventional supply chain because there are many intermediaries involved and small volumes are disadvantages when it is about getting a truck to transport produces. As a compromise between conventional and alternative chains, these producers use of agrochemicals and sell part of their production to neighbors and to nearby vegetable shops. These channels do not achieve to improve the demand for products free of agrochemicals; however, direct contact with consumers is an incentive to use less agrochemical inputs. It is thus a win-win situation: small-scale farmers improve their farming practices without being constrained to specifications, and they have a better income; consumers trust producers for the quality of vegetables they buy at lower price. These producers combine short-circuit with conventional circuits of commercialization through wholesale markets. A second example deals with wholesale markets. Mar del Plata hosts three. Two are located outside the city. One, the oldest, stands within the urban space, which makes it hardly accessible for large trucks; large volumes can hardly enter/go out. Hence, most of producers/retailers operating through this wholesale market are in average of smaller-scale than the ones operating through the two other markets. Many small-retailers agree that vegetable quality is higher there: smaller-scale producers (perceived as having less intensive practices and better harvesting practices), face to face transactions as well as the anchoring in local food supply are mentioned as possible explanations for such a different quality in this wholesale market. Its suitability to local community's expectations, notably in the context of rising health preoccupations, makes that this wholesale market plays an important role in the local food system. But there is a political idea to move wholesaling activities to urban peripheries, which questions its future.

Conclusion

The periurban landscape of Mar del Plata is undergoing changes. Impacts of the municipal order go beyond productive aspects. In this process, small-scale farmers with low financial means find themselves in a delicate situation in between the wish to keep on producing vegetables and the technical dead-end in which they feel they are. The urban policy can be a break to build sustainable local food systems if we consider how estate agencies are taking advantage of the situation. Also, the way the public policy was adopted – without consultation – led to a break between consumers and producers. But this urban policy could also be a lever to build a more sustainable local food system; health concerns could be an opportunity to build a concerted policy for urban and periurban planning. Indeed, there is new consciousness of consumers and producers, although some producers try to improve their practices more for legal than for

health purpose. New intermediary forms emerge or find more legitimacy regarding local stakeholders because they answer local food issues. But public actors and public policies support strong and well identified models – conventional and alternative ones. Intermediary initiatives do not find visibility in that political landscape and receive little/no political support; they develop and maintain through local actors' practices, apart from institutional programs or political support and bear more local community's expectations than a political vision. They remain scattered and fragile in the face of urban policies and rapid transformations in the urban fringe but they are signals of positive on-going changes.

Sustainable development impacts of various ways to modernize urban food distribution: the case of vegetables in Vietnam.

Paule Moustier[1] and Nguyen Thi Tan Loc[2]

Concept and rationale

During the past twenty years, the food sector in Vietnam has undergone major changes. Economic and demographic changes have caused an increase in the demand for more diverse and better quality produce, especially in urban areas. The food distribution sector has adapted to these changes and has now taken on a diversity of forms including covered markets, wet markets, street vendors, shops and supermarkets. The government is promoting the expansion of supermarket distribution and plans to eliminate all informal trade on the grounds of modernization, which includes various concerns related to food safety, economic development and attraction of foreign investors. Urban areas are indeed windows of government efforts to promote economic development through modernization, while they increasingly concentrate social problems, especially unemployment of the less qualified dwellers (Moustier *et al.*, 2009; Thi Hong Nguyen *et al.*, 2013; Wertheim-Heck *et al.*, 2015).

Research objective

The paper investigates the impact of supermarkets in terms of various dimensions of sustainable development, related to social objectives (employment, consumers' access, management of food safety), economic objectives (farmers' incomes), and environmental impact (mostly as regards farmers' practices; and nature of transport used), relative to other distribution formats. Supermarkets are considered as a package of organizational and technical innovations in food chains which can be related to sustainable development objectives.

Conceptual framework

The paper starts by some review on the literature to get some hypotheses on the link between different formats of food distribution (more or less centralized and capital-intensive) and sustainable development. It is hence a contribution to the analysis of the performance of food chains in terms of sustainable development as the structure of food chains, in particular the technological content, is commonly (sometimes implicitly) considered as an indicator of food chain performance, particularly economic performance, but also food safety management. The development of supermarkets goes hand in hand with various innovations in terms of technologies (*e.g.*, logistics platforms, cashiers, refrigeration) which result in cost reduction (thanks to economies of scale), value-adding activities and often go together with patterns of vertical integration in the chain(Hagen, 2002; Reardon *et al.*, 2009). One challenge is how to ensure that the value added by these new enterprises can effectively be distributed to the poorest people rather than primarily bringing profit to those who are able to invest in this demanding business and excluding the poor who cannot compete with them. Labor-saving and scale-biased innovations have generally a negative impact on employment of the poor and may be less suitable to a country like Vietnam where labor is in excess supply than is the case with capital-saving or neutral innovations. As regards the effect of vertical integration on management of food safety and environmental impact at farmers' level, the literature shows ambiguous results – but it tends to show benefits in terms of economic results and food safety that are driven by retailing firms' involvement in the control of farmers' practices (Biénabe *et al.*, 2011; Jaffee *et al.*, 2011; Minten *et al.*, 2009).

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Method-data collection

The paper is based on a review of the literature and empirical data collected in Vietnam between 2009 and 2014. In 2009, we conducted an analysis of inputs-outputs, costs, benefits, and governance along four value chains in the horticultural and rice sector, which generated indicators of economic performance, technologies, chain governance, use of energy and chemical inputs. In 2009 and 2014, we estimated the number of employees and volumes traded by different points of sale to estimate their contribution to total vegetable distribution. In 2009, we also conducted surveys of poor consumers (110 in Hanoi and 52 in Ho Chi Minh City) to appraise their access to food. We compared the prices of selected food products in various points. In 2014, we estimated the share of different selling points by a survey of 138 peri-urban farmers. We also conducted some action-research on the inclusion of street vending in selected districts where we took into account livelihood as well as food safety issues (Nguyen and Moustier, 2015).

Main results

We estimated that supermarkets generate half the employment of street vending for a given quantity of vegetables, markets and shops standing in-between. In 2009, vegetable street vendors supplied 32% of the total vegetable volume sold to consumers, compared to 58% for retail markets, 9% for shops, and 1% for supermarkets. Until 2009, the number of vegetable street vendors increased at a higher rate than that of the city's population. In 2014, we estimated that 45% of vegetables were sold by street vendors, 49% at retail markets, with a limited volume being sold at stores (3%) and supermarkets (6%). Peri-urban vegetable producers mostly sell through markets (42%), street vendors (42%) or directly to canteens and consumer groups (9%). Freshness, lower prices and easier access are major reasons for consumers preferring market or street retailing to supermarkets, while supermarkets and shops are more trusted in terms of food safety. Immediate payment in cash is the major reason of farmers not selling to supermarkets, albeit producer prices are generally higher. Yet wet market retailers and street vendors are seriously jeopardized by the negative attitude of national as well as urban authorities towards their business. The modernization of wet markets can indeed stimulate unregulated street vending with hygiene and traffic problems (Wertheim-Heck *et al.*, 2015). The bulk of vegetables supplied to urban supermarkets originate from "safe vegetables" cooperatives in peri-urban areas (sold either directly through contracts or through dedicated wholesalers) or semi-public companies. The incomes of farmers participating in supermarket-driven chains are generally higher than in informal markets, but this is allowed by farmers belonging to cooperatives involved in marketing; and farmers' direct sales in cooperative-managed shops provide them with higher incomes.

Farmers' efforts in reducing chemical inputs, which are favorable to food safety as well as environmental protection, are indeed stimulated by supermarket outlets; but also by alternative ones, including quality food shops. Comparing pesticide residues in various points of sales shows the higher performance of organic shops and supermarkets along this criterion of food safety. But training street vendors as regards sources of supply and waste management is an efficient way to upgrade their business. Consumers' access to supermarkets is mostly by cars or motorbikes, while food distributed by street vendors enables consumers' access to food by foot, which suggests a lower energy cost of street vending, at least at the final stages of distribution. There is indeed a variety of ways to upgrade food distribution, along sustainable development objectives, besides supermarkets, including trained street vendors in terms of food safety; farmers' organisations involved in chemical-limited production, food labelling and distribution; farmers' markets; quality food shops. These innovations combine the advantages of decentralization and labor-intensity in food distribution, with an orientation towards consumers' health and improved environment. The urban context can prove positive in the development of such innovations, due to the availability of technical and marketing information, and the proximity between farmers, retailers and consumers. Yet it requires a more positive attitude of public authorities towards small-scale distribution. The paper concludes with a tentative model of relationships between organization of food distribution and supplying chains, and consequences on economic, social and environmental objectives.

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Landscape factors influencing sustainable food agri-chain innovation: The role of place in the Toronto experience of Local Food Plus

Wayne Roberts[1,2] and Lori Stahlbrand[2,3]

Agri-food chains have an unrivalled capacity to contribute to, and benefit from, every one of the United Nation's 17 Sustainable Development Goals (SDGs). Supporters of every one of the goals can make substantial progress by treating agriculture and food as a gateway to impactful actions. One or both of agriculture and food are essential to: 1. reducing poverty; 2. reducing hunger; 3. improving health and well-being; 4. providing educational opportunities; 5. increasing gender equity; 6. ensuring clean water for all; 7. ensuring clean energy for all; 8. providing good work and economic development; 9. innovating in industry and infrastructure; 10. reducing inequity; 11.fostering inclusive cities; 12. greening production and consumption; 13. protecting the climate; 14. conserving marine life; 15. conserving forests and fields; 16. promoting peaceful and just institutions; 17. Strengthening society-wide action on behalf of the 16 stated goals.

Passion for this wide-ranging potential of agri-food systems brought both individuals submitting this proposal to write a Canadian bestseller called *Real Food for a Change* in 1999, and to subsequently become professional practitioners in the Canadian food and agriculture sector. One proponent, Wayne Roberts, PhD, was manager of the influential Toronto Food Policy Council from 2000 to 2010, prior to becoming a member of the International Advisory Committee of Wilfrid Laurier University's Centre for Sustainable Food Systems and a participant in the SSHRC-funded FLEdGE (Food: Locally Embedded, Globally Engaged) Project, as well as international consultant and speaker in the field of city food policy. The other proponent, Lori Stahlbrand, founded and led a civil society organization called Local Food Plus (LFP), from 2004 to 2012, and in that capacity became a leading promoter of local and sustainable food infrastructure, prior to taking up doctoral studies at Wilfrid Laurier University and university teaching in the field of Global Food Equity.

Stahlbrand convinced the University of Toronto to include language in its Request for Proposals for foodservice that required increasing amounts of local and sustainable food. Stahlbrand then convinced several foundations to fund her efforts to build the farm connections and overall infrastructure to supply the food. Before her resignation from LFP to undertake doctoral studies in 2012, Stahlbrand and her team at LFP worked with University of Toronto officials and Ontario farmers and processors to ensure provision of up to 25 per cent of campus food from local and sustainable sources. Years later, in 2016, the University of Toronto consummated the local and sustainable experience with the decision to operate its foodservices in-house, rather than contracting with a global foodservice company – a rare accomplishment for a university in North America, where food is usually defined as an out-sourced ancillary service. As a campus with one of the largest student populations in North America, the University of Toronto experience with a sustainable local food supply chain is a generative one – with many lessons to reveal about the challenges of developing agri-chains with a potential to contribute to the full range of Sustainable Development Goals.

This proposal marks the first time that the full context of the U of T/LFP story will be unfolded. Having Stahlbrand as a co-presenter is an opportunity to provide first-hand "behind-the-scenes" evidence of the experience of developing a local-sustainable agri-food chain to serve a high-profile public institution. The combination of intimate practitioner knowledge and extensive academic research and analysis will

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yield many insights into the technical, operational and socio-political aspects of local and sustainable food chains as works in progress.

Having Roberts, retired manager of the Toronto Food Policy Council, as co-presenter permits an under-reported and under-theorized aspect of the Local Food Plus/University of Toronto experience to be told. He will show that the LFP/U of T experience co-evolved with what might be called the "Toronto community of food practice," within which the Toronto Food Policy Council played a central role. Founded by the Toronto Public Health department in 1991, the TFPC was one of the first food policy councils in the world, and the first to exist in a large and high-profile city. The TFPC quickly became an important force, and imprinted several norms within the developing food community that were unique in the North American context. It established a presence for public health, public policy, sustainability (it wrote the Toronto Declaration on Nutrition in 1992, in which the City formally endorsed sustainability) and government collaborations with the fast-blooming NGO community and community of food practice. Consequently, food work and food supply chain work in the city "instinctively" included public policy and public health goals as objectives, and always included representatives of consumers and city residents in the design of supply chains. On the ground floor level, the TFPC was able to use its role as a network connector to introduce Stahlbrand to several individuals, organizations and foundations that enabled her to organize LFP, arranged for her to meet University of Toronto figures and become a part of the University community, become aware of Greenbelt issues that led to a major foundation grant, and so on.

Few of the studies on food movement-inspired supply chain work recognize the significance of this dimension of the early (1998-2004) Toronto and LFP/U of T experience for the elaboration of food transition theory and analysis. Almost all studies of supply chains, for example, are premised on a "farm to table" or "farm to cafeteria" model, whereby farmers get together and bring new products to the city. In actuality, the opposite is often the case: people in cities search out and arrange suppliers who will address their needs. This "farm to table" premise of most food reports is closely tied to an agricultural premise, which assumes that problems within the crisis-ridden agricultural community provoke action, which ends up coming to the city. To the extent the Toronto experience is indicative (Stahlbrand's PhD thesis research shows that the English experience with school and university meals confirms the Toronto pattern), there needs to be a fundamental rethink of how innovative supply chains are constructed. Unlike agribusiness chains, which flow one way, they are two-way streets. Moreover, in the absence of two-way approaches to food supply chain construction, it is unlikely that the "value proposition" of the food brought to the city will include many of the SDG goals elaborated by the United Nations.

Examination of the early years of the TFPC-Toronto community of food practice/ Local Food Plus/ University of Toronto developments confirm the importance of 'landscape' factors as elaborated by Geels in the Multi-Level Perspective (MLP) framework. In particular, it emphasizes an analysis of innovation that science writer Steven Johnson calls "adjacent possibility." This concept stresses the importance of order and sequencing in the narrative of innovation. In effect, it argues, the opposable thumb and nimble fingers on the human hand were not possible without a wrist, and in turn an arm, and in turn shoulders, and in turn an erect human posture. In the same way, the social media could not have developed without the Internet, which in turn was preceded by home desktop computers, which in turn were only possible with microchips, and so on. Applying this sequential logic to the development of agri-food chains, it could be argued that a local and sustainable food supply chain addressing United Nations sustainability goals cannot succeed without already-established urban communities of food practice with a deep sense of public policy and consumer needs. In the absence of such expressions of the "adjacent possible," it is unlikely that sustainable local supply chains oriented to stable and bulk orders for major institutions will emerge.

This proposal presents the narrative around two other pivotal events in the LFP/ U of T experience. One that will be featured is the development of a local and sustainable certification system that would provide guidance to farmers enlisted in the program and provide assurance to the University of Toronto, media

and general public that that added price premium on local and sustainable food indeed gave value and values for money. The other pivotal event that will be featured is the suspension of LFP outreach activities in 2015, the result of an inability to raise funds to carry on. Each of these events is rich in learnings about the challenges of constructing sustainable local agri-chains. Each of these events illustrates the ongoing significance of LFP's co-evolution within a Toronto community of food practice.

Establishing a certification system for sustainable local food was considered essential to the construction of a sustainable local agri-chain. The certification system required that farmers follow a production system of minimum Stage 2 Integrated Pest Management, with additional standards for on-farm labour, animal welfare, biodiversity preservation and energy use. The standards clarified to farmers exactly what would be expected of them if they wanted to have access to contracts that awarded them a sustainability price premium. Importantly, the certification system also appealed to local organic farmers who were competing directly with California imports, and who looked to sustainable local certification for some profile with local purchasers.

Perhaps due to "path dependence," precedents established for organic growers were incorporated, especially independent third-party certification by organic inspectors specially trained to do inspections for LFP. In retrospect, this proved to be a serious mistake. It saddled the LFP with a very expensive, rigorous, and ultimately administratively unwieldy model of certification – a huge opportunity cost for a chronically cash-strapped organization. As well, the strictness of certification imposed significant paperwork demands on farmers who were generally over their head in paperwork already. Certification added little value for consumers, most of whom were happy to accept LFP leaders' word for the legitimacy of the label. And retailers, restaurants and institutions were also generally indifferent to the strictness and expense of LFP certification.

In her presentation, Stahlbrand will reveal some of her subsequent research into alternative means for providing guidance for sustainable local producers, and for ensuring quality for consumers – especially measures that have been adopted by the Soil Association in England.

The second pivotal event was the decision to close active operations of LFP in 2014. Although the University of Toronto and other LFP partners have continued to extend their sustainable local food purchasing practices, the future of the civil society organization that took responsibility for an expanding agri-chain for local and sustainable food is uncertain.

A comparison of the English university food purchasing experiences of the Soil Association suggest there were viable alternatives to some of the decisions made by LFP in Canada, many of which will be reviewed in the session. But at this point in time, the concepts of the "adjacent possible" and of "disruptive innovation" best explain the inability of the LFP to convince two key groups to provide necessary funding. Foundations would not adapt their standard approach to funding, and guarantee investment in such a major and long-term project for more than three years. Departmentalized governments could not understand that cross-cutting sustainability goals required some form of cross-cutting governmental support, and left LFP to the mercy of the Ministry of Agriculture, itself poorly funded and beholden to export-oriented conventional agribusiness interests with no serious commitment to sustainability goals.

These are challenges that any initiative hoping to contribute to a sustainable local agri-chain must consider.

Are food losses and waste overestimated in developing countries?

Géraldine Chaboud[1]

Introduction

In spite of the growing concern on food losses and waste (FLW) issues, empirical research on FLW along food supply chains (FSC) in developing countries, from production to retail, is uncommon (Minten *et al.*, 2016; Parfitt *et al.*, 2010). Details on how FLW have been calculated and where unsold food products actually end up are rarely available (*e.g.* garbage, home-consumption, food donation, feeding, etc.). However, the common belief stipulates that in developing countries, FLW are expected to be greater at post-harvest stages (harvest, storage, transport, retail) due to poor post-harvest handling and technical constraints (Godfray *et al.*, 2012; Hodges *et al.*, 2011).

This study presents some of the following advantages. First, the levels of FLW along the "traditional" tomato value chain that supplies the city of Cali in Colombia are assessed. Where knowledge gaps exist, data and empirical findings are generated and provided, respectively. Second, this case study is helpful for observing what happens to unsold tomatoes and where they actually end up. It is not unknown that informal waste recycling in those countries is common (Medina, 2008). Municipalities of developing countries often deal with environmental and sanitary problems caused by waste (Thi *et al.*, 2015). It is the case of Cali where the municipality launched in 2014 the program "Cero basura"[1] within "Cali Bioagradable". Detailed information on the different destinations of unsold products is provided but only food products that ended up in the garbage were considered as FLW. FLW were approached from a waste management perspective. Third, the case study selected is used to verify (or not) the common belief about high post-harvest losses in developing countries, especially in semi-informal channels. Finally, with the perspective of improving the assessment and report of FLW, a methodological framework was designed and used as a guide to set up the survey questionnaire, as well as report empirical findings. It has helped us avoid assessment bias, as far as possible, and to ensure transparency when reporting data.

Methodology

The aim was to identify a representative sample for the whole "traditional" tomato value chain that supplies Cali and representatives of each type of stakeholder involved. Producers grow and sell their agricultural products; traders provide the link between the rural area and the city, while corners stores sell food products to urban consumers. Different interviews and surveys were carried out to understand the role of each actor and to assess the level of FLW at each stage (*i.e.* farmers, traders – wholesalers, middleman – and corner stores). Exploratory interviews with experts and stakeholders were conducted. Then surveys were conducted with three types of structured questionnaires adapted to each FSC stakeholder. We surveyed 99 farmers, 18 traders and 200 corners stores. FLW were, therefore, assessed on the basis of the FSC stakeholders' declarations. We used a downstream survey approach from retailers to farmers in order to better target the farmers who supply tomatoes to the wholesale markets in Cali.

Results and discussion

During the crop cycle, on average 6.2% of the available tomatoes are left in the field by farmers and on average a producer throws away 9.2% of the tomatoes harvested. Beyond the farm gate, on average, 1.2% of the products purchased by a trader remain unsold and only 0.5% of the purchased products end

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up in the garbage. Retailers purchase products, of which on average 4.3% remain unsold and only 1.7% is actually thrown away.

Data shows five main results:

- Transport losses are not significant along the tomato value chain.
- Farmers are the stakeholders in the FSC who most frequently report FLW.
- There are greater differences in FLW between farmers than at other stages. This suggests that there are discrepancies in the performance of farming operations (management practices and/or agro-climatic environment) and/or in terms of farmers' socio-economic characteristics, which could explain the scale of farmers' FLW.
- Farmers frequently declare FLW. However, only a few farmers report substantial FLW, which suggests that high rates of FLW tend to be concentrated. The pattern is similar for retailers. As Kaminski and Christiaensen (2014) claim that the relatively low incidence of FLW, together with the relatively high rates of FLW (incurred in our case among farmers and retailers), underlines the need for carefully targeted FLW operations.
- Unsold tomatoes or tomatoes considered unmarketable by stakeholders are frequently used for different purposes. Unsold products tend to have a second "life".

The information shared by FSC stakeholders in the surveys and interviews is coherent with the results on amounts of FLW, which confirms the general accurateness of the data collected.

The modes of transport used from rural areas to the city are not refrigerated, but delivery is relatively fast (from 1.5 to 2 hours on average). Farmers and traders mainly transport tomatoes by truck. They use food box package for protecting tomatoes during transport. Moreover, during the transport stage other measures are widespread among stakeholders to prevent FLW (*e.g.* heavier produce is put at the bottom, tomato box package are not overloaded, fast delivery, they load their own produce, etc.). Speedy delivery and preventive measures for minimising FLW, adopted by farmers and traders, can explain the absence of FLW during transport.

Farmers are the stakeholders in the FSC who most frequently report FLW. This first result is consistent with the stakeholders' perception of the frequency of FLW. A higher percentage of farmers (58%) consider that they have FLW all or most of the time in comparison to traders (22%) and retailers (25%). The farmers' perceptions and responses are coherent with the FLW levels recorded. Diseases and pests were identified by farmers as the major causes of agricultural losses and waste. Pre-harvest management of pests and diseases can partly explain the amounts of tomatoes not harvested and those harvested and not sold. Consistency was finally confirmed by production practices. In the area surveyed, more than half of the farmers grow tomatoes outside. Outdoor cultivation is more exposed to diseases, pests and climatic conditions than semi-greenhouse and greenhouse cultivation. The mode of production adopted by the majority of the farmers is likely to impact the quality and quantity of tomatoes produced.

The average rates of unsold products for traders and retailers are low. The data matches the traders' perception given that approximately three-quarters of traders declare that FLW levels are low or very low. Their responses suggest that tomatoes are easy to sell on the market irrespective of product quality. Traders also claim to have in-depth knowledge of the tomato market, as well as the different outlets depending on the quality of the product. Generally, tomatoes are delivered to wholesalers the afternoon before the market night. Subsequently, they resell the tomatoes the same night. The time of storage is short. Similarly to traders, retailers affirm that tomatoes are easy to sell. They claim that FLW are low because they buy small quantities of produce on a daily basis and the demand for tomatoes in the market is high. Most of the respondents (80%) store tomatoes for no more than 3 days. The traders and retailers' marketing and storage practices seem to explain the low average percentages of unsold products.

The average rate of FLW per trader and retailer are even lower. This is not surprising for several reasons. The informal sector plays an essential role when it comes to alternative uses for food products originally destined for sale. The interviews with wholesalers revealed that at the end of market day, it is not

uncommon to see housewives coming to the market to recover unsold products for cooking. People also recover food products for resale in the street. In Cavasa (the wholesale market), the Cali Food Bank also recovers unsold products at the end of each market. Other products unfit for sale are recycled at the composting plant located in Cavasa. This reduces the volume of food products that are thrown away. Over and above food donation, retailers and farmers use produce for home-consumption to avoid throwing away unmarketable tomatoes. On average, a retailer uses more tomatoes for home-consumption than a farmer. This is coherent for two reasons. Firstly, farmers manage larger volumes of tomatoes than retailers, *i.e.* home-consumption is expected to cover a smaller part of the total volume. Secondly, during the survey and interviews farmers shared their concerns about eating their own tomatoes because of the intensive use of pesticides and chemical fertilisers. Some of the farmers are reluctant to use their own tomatoes for home-consumption in order to avoid any health risks.

Conclusions

Insights from the case study selected are important to guide future areas of research and intervention policies.

Firstly, data show that FLW recorded at the harvest and post-harvest stages are likely to be linked to pre-harvest management. Therefore, depending on the target product, pre-harvest stages could constitute an important step for inclusion in future studies. At the empirical level, interventions, such as training, assistance and support for farmers at the pre-harvest management stage appear essential. They could help increase the efficiency of resource use by reducing the quantity of tomatoes likely to be discarded and by improving the quality of tomatoes sold along the entire FSC.

Secondly, the average rate of food products discarded is in itself not sufficient to justify the research interest and guide policy intervention. Data may conceal more important issues. The rates of tomatoes thrown away at the trader and retailer stages are low. Yet, that does not mean that attention and intervention are not required at these stages. The relatively low level of FLW raises questions about the safety and health risks of the tomatoes sold to consumers

(*e.g.* high level of pesticide residues) because of poor marketing control and a lack of standards. Stakeholders may also suffer losses with low quality produce by increasing their qualitative FLW. Stakeholders are paid little for poor quality tomatoes, which can cause economic losses.

Thirdly, in developing countries, FLW at post-harvest stages cannot always be explained by poor post-harvest handling, lack of infrastructure and technical constraints as suggested in the literature (Godfray *et al.*, 2012; Hodges *et al.*, 2011). Stakeholders adopt strategies to overcome technical constraints and limitations linked to infrastructure in order to minimise FLW at their own stage. In addition, coordination among stakeholders appears essential to minimise FLW at the meso-level of the FSC.

Finally, assessing the determinants that significantly influence FLW along the FSC is essential for future recommendations, the design and implementation of effective intervention policies. Here, the case study focuses on quantitative measurements. However, alternative estimates of FLW based on a qualitative view would complement the analysis and provide an integrative overview of FLW issues.

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“Zero waste”

POSTER

Vulnerability and resilience of the urban food system to extreme weather: a case study of Colombo, Sri Lanka

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Colombo, the commercial capital of Sri Lanka is the most urbanized area of the country. It is home to half a million people and has an equal number of floating population daily. Most of its land area is utilized for commercial and residential purposes while the amount of agricultural activities in the core city (*i.e.* Colombo Municipal Council area) is negligible. Hence, Colombo's own food production is minimal and is dependent on food cultivated in other areas of the country, which is passed along a complex supply chain of many actors. Furthermore, the two most popular wholesale markets in Sri Lanka, the Manning market for commodities such as vegetables and fruits and the Peliyagoda market for fish are located in and close to Colombo making the city a food supply hub for different parts of the country. Therefore, when the supply chain to Colombo is being negatively affected also the food system of the country can be disrupted.

This study was carried out in May 2016, while and directly after Sri Lanka was hit by a severe cyclone (https://en.wikipedia.org/wiki/2016 Sri Lankan floods) as the country is experiencing all few years, and several parts of Colombo suburbs and external food supply areas were flooded. The study aimed to investigate in real time the vulnerability and resilience of the urban food system to such increasingly periodic events.

Impacts on and recovery of marketing channels and supplies were studied by visiting in defined intervals major markets with a significant influence over Colombo's food system and interviews with lorry drivers, commission agents, buyers, sellers, whole sellers, and importers. In addition, floor managers and distribution centre managers of leading super market chains were interviewed to analyse how far their food supply was affected and their coping strategies. The interviews were carried out a week, a month and two months after the floods which displaced half a million people across the country. In addition to the impact, also the reasons for low supply were analyzed (production failure, transport failure, etc.).

While the paddy rice supply, the most important local staple food, remained constant during this time of crisis due to sufficient storage capacity in Colombo., the heavy rains led to a severe shortage of vegetables. The upcountry vegetable (carrots, leeks, beans and cabbages) supply was greatly affected and prices were at least as four times higher than in the same period of previous years. As the floods had a lesser impact on production areas of low-country crops (Okra,Pumpkin,Cucumber etc.), their supply and prices remained relatively stable. Leafy vegetables (lettuce, Spinach,water spinach etc.) were also greatly affected because the main supply to Colombo comes from peri-urban areas that were flooded. Fish supply was heavily affected, with a 75% drop in supply immediately after the floods, because fishermen were advised to not go out fishing during the extreme weather. The supply and the prices of onions, garlic, dhal, and potatoes remained however unchanged as a major portion of it being imported and the harbor and wholesale market for imports is located in Colombo.

The big supermarket chains (Keells, Cargills, Arpico) also experienced low supply and higher prices of vegetables and fish but had more flexible supply chains, own storage and alternative suppliers. While they recovered most of their supply gaps within two to three weeks, the mainstream supply chain (which serves the middle and low income community) took for most affected commodities up to 2 months to recover. Also some local food processing factories (*e.g.* alcoholic and non-alcoholic ·beverages) which were flooded had 2 to 3 months after the events still production shortages.

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This study shows that the supply of some popular commodities (*e.g.* fish, vegetable) proved to be very vulnerable, because no infrastructure or mechanisms are in place to cope with possible supply failure. Pulses, dry fish and other imported commodities can fill this gap to some degree, and within limits of cultural acceptance. Mainstream supply chain actors, small retail shops and poor households are most affected because of low adaptive capacity. Lack of economic incentives, a low lobbying capacity of those most affected, coupled with the fact that floods have been periodic but hard to predict limited so far public investments into the related challenges. However, as climate change related extreme weather events are likely to become more frequent in the future, investments, for example, into short and more diverse food chains (including urban and peri-urban agriculture), as well as storage, is likely to increase the resilience of Colombo's food system to possible future impacts from climate change and, thereby help the city to move towards achieving the second sustainable development goal-of zero hunger.

Resilience of rural-urban food flows in West Africa

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Within the larger assessment of urban food supply and commodity specific foodsheds, the question was posed how City Region Food Systems (CRFS) respond to natural disasters like droughts or flooding which might severely affect urban food supply and resilience.

The study focused on four cities, Accra, Kumasi, Tamale (all Ghana) and Ouagadougou (Burkina Faso) cutting from South to North across different agro-ecological zones from humid to semi-arid, and consisted of two parts: A detailed and multi-seasonal quantitative analysis of commodity specific rural-urban food flows to determine common urban foodsheds of Ouagadougou and Tamale, and a commodity specific, semi-quantitative study on the experience and coping measures of the private sector to production shortfalls in all four cities.

The food flow study was conducted over two years, covering the seasons of good and short supply and more than 30 food commodities. Food flows were assessed via vehicle surveys on all major urban access roads to the cities, as well as market surveys and visualized via GIS. For the study of coping mechanisms 90 traders on 25 retail and wholesale markets in the four study cities were interviewed about shortfalls between 2007 and 2014 addressing the following key commodities: yam, cassava, plantain, millet, maize, local rice, okra, onions and eggplant.

Results indicated that foodsheds were highly crop and season specific, ranging from one-dimensional to multi-dimensional foodsheds. The most common supply challenges along the transect were extreme climatic events such as large scale flooding as well as lack of rain and drought. In view of the analysed key commodities, traders recorded for every year supply problems for one or another crop, mostly related to particular weather conditions but also fuel price increases. In particular, 2011 posed multiple challenges due to unexpected weather conditions, as mentioned by every third trader who could recall the exact year. Supply losses ranged commonly between 40 and 100% of which in 2 of 3 cases alternative foodsheds allowed to fully recover the loss, while related extra costs (transport distance) were usually transferred to the customer. Supply shortfalls which could in several cases not be buffered, even via imports, concerned *e.g.* local rice, millet, maize and onions.

There was an increase of city vulnerability from South to North. Compared with Accra and Kumasi, twice as many cases of failed supply recovery were reported in Tamale, and the number of cases doubled again in Ouagadougou.

The data show that the larger geographical diversity of multi-dimensional foodsheds appeared to enhance the resilience of urban food systems. However, while the urban food system appeared generally prepared to cope with extreme climate events (every asked trader had alternative plans for food sourcing) the poor suffered most from related increases in food prices by 5 to 35%. These trade-offs could be addressed by well-planned storage facilities.

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Session 10

Innovations in approaches and tools for inclusive and efficient value chain development

Commercial and inclusive value chains: doing good and doing well

Malcolm Harper[1], John Belt[2] and Rajeev Roy[3]

Introduction

A value chain approach refers to a set of activities by chain actors, including buyers, processors, smallholders, traders and other service providers to generate higher value and create win-win relationships among several chain actors. Our book (Harper, Belt and Roy, 2015) is about value chains, not all value chains but a particular class of such chains – 'inclusive' value chains – which include and substantially benefit large numbers of poor people. These people are often smallholder farmers, but may also be small-scale retailers or poor consumers. The value chains described in the book have been developed because they are good business: the poor people from whom they buy their raw materials, or through or to whom they market their products, are their best partners from a commercial point of view. They can perform whatever functions are necessary, to higher quality standards, or more reliably, or less expensively, than any other suppliers, and it makes good business sense to work with them, and to pay them more than they could earn elsewhere, so that they will do their best to continue.

Background

Porter (1985) showed how companies, and whole nations, could improve their competitive position by optimising value chains as a whole, rather than seeing them only through the lens of the 'leader' of the chain. Kolinsky (2000) went further, and showed how value chain analysis could be applied not only to maximise the profits of one firm within the chain but also to achieve a 'dynamic shifting of producer rents through the chain', thus improving the share of poor and disadvantaged producers or others. Prahalad (2005) writes of 'inclusive capitalism' where he discusses businesses that try to include the poor and underserved markets and consumers. While Prahalad's focus was primarily on the poor as a market, several others have specifically looked at possibilities of including the poor in productive processes (Fairbourne *et al.*, 2007, Harper, M. 2008). These writers and others discuss how poor producers and other intermediary micro-enterprises such as village-based processors, itinerant vendors, and others can be linked into 'modern' value chains. Several donor agencies have promoted this type of activity by supporting value chains by subsidizing inputs, finance, institutional development, business development services or infrastructure. A number of multinational corporations have also promoted such value chains, supported in part from their 'corporate social responsibility' budgets. We do not suggest that donors, governments and others should never subsidise value chains in order to include and benefit smallholder farmers or other disadvantaged groups, but our case studies show that it is not always necessary to provide subsidy of any kind to enable the small producers in a value chain to gain from their inclusion. We aim to demonstrate that including and benefitting the poor can do good and be good business, at the same time.

Methodology

We used a multi-stage process to identify and choose the cases. First we publicised the opportunity through our own and other contacts. We received a large number of submissions; many were rejected because they had been subsidised, or they involved very small numbers, or the aspirant contributors were clearly anxious to promote rather than to describe the value chains. We short-listed apparently suitable cases, and were able, thanks to CTA in Wageningen and the KIT in Amsterdam, to offer a modest fee to the authors.

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Showing that value chains have 'significantly benefited' the poorer people who are involved requires information about their condition before they joined the chain, and at the time when our contributors carried out their studies. Incomes may seem to be the best measure of economic well-being, but it is notoriously difficult to measure anyone's income. Fortunately, however, we were able to use the Grameen Foundation's Progress out of Poverty Index (PPI, see www.progressoutofpoverty.org) which provides a remarkably simple and reasonably accurate measure of economic well-being, with tailor-made versions for the countries we covered. It was not always possible to ensure that the samples were representative, or of sufficient numbers to ensure statistical validity, but we hope that each case contains at least some reasonably convincing evidence that the value chain it describes is not only inclusive but also that it substantially benefits some if not all of those whom it includes.

The cases

Twelve of the fifteen cases included in the book involve farm products. They include 'traditional' crops such as rice and millet, but we also included milk, fresh vegetables, poultry, cashew nuts and khat.

The Khat case shows how a multi-link chain makes it possible to satisfy demand, across international borders, at a reasonable price, even in a region which has been subject to long-lasting warfare and violence. It is instructive, if sobering, to compare the effectiveness of this value chain with the experience of so many attempts to bring more desirable products to disadvantaged people living in remote areas.

The case for banana beer in Tanzania describes a low cost local product, made with locally available materials, can successfully compete with well-established brands, and how bottle collectors, smallholders, traders and local entrepreneurs can benefit from the value chain.

Small-scale 'tribal' farmers in South Rajasthan in India have taken over the very labour intensive production of genetically modified cotton seed from better off farmers in neighbouring Gujarat. As a result, a complex value chain of organisers and agents links large numbers of tribal farmers to seed companies and farmers' incomes are substantially increased.

Millet is a traditional smallholder crop, grown mainly for subsistence, and its demand has tended to decrease with 'development'. One company, however, has seen the opportunity in Tanzania for an upgraded product, properly processed, and has developed a multi-stage value chain with backward linkages to the farmers and forward linkages to consumers.

Malawi has ample land which is suitable for rice, but it must nevertheless import large quantities of rice every year. A local company is helping smallholders to produce rice for them, rather than cultivating it on a large scale.

Cambodia is a large producer of rice but its production per acre is low. A local entrepreneur realised that this constituted an opportunity and he decided to work with existing community organisations, having some 50,000 farmers under contract to supply the company.

India is the world's largest producer of milk, thanks in large part to the success of the Amul cooperatives. But Moksha Yug, based in the Southern state of Karnataka, shows that a private company, without any farmer groups or associations, can profitably compete by reaching out to even smaller-scale producers than state sponsored cooperatives.

Chicken meat is by far the most popular meat in India. One company, which is one of the top ten poultry producers worldwide, has chosen to work with some 20,000 independent out-growers, substantially increasing their income.

Green bean exports from Senegal to Europe have increased dramatically in recent years. Its production is subject to increasingly stringent regulations and controls. Many farmers have found employment with the large producers. The workers on the large farms are relatively well paid, and most of them are women.

Village householders from Odisha in India cultivating cashew nuts benefit from increasing international demand, as do some of the processing factory workers, most of them are women. Many campaigners have publicised their low wages and difficult conditions, but there are few alternative employment opportunities in rural Odisha; the workers themselves are generally pleased to have a job of any kind, rather than having to migrate.

The palm oil case from Peru shows that a smaller locally based value chain can sometimes succeed where larger-scale producers have failed. A local entrepreneur realised that local poultry and pig producers needed a lower cost replacement for the imported feed supplement. He succeeded in organising the local people, through their municipal associations, and they are substantially improving their incomes by harvesting oil palm fruits for his company.

Turmeric is a rhizome similar to ginger and is an important constituent of curry powder, and is also used as a dye and a medicine. A local company in Odisha state of India, has developed an effective and mutually profitable value chain for organic turmeric, which includes and benefits tribal farmers who are the traditional inhabitants of the forested hill areas of the state.

Discussion

We chose deliberately to seek out and study less well known chains whose leaders were small businesses. Such companies are not interested to portray themselves as 'socially responsible'; their aim is to build their businesses and to make money. Many of these local entrepreneurial businesses had to seek out and develop new suppliers and other business partners. More established and better-off producers, retailers and so on are generally already linked to existing value chains. The companies in our cases had to look for new suppliers, disrupt existing procurement processes and reach deep into the supply chain and by-pass existing powerful intermediaries. All this can be achieved by involving smallholders or other small-scale producers, intermediaries or customers who lack access to larger markets or suppliers. Small-scale entrepreneurs, smallholders, poor clients and other disadvantaged groups have limited resources and they lack substantial market presence. They tend to be ignored or exploited by very large suppliers or others, and are at a serious disadvantage in negotiations with them. Smaller firms such as the ones described in the cases, can often achieve a better match with the very smallest and weakest producers or others. They can enter into balanced business relationships with them and they are less likely to be held hostage to supplier power.

The businesses covered in this book have set up the value chains primarily driven by market forces and business logic. There was a natural fit between the businesses and the small producers, intermediaries or clients who make up the value chain. Small-scale local actors contributed their own understanding of local conditions which helps the businesses.

Smallholders, and the people who make a living as vendors or market traders are often among the poorest in any society, and they are often the 'target beneficiaries' of development projects. These projects focus on the weaknesses of the people they are trying to assist, the businesses of the value chains in these cases, however, did the opposite; they identified the strengths of the small units with which they are collaborating and effectively exploited these strengths, in the positive sense of the word, in order to achieve their objectives and maximise their profits.

There are many features which explain the success of the various value chains, and there is certainly no common model to which they all conform; one of the strengths is that they are built on the basis of local circumstances. Generally they involve familiar activities, or small modifications of such activities, that do not require training in new practices, making it easier for poorer actors to participate. They have access to alternative markets of comparable value; this minimises the risk of monopoly and exploitation, and the assets which they have to use for their participation in the value chain are generally not specific to that particular business. They can redirect their efforts if they wish or have to leave the value chain. They can also if necessary access alternative sources of raw material and supplies; this constrains any tendency towards monopolistic behaviour.

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Factors influencing successful inclusion of small farmers in modern value chains in ACP countries

Andrew Shepherd[1]

Rationale

As a component of CTA's ongoing project on "Research, capacity building and institutional development in support of inclusive value chains in African, Caribbean and Pacific (ACP) regions", six case studies were commissioned in response to a Call for Proposals to either (1) carry out original research into the factors affecting the development of inclusive value chains or (2) prepare case studies of successful and innovative inclusive value chains. All of the proposals received concerned cases from countries in Africa.

Theoretical Framework

Small-scale farmers face numerous difficulties in producing for sophisticated markets that are based on supplying products that comply with specific consumer demand. Such difficulties can include poor access to inputs and services, inadequate farmer organisation, difficulties in meeting quality requirements; and lack of access to credit for equipment and production activities. In general, efforts to promote inclusion attempt to address some or all of such constraints. The CTA Call for Proposals considered 'inclusive value chains' to be those that "obtain supply from smaller farmers, although value chains that actively involve small and medium-sized enterprises, such as small traders and processors, could also be considered".

From a review of the literature it can be noted that the definition of 'inclusive' usually refers to poverty rather than to size. However, while inclusive projects aim to work with the 'poor' the definition of 'poor' is often imprecise. An SNV study defines an inclusive business as a socially responsible entrepreneurial initiative, which integrates low-income communities in its value chain for the mutual benefit of both the company and the community (SNV and WBCSD, 2010). This, therefore, involves the expectation that large buyers will relate with farmers in an equitable manner. Perhaps the easiest approach is that taken by the GIZ, which defines inclusive business as any business that interacts with smallholders (GIZ, 2012). But the question then arises as to what is new about the concept of inclusiveness, given that farmers have been interacting with buyers for generations.

Haggblade *et al.* (2012) address this question. They see actions to promote inclusiveness as a response to changes to production and marketing systems that have opened up opportunities for some rural suppliers to access new markets but have exposed others to new threats as a result of quantity and quality requirements of the markets. They argue that agribusiness investments are not inherently pro-poor and that the move towards stressing 'inclusiveness' responds to this, by promoting interventions that benefit the poor. Desired outcomes of such an approach include higher income for the poor as well as greater participation of women and youth in value chains. This approach does, however, raise the question of how to make value chains more inclusive for poor farmers without hampering competitiveness. Harper, Belt and Roy (2015) aim to show that it is possible and profitable for businesses to build and maintain such value chains, without subsidies or other non-commercial assistance. In other words, working with the poor can "do good and be good business". They consider 'inclusive' value chains to be those that include and substantially benefit large numbers of poor people.

According to the deliberations of an FAO workshop, features likely to be found in an inclusive value chain include: their suitability for households with few assets; reliable and profitable trading practices; diversified market opportunities; a strong element of capacity building; and full and transparent consultation (FAO 2014).

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Also influencing the adoption of an inclusive business model is the fact that products targeted at export markets, in particular, are increasingly becoming subject to certification. Exporters have to be sure that the farmers they work with are capable of meeting the standards required by the certifiers. Although the use of certification continues to expand, Kuit and Waarts (2014) conclude, from a review of many certification programmes, that there is little evidence that farmers are benefitting from them.

Main Results

The oral presentation will describe six case studies commissioned by CTA. These covered: (1) jatropha chains in Burkina Faso and Mali, carried out by IRAM and JatroREF; (2) oilseeds in Uganda, carried out by SNV and IIED; (3) litchi in Madagascar, carried out by AVSF; (4) cashew in Benin, by Self Help Africa; (5) milk products in Senegal, carried out by GRET, IFPRI and Jokkolabs; and (6) bananas, pigs and aquaculture in Uganda, carried out by Shoreline Services, in association with ILRI. The studies adopted a range of definitions of inclusive value chains but such chains were generally considered to be those that seek to obtain supply from poorer farmers, thereby maximising their access to market opportunities. These case studies inevitably provide a slightly biased approach to the topic because the organisations applying for funding were likely to be the NGOs involved in supporting their development. Indeed, five of the case studies were prepared by NGOs or donors and concerned activities in which they were, or in some cases still are, actively engaged. It is improbable that any of the chains described in this report, other than the banana, pig and fish chains in Uganda analysed by the Shoreline study, would have emerged in the form described without NGO or other intervention.

Efforts to establish inclusive value chains may fail if the buyers make little effort to understand both the agricultural practices and skills of the farmers and their socio-cultural environment. For example, yield projections should be based on the local farm situation and not on yields achieved on commercial farms or on research stations. The capacity and willingness of farmers to follow recommended practices should be fully assessed. The implications of new farming practices on household and employed labour, and on gender relations, must be fully reviewed. Such issues have particularly plagued jatropha and other biofuel developments, as illustrated by the case study from Burkina Faso and Mali.

A major factor in the success of inclusive chain development is the extent to which the buyers provide "embedded" services, such as input supply and technical advice, for which the farmers only pay indirectly through lower final prices for their products. Not only does this practice overcome the financial constraints of farmers but it also gives them access to inputs and support that might otherwise be unavailable. Even where such support is not fully embedded and farmers are required to meet some costs directly, the provision of improved seeds and other inputs specifically tailored to the needs of a particular product buyer can be very beneficial. However, trust between farmers and buyers is essential if this is to work. Developing such trust can be complex and time-consuming and the role of outsiders, such as NGOs, in supporting this can be beneficial, although such support does raise issues of sustainability. A major cause of discord is slow payment, which was a factor in jeopardising the oilseeds chain in Uganda.

Farmer organisations and cooperatives can play an important role, either as agents of a company or as the prime movers of an inclusive value chain. The use of full-time professional business management appears to be essential for farmer organisations seeking to become involved directly in value chains as there are many risks associated with poor management. This was well recognised by the Madagascar cooperative marketing litchi and other fruits.

NGOs working to support inclusive value chain development have tried various approaches to organise farmers. One model is to work only with established organisations and not try to set up new ones. Bodies set up solely to bring about inclusion often have a short life span. On the other hand, where no suitable organisations exist an inclusive value chain may require some consolidation of farmers into groups in order to promote communication, provide training and facilitate logistics to deliver inputs and collect the products.

Although "inclusion" tends to emphasise the position of farmers within a chain, the strength of the value chain approach is that it moves development efforts away from being farmer-centred to considering the entire chain from producer to consumer. Some of the case studies well illustrate the value of this approach, such as litchi in Madagascar where efforts to develop sales in export markets had a positive benefit for all in the chain. The importance of inclusion for purposes of certification was supported by a study cited by the Madagascar case study. However, it found that litchi farmers certified as GlobalGAP did not receive statistically higher prices than noncertified farmers (Subervie and Vagneron, 2011). Unlike the litchi cooperative's investment in fairtrade certification, which was the main focus of the case study, GlobalGAP was driven by exporters, not producers. Certified farmers were, however, able to sell greater quantities as a result of GlobalGAP certification, providing support for another emerging conclusion about certification, that it is becoming more of a precondition for selling products than a way of obtaining higher returns.

The case studies show that inclusion of small-scale farmers often requires a "trial and error" approach in order to arrive at the most suitable model for a particular environment. The research also suggested that the tendency in development work to ignore the traditional trading sector may be misguided. While not suitable for the handling of products requiring export certification and traceability, traditional marketing intermediaries (the so-called "middlemen") do have a capacity to provide transport from remote areas, to buy small quantities per farmer and, often, to pay in cash. Farmers may be inclined to sell to them despite agreements with other buyers. However, it is presently rare to find projects and programmes that provide either technical assistance or direct support to traders.

The case studies provide several examples of successful NGO activities to promote inclusion. While donor and NGO support can have a very positive impact on value chain development, the question arises as to what happens when that support comes to an end. Collaboration with development agencies makes sense for the private sector when it has few costs to bear, but taking on those costs itself may not represent a sustainable business model. Care must therefore be taken to avoid giving a false picture of the viability of an inclusive business model if companies lack the resources and skills to continue implementation after donor support has ended. An additional concern is how to replicate apparently successful large-scale interventions and how to scale-up activities that have been successful on a small scale or as a pilot. This suggests that new project activities need to be planned in close collaboration with companies and with a strong emphasis on developing affordable interventions that, if successful, will provide a business case for the private-sector partner to continue implementing them. In turn, demonstrated profitability should provide the model for future replication or scaling up.

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Cross-border trade and women in value chain development

Florence Tartanac[1]

Rationale

Although trade is regarded as a key driver for growth in almost all African countries, the development and implementation of coherent and appropriate policies and strategies to realize the full benefits of agricultural trade, particularly its employment creation potential, is still limited. Moreover, with evolving international markets dynamics and expanding global value chains, the continued competitiveness of food products from developing countries depends increasingly on the country's ability to assure appropriate levels of quality and safety standards for their food products. Following the new trends, the trade development agenda is moving away from the traditional agenda on tariff liberalization to a two-fold strategy, on the one hand addressing issues such as international standards, intellectual property rights, removal of non-tariff barriers and technical barriers to trade, all of which requires specialized and technical expertise; and on the other hand focusing on meeting the increasing demand for agricultural food products at national and regional level.

In the promotion of regional trade, including domestic and cross-border trade, value chain development is key to increase trade in import-competing food staple sectors, which is where the majority of the rural poor operate. For many of these disadvantaged African pr1"oducers, the domestic and regional markets are likely to provide a more promising outlook in the short to medium term than international markets. Increased trade will also generate improved employment opportunities, particularly for Africa's youth – contributing to create job opportunities for at least 30% of the youth in agricultural value chains.

Small-scale (both formal and informal) cross-border trade, which involves mainly food products, is an important coping mechanism for women to create self-employment, promote income and reduce poverty. Employment creation is particularly relevant for women and especially in the informal trade: 70 percent of informal traders in Africa are women; with trade providing the main source of income for 90 percent of them and being the most important source of employment, with 60 percent of the non-agricultural self-employment in Sub-Saharan Africa.

The potential represented by small-scale trade in poverty reduction is hindered by a number of challenges:

- Inefficient value chains with high transaction costs and limited economies of scale;
- Administrative obstacles, including poor enforcement of policies (*e.g.* difference in standards applied);
- Transparency in tax collection and ad-hoc enforcement of national simplified export requirements for small traders and adoption of the regional small trade regime (STR) for small traders, both formal and informal (33 percent of regional formal export are below USD 2 000 and could potentially benefit from the STR);
- High cost and time of crossing borders, due to poor transport infrastructures
- Lack of infrastructure at the border (*e.g.* bulking and storage facilities for traders; lab and test equipment for custom agents);
- Poor market information system;
- High insecurity and vulnerability to violence and harassment;
- Low presence of formal associations and cooperatives of small traders (especially for women), resulting in poor service delivery to small traders;

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- Lack of awareness of border agents of trade protocols;
- Limited flow of information on border procedures and on how regulatory authorities operate

All the challenges are particularly relevant and affecting for women, which constitute a significant but yet invisible presence in the value chains. This is the reason why trade development agenda cannot ignore the broader value chain framework, as well as the inclusion of gender into value chain development interventions. Several studies show that expanding women's economic opportunities and benefits from more efficient and inclusive agrifood chains, triggers multiplier effects on food and nutrition security, education and health. Women's knowledge, education, social status, health and nutrition, and their control over resources are key factors that affect nutritional outcomes. Making women benefit more from value chains can empower them to make better food, health and care-related decisions for themselves and their households. Enhancing women participation in value chain, which include also trade at different scales, contributes to improved nutrition through three main channels: (i) on the demand side: improving diets by promoting consumption of nutritious food; (ii) Supply side: by improving economic returns, *i.e.* reducing transaction costs, increasing outputs, sales and profits along the value chain, leading to improved income; and (iii) Demand-supply interface: Improved value chain efficiency (*i.e.* where output is not only economic but also involves interventions in nutrition and food safety) is expected to have a direct impact on: food availability, quality and affordability, leading to improved nutrition.

Methodology

This paper is based on the lessons learned from the implementation of field and policy support women small traders in Rwanda, within the framework of the Cross-border Trade Support Initiative led since 2012 by several development partners, including FAO.

Learnings from this experience have resulted in its up scaling by public institutions through a number of initiatives and policy frameworks focusing on incorporating gender into value chain development and cross border trade policies. Also, gender is increasingly becoming a relevant component incorporated into trade development initiatives at different levels.

Main results

This paper presents some findings and policy recommendations.

Policy framework: increased acknowledgment of the economic contribution of women in food value chain – both at informal and formal level

Despite their substantive economic contribution, small-scale women traders are invisible in statistics, policies and regulations and in the GDP of their countries. There is only scarce and reliable data on informal and small-scale cross border trade because of this lack of recognition. The vicious circle of invisibility, informality, and ad hoc application of rules and regulations can only be interrupted when policies are informed by reliable data and information and by the recognition that women small traders create wealth, contribute ti poverty reduction, employment creation and regional integration in a considerable way.

*Implementing harmonized trade-policy mechanisms, including those on small-scale and informal trade (*i.e. *simplified trade regimes)*

Despite the existence of some programmes, initiatives and instruments that support women informal traders, they do not use the available formal systems and structures for most of their transactions. This makes it difficult for regional trade policy initiatives to have significant impact on the informal trade by women. Trade policies should systematically address the specific role, economic contribution and the vulnerabilities of women small traders and target the improvement of informal trade through favorable tax regimes and enforcement of existing simplified trade regulations.

Raise awareness of current trade regulations – i.e. *to informal actors,* e.g. *women traders associations; producers associations, and customs agents*

Experience shows there are challenges with respect to the application of trade regulations, some of the reference material used for sanitary and phyto-sanitary standards, for example, is either missing or out dated. Small traders, and especially women, are not aware of current regulations, of the documentation needed for export and of the existence of simplified trade regimes, resulting in porosity of borders, 'un-necessary' smuggling and growing insecurity.

Developing a proper legal framework to regulate the organizational structure of women small-scale value chain actors and support them with specific incentives

To give women small traders more voice and influence, the formation of associations is recommended, to improve access to information and reduce transaction costs. However, when supporting the creation of associations, the potential benefits of formalization versus informal issues need to be carefully assessed. Formalization might have negative implications for women traders and for overall rural economy. Incentives and support mechanisms should include informal associations among the beneficiaries.

Developing inter-ministerial one-stop information points at the borders and build capacity to facilitate their use

Flow of information on documents required, custom laws and standards is very limited, contradictory and time-consuming. One stop border posts are being piloted in several countries, especially in Eastern and Southern Africa, to ease trade at the border, reducing the time required for inspection and clearance procedures. Where one-stop shop are at an advanced stage, it still requires substantive amount of document to fill, resulting in time-consuming and often inaccessible information, being most of the procedures and forms available on-line, wiht challenges for small-scale women traders above all.

Concluding remarks

The importance of including small-scale trade into value chain development strategies has often been overlooked, especially due to a lack of data and information on the economic and social role it can play. Also, the contribution women make to poverty reduction, food and nutrition security and economic growth remains often invisible and neglected in substantive policy formulation. The role of women in the overall value chian development and the multiplier effect gender-sensitive policies can play is slowly, but increasignly, informing development initiatives in value chain development and regional integration, as shown by the case-studies presented in the paper. Specific focus will be given to the evidence driven from Rwanda initiatives to support women small traders and implement gender-sensitive value chain interventions in different subsectors.

Inclusive and efficient value chains

Maximo Torero[1]

Millions of low-income people, a large proportion of whom are women, participate in agricultural value chains as producers, small-scale traders, processors, and retailers. Many millions more, including the great majority of the developing world's poor, participate in value chains as consumers. Small farmers, women, young people, and members of marginalized groups often face barriers to participating in value chains. These barriers reduce the degree of commercial engagement of these actors, and diminish prospects for income growth (Singh, Squire, and Strauss, 1986; Fafchamps and de Janvry, 1991; Omamo 1998). When participation is fairly inclusive but the value chain is performing poorly, for example by generating high transactions costs, the benefits of participation are diluted. Improving the efficiency (that is, reducing the cost of moving products along value chains) and inclusiveness of agricultural value chains is therefore a centerpiece of many efforts to meet the SDGs on poverty and hunger.

Over the past 10-15 years, many analyses of the performance of specific value chains have been undertaken. Interventions to improve efficiency and inclusion have been designed and implemented by governments and their development partners and private firms (Seville *et al.* 2011; Vorley *et al.* 2012; Donovan *et al.* 2008; Gereffi *et al.* 2005; and Miller and Jones 2010). This growing body of work has not achieved the desired impact for several reasons. The choice of value chains studied and of interventions to improve them is not systematically informed by prioritization to assure that they are of high priority for large numbers of poor smallholders. Interventions are not always rigorously tested or analyzed for scalability, and hence M&E frameworks may lead to erroneous conclusions about prospects for impact. This paper aims to bring evidence on how this challenges can be resolved. We will present different innovations on how value chains can become more inclusive an efficient through proper targeting by using a typology of micro regions developed through stochastic frontiers with specific examples for Ghana and Mozambique. The typology can then be combined with detail value chain surveys to identify specific interventions needed at the node of the value chain optimizing resources and maximizing the potential for impact on poverty through a more effective scaling-up strategy. We will also show how interventions on contract farming and farmer associations can then help to resolve the barriers to participation and improve efficiency.

1. IFPRI, Washington DC, USA.

Assessing equity in value chains through a participatory guide to business models that link smallholders to markets: insights from LINK application across diverse value chain settings

Mark Lundy[1] and Matthias Jager[1]

Value chain initiatives occupy a key space in current rural development discourse as donors and practitioners seek to leverage market mechanisms to achieve poverty reduction. Increased efficiencies and economies of scale constitute the central focus of these interventions with the assumption that these gains underpin processes of positive, sustained change for the poor. A value chain for development (VCD) or market systems approach engages an inherently complex system at a relatively high level of abstraction seeking to identify leverage points for lasting change. While useful in providing an overview of system dynamics, constraints and enabling factors, these assessments fail to assess more micro considerations more useful and actionable for specific development interventions.

Fostering equitable trading relationships between farmer organizations and formal markets is one of the principal goals of inclusive value chain development. This presentation deconstructs the value chain development approach to focus on the quality of business relationships between specific actors through an inclusive business model lens. The presentation introduces four key tools of the LINK methodology (value chain map, business model canvas, new business model principles, and the prototype cycle) and presents case study results based on tool application and adaptation by development practitioners in Nicaragua and Honduras. Evidence comes from 12 cases applied by three development organizations in vegetables, cocoa, corn, passion fruit, beans, honey, dairy and meat value chains. The presentation focuses on how an inclusive business model lens assists in identifying intervention points to align incentives between value chain actors, how to measure inclusion from the producer organization and buyer perspective and how to assess improvements in commercial relationships.

Results indicate that an inclusive business model lens assists in the identification of strategies that deliver improved results in terms of alignment between value chain actors, quality and sales volume and, in some cases, greater inclusion of women in decision-making processes. In some cases the approach has led to replication by private sector actors. The presentation concludes by indicating the need to track the gains of more inclusive business models over time to assess household impacts and longer-term business and value chain influences.

1. CIAT, AA 6713 Cali, Colombia.

Household asset endowments and implications for inclusive value chains

Jason Donovan[1]

Despite the considerable investment by NGOs, donors, and development agencies for facilitating smallholder links to high-value agricultural markets, few studies have documented the impact of improved market access on poverty, gender, or the environment. Project assessments generally have relied on a few generic impact indicators (*e.g.*, output per acre, size of holding, income gained) and thus have provided limited understanding of the determinants of household participation and the benefits across different types of households. Deeper insights into how smallholders benefit from linkages to high-value markets can be obtained by adopting a livelihoods perspective, with special emphasis on households' assets and the ability of households to build their endowments over time. The *5Capitals* methodology (Donovan and Stoian 2012) provides an asset-based framework for the assessment of outcomes from value chain interventions with smallholders. The tool explores how variations in households' endowments of livelihood assets, namely natural, human, social, physical, and financial capitals, shape the capacity of smallholders to participate in and benefit from value chain interventions. This presentation examines an application of the *5Capitals* methodology in Nicaragua, which focuses on smallholders' capacity to exploit new linkages to certified coffee markets. Data on assets were collected from 292 households, which were clustered to test how differences in outcomes (asset building) reflect variations in initial asset endowments. The results suggest that most households built particular elements of their asset base and increased their resilience to future shocks. However, households struggled to make effective use of the gains for intensifying their livelihoods. Of the least-endowed households, few made investments in the scale or productivity of coffee, and most continued to depend heavily on subsistence production and seasonal off-farm income for survival. In conclusion, improved market access alone, even under relatively favourable market conditions and with considerable external support, will have uncertain impacts on rural poverty if the underlying constraints on household assets and investments are not addressed concurrently.

1. ICRAF, Lima 12, Peru.

Gender equity in value chain and livelihoods development: innovative approaches and tools

Dietmar Stoian[1]

Over the past decade or so, value chain development (VCD) has been promoted by public and private sector and civil society organizations as one of the principal approaches to rural poverty reduction. Underlying most approaches is the assumption that poor smallholders are prepared for participating in VCD, and that investment of their family labour and other resources in value chain activities will lead to lasting livelihood improvements. Thorough scrutiny of diverse VCD initiatives shows, however, that endowments with livelihood and business assets among smallholders and the small and medium enterprises (SME) linking them with downstream value chain actors vary widely, and households and enterprises below certain asset thresholds struggle to become 'value chain ready'. This requires differentiated approaches to VCD that account for varying asset endowments and the diversity of smallholder livelihood strategies. There is also growing evidence that gender-differentiated access to assets in smallholder households may allow some household members, particularly medium-aged men, to more readily respond to and benefit from VCD initiatives. This is a particular challenge for VCD approaches that seek to promote gender equity.

This presentation focuses on innovative tools that facilitate the design, implementation, and M&E of gender-responsive VCD. It acknowledges the inherent tension between the specialization fostered through VCD and the diversification of smallholder livelihoods in response to diverse risks and opportunities. The tools presented account for the fact that the access to and control over resources, labor division, income generation, and overall decision making in smallholder households and SMEs are differentiated by gender and age. They highlight the gender dimension for three critical aspects of VCD: 1) participatory approaches to VCD, 2) design of inclusive business models, and 3) assessment of poverty impacts of value chain development.

Particular emphasis will be put on the *5Capitals-G* methodology, an asset-based approach to gender-responsive value chain development that facilitates both the establishment of a baseline at the onset of VCD and periodic assessment of outcomes and impact. Drawing on findings from case studies in agrifood and tree-crop value chains in Latin America, Africa and Asia, genderdifferentiated options for asset building at household and enterprise levels are presented, with links to gender-responsive design and implementation of participatory value chain development and inclusive business models.

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Innovation for inclusive value-chain development, successes and challenges

André Devaux[1]

With growing pressures for agricultural programs to achieve greater and more sustainable poverty impacts, in less time and with fewer resources, greater attention is being paid to valuechain development (VCD). In recent years, many programs have experimented with value chain development approaches. It is inherently complex to design and implement interventions that involve small businesses and the rural poor, and results have been mixed. There is urgent need to learn from experiences how to improve the design of VCD interventions.

This presentation will present results of a review of cases involving recent work associated with CGIAR and its partners in Africa, Asia, and Latin America, which has been published in book form. We will discuss emerging issues and policy implications, and identify knowledge gaps and priorities for future applied research and evaluation related to agricultural value chains and sustainable development. The chapters in the book deal with many aspects of agricultural innovation and VCD in different geographic, social, economic, and institutional contexts. The papers assess the opportunities emerging from new and expanding markets for agricultural produce and identify challenges to smallholder participation in these markets and the resulting benefits. They illustrate how interventions have fostered agricultural innovation and inclusive value-chain development, and the extent of their impacts. They also highlight the need for incorporating learning-oriented monitoring and evaluation into VCD interventions

The book identifies a number of priorities for future research to advance inclusive VCD, which can be summarized in five points: methods for implementing asset-based approaches to valuechain development; platform membership, management, assessments and facilitation; evaluation approaches and testing of action and change models: upscaling; and application of a “gender lens.

1. CIP, Lima, Peru.

Measuring and simulating trust in value chain development

Christine Plaisier[1,2,3]

Fostering of inclusive business is a recent approach to alleviate poverty in developing countries. Inclusive business is to be understood as sustainable and commercially viable business that involves low-income communities in value chains, in a way that is benefitting them. NGOs develop inclusive business in public-private partnerships with firms that have interests in reliable local supply. In such partnerships, there are issues to be solved like the high transaction cost for firms sourcing from large numbers of poor suppliers, the cost of logistics, the firms' trust in the suppliers' capacity and commitment to the relationship, the suppliers' trust that firms will accept their produce and pay as promised, and the availability of knowledge, capital, and inputs to the suppliers. NGOs and firms are assumed to have complementary capacities and resources to solve these issues.

New impact assessment approaches are required to evaluate public-private partnerships aiming at supply development. Topics to be measured include changes in farm income and transaction cost, and behavioural change in value chain relationships. The research reported in the present paper has focussed on an agent-based simulation, as part of a project developing a value chain laboratory for impact assessment of supply development programmes. In the concept of the value chain laboratory, the agent-based simulations mirror simulation games with actual value chain participants, following the symbiotic gaming and agent-based simulation approach as proposed by Tykhonov *et al.* Thus, an environment is offered where data can be gathered, hypotheses about the processes can be tested, and alternative regimes can be experimented with.

The research is conducted in the context of a programme called 2SCALE (Toward Sustainable Clusters in Agribusiness through Learning in Entrepreneurship). The goal of 2SCALE is to improve rural livelihoods and food and nutrition security in nine African countries. To this end 2SCALE forges public-private partnerships, with private partners varying from local producer organisations and SMEs to large-scale companies such as seed companies, processors, and trading companies. The approach is based on (1) formation of agribusiness clusters – local networks between the producers themselves and with service providers – to improve competitive intelligence and bargaining power, (2) integrating the agribusiness clusters in value chains, with backward linkages to input supply chains and forward linkages to food supply chains, and (3) enabling fair business environments with better access to information and finance, in particular for the weaker actors.

1. Tim Verwaart , The Netherlands.
2. Youri Dijkxhoorn, The Netherlands
3. Coen van Wagenberg, The Netherlands.

Session 11

Linking global value chains and territories: conceptual insights for understanding and ensuring sustainability at different scales

Agri-chains and territories "zero-deforestation": what role for the payments for environmental services?

Alain Karsenty[1]

Strategies against deforestation are evolving. While uncertainties about funding and modalities of REDD+ are growing, private actions are multiplying, especially on the side of big agribusiness subject to pressure from environmental NGOs and consumers. More than 80% of deforested land is used for agricultural purposes. Industrial agriculture is responsible for two thirds of deforestation in Latin America and for one third in Africa. In addition to their direct responsibility, firms are also involved in deforestation caused by small producers. They are supporting the diversification of production systems towards perennial crops (oil palms, cocoa) through contracts with or monitoring of producers via the cooperatives that supply them.

Voluntary commitments

Since 2010, the major transnational food companies, especially for palm oil, which are criticised by environmental organisations, have been encouraged to cut out of their supply chains any products derived from deforestation. Some 20 companies committed to sourcing deforestation – free palm oil, such as the Indonesian Wilmar, one of the leading global producers. Some states – Indonesia, Côte d'Ivoire – pledged to support companies' efforts to eliminate from their supply chains agricultural products derived from deforestation.

Companies' zero deforestation commitments are becoming a new tool for mobilisation, whereas the hopes raised by REDD+ (Reducing Emissions from Deforestation and Forest Degradation in developing countries) are now fading.

However, these voluntary commitments are difficult to implement and to verify, especially when supply chains are comprised of a large number of small producers.

First of all, the concept of zero deforestation remains ambiguous. It implies agreement on the definition of a forest, especially on the minimum forest cover threshold per unit area and on canopy height. Next, how can consumers be sure the products they buy are zero deforestation if these products cannot be accurately traced from the original plot because there is no reliable cadastre? The clarification of land rights and the implementation of a georeferenced land information system in rural areas are therefore prerequisites.

Moreover, the zero deforestation targets imposed by companies are often too restrictive for small producers. This is reflected in the steps taken by producer organisations in Indonesia and Malaysia: they have asked palm oil companies to abandon their commitments and to adopt less binding objectives, on the grounds that small producers are unable to meet these requirements. Without additional long-term support for small producers to enable them to meet the demands of these firms, the zero deforestation commitment will be compromised.

Finally, it would be a mistake to think that even if firms are in a position to guarantee the effectiveness of their commitments, they can succeed in reversing current deforestation and degradation dynamics. Indeed, any given territory faces numerous factors of deforestation and, more generally, of environmental degradation, and managing one factor may lead to the development of another. Controlling production conditions for farmers in one sector does not mean that all drivers of degradation are controlled – other agricultural or pastoral production systems, charcoal production, and timber harvesting. In other words, a zero deforestation approach in one or more organised sectors could be accompanied by continued environmental degradation in a given territory. It is therefore necessary to act not only in supply chains, with firms and producers, but also in territories, with the communities living there.

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PES as public policy tools

How can these obstacles be overcome? Payments for environmental services (PES) can provide an instrument for decoupling agricultural development and deforestation, in the sense that they provide a direct incentive to change practices or to engage in conservation.

PES are written contracts, whether individual or collective, that are voluntary and conditional (payments are only made once the service provided has been reported). Most PES reward people for a certain type of land use, in other words an environmental service provided by users, a use or service associated with the quantity and quality of an ecological service provided by nature. The distinction between land use-restricting PES and asset-building PES is well established. Individual PES reward people for a certain type of land use, in other words an environmental service provided. Collective PES reward communities for preserving the ecosystems in their territory in the long term.

Combining these two types of PES would make it possible to overcome the obstacles described: asset-building PES would support small producers in the adoption of agro-ecological practices; and collective PES would finance communities to preserve their territory.

As mentioned above, firms will only be able to fulfil their commitments if small producers implement ecologically intensive agrosilvopastoral systems, which will also enable them to increase their income and to avoid encroaching on the natural ecosystems still available. This would require financial support to promote innovation and to encourage land users to plant trees and hedges or to restore degraded areas. Payments could be based on the labour costs invested (agricultural minimum wage, for example), although variable payments according to the species planted or the areas in which these operations are conducted could be possible.

These asset-building PES will guide developments in agrosilvopastoral practices and will help to increase the resilience of agricultural systems in a context of changing climate and environmental conditions by contributing to the diversification of crops and activities and supporting the reintroduction of trees into monocultures (for example, establishing agroforestry systems in order to also produce shade cocoa).

In addition, collective PES will be implemented at the local level to restrict certain land use rights: in exchange for regular payments, users will waive some of their rights, whether real or deemed legitimate locally. A collective dynamic will thus be created supporting commitments for a given use of the territory, for the construction of a sustainable territory or for zero deforestation, depending on the case. In order to plan or locate new perennial plantations, participatory zoning of territories could be developed. This could be based on two indicators: High Conservation Value (HCV), which distinguishes between forests according to criteria such as biodiversity or their socio-cultural role; and High Carbon Stock (HCS), which differentiates between forests which even when disturbed still provide ecosystem services, and highly degraded forests, which can be converted to agricultural plantations.

Indicators of the environmental quality of the territory will also be discussed with populations. PES could help to finance environmental quality improvements that depend on collective action – for example delimiting village lands by means of collective tree planting – and to provide collective advantages (land security through the demarcation or registration of individual plots, drinking water supply, storage facilities, rural roads, schools, dispensaries, etc.) by making them conditional on the maintenance or improvement of environmental quality, which is measured and acknowledged together with the community.

Combining individual asset-building PES and collective land use-restricting PES would create compulsory solidarity (that would also be necessary to achieve efficiency) to guarantee conservation. Establishing the conditional, tied nature of payments (if the collective conservation contract is terminated, individual contracts will suffer the same fate) would help to limit the risks of free riding through the exertion of social pressure.

Implementing a system of this kind requires substantial public involvement, for example to identify and map the individual plots on which farmers will fulfil their contractual obligations. The approach adopted could be that of the rural land use plans (georeferenced cadastral information, with the identification of plots and right holders, and an indication of the exact nature of individual and collective rights).

Financing through innovation

How can a mechanism of this kind be financed? For their zero deforestation commitments to become effective, companies must support the family farmers under contract to enable them to comply with the specifications established, which requires contributions to financing their training and basic investments (nurseries, etc.). However, substantial public investment is also required. Although international finance in the name of climate mitigation or development assistance can be mobilised, a national financing base would shield this programme from the vagaries of international funding.

To ensure sufficient, long-term financial resources, it is possible to use a fee mechanism with a very broad base and low rate, with fees earmarked to the PES programme. This would not be environmental taxation (the principle of which is to tax pollution in order to reduce it), but a yield-oriented tax whose proceeds are allocated to financing a public good: environmental quality improvement in rural territories (through the reintroduction of trees into cropping systems). A broad base means that fees must be applied to as many supports as possible, provided this is socially and therefore politically feasible. This is the condition on which the fee levels can be low enough to be relatively insensitive for the consumers. Indeed, contrary to an eco-tax, the goal of this type of fee is not to reduce consumption of its support (or to increase it), as this would reduce its yield and jeopardise the financing of the PES programme.

Several supports are possible: telephone units (a slight increase in the cost of call seconds); bottled drinks (beer, other alcohol, soda, mineral water, etc.); sporting bets, lotteries (levies on bets and tickets); car tax (increase allotted to the PES programme); water distributed by public networks (likewise); and fuel distributed in service stations (likewise). Companies and distributors would simply collect fees, which would be set by the government and applied in a general, uniform manner. The burden of the fee would fall on final consumers, as with VAT, to ensure its introduction does not distort competition between companies in the different markets.

A system of this kind could soon be implemented in Côte d'Ivoire. This country is basing its REDD+ strategy on decoupling agricultural development and deforestation. The first stage will involve setting up pilot PES systems in certain companies' supply areas, in order to form partnerships with the private sector and to test different aspects of PES mechanisms. These pilot projects will serve to analyse different components and methods, and lessons will be drawn from them before proposing a national programme. This change of scale requires the emergence of a reference national operator with staff trained in the pilot mechanisms. Companies will need to confirm their zero deforestation commitments and to contribute to financing asset-building PES. The government will also need to fulfil its environmental commitments by introducing fees allotted to the national PES programme. This would increase the credibility of policies aimed at promoting a green economy, credibility which should be the basis of substantial financial support backed by development partners and specialised institutions such as the Green Climate Fund.

Vulnerability and resilience modelling for sustainable food systems

Paolo Prosperi[1,2] and Thomas Allen[3]

Introduction

The latest FAO estimates indicate that approximately 800 million people are chronically undernourished worldwide (FAO, 2015). Concurrently, more than 2 billion people are affected by malnourishment related to unhealthy food consumption and dietary trends, which is reflected in the spread of food-related diseases like obesity and nutrient deficiency (Ng *et al.*, 2014). At the same time food production and consumption exert a huge impact on the environment and are significant sources of green house gases. Furthermore, agriculture is responsible for 70% of water withdrawal (FAOSTAT, 2012) and represents a main driver of deforestation and biodiversity loss. Food systems rely on physical resources such as land, water, biodiversity, and fossil fuels which are becoming ever more fragile and scarce. Efforts need to be focused on the creation of food systems that are more efficient in the use of resources and reduce food waste, at every stage, from primary production to transformation and consumption (UNEP, 2012).

Recurrent food crises and global change – along with habitat loss and micronutrient deficiencies – placed food security and environmental sustainability at the top of the political agenda. The analysis of the dynamic interlinkages between food consumption patterns and environmental concerns recently received considerable attention from the international community (FAO & Bioversity International, 2012). Interconnected environmental sustainability and food and nutrition security topics, and the debate about strengthening the links between food, health, and environmental research, are gaining increasing intensity (Freibauer *et al.*, 2011).

The sustainability of food system is at risk, with socioeconomic and biophysical changes affecting the food system functions, including food and nutrition security. Building sustainable food systems has become a key effort to redirect our food systems and policies towards better-adjusted goals and improved societal welfare. Food systems involve multiple interactions between human and natural components. The systemic nature of these interactions calls for systems approaches and integrated assessment tools. Identifying and modeling the intrinsic properties of the food system can help tracking progress towards sustainability and setting policies towards positive transformations (Fanzo *et al.*, 2012).

Understanding what needs to constitute the assessment of the sustainability of food systems and diets is key for providing decision – and policy – making with knowledge of action, and having a systemic rationale and a framework to build a metric system is indispensible (Fanzo, 2014). It is then necessary to investigate the impact of the determinants on the sustainability of diets and identify the appropriate tradeoffs related with recommendations and actions towards the sustainability of the food systems (Johnston *et al.*, 2014).

Aims

This work aims at identifying the main variables to formalize and operationalize the abstract and multi-dimensional concept of sustainable food systems, and to define the food system characteristics and fundamental systemic properties that make the food system capable of sustaining food and nutrition security outcomes. Building on dynamic system theory, we suggest a formal representation of the overall food system to structure its different elements; clarify the distinctions between input, state, and output

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variables; and formalize the scale at which system dynamics are operating. Then, we present a stepwise application of the model, identifying specific drivers and issues for the Latin Arc and formulating explicit interactions.

Methods

Through a broad understanding of sustainability, the methodological approach of this work builds on the theories of vulnerability and resilience. Following the steps of the global change vulnerability assessment, a causal factor analysis is presented at a transnational and subregional level concerning three Mediterranean countries, namely Spain, France and Italy. Formulating "what is vulnerable to what" hypotheses, a set of causal models of vulnerability were identified.

Vulnerability – as the degree to which a system is likely to experience harm due to exposure to a perturbation or stress – is a function of exposure, sensitivity, and resilience (IPCC, 2012). The Turner *et al.*'s (2003) vulnerability/sustainability framework is one of the most quoted integrated conceptual models for vulnerability assessment (Gbetibouo *et al.*, 2010). Exposure, sensitivity and resilience provide the concepts to identify the system's properties that shape a causal pathway towards food system's outcomes (Prosperi *et al.*, 2014).

Vulnerability per se is considered unobservable; since it does not express an observable phenomenon it is a theoretical concept that cannot be measured (Patt *et al.*, 2008). Thus, before measuring vulnerability it is necessary to make the concept operational, providing a method for framing it into observable concepts. The general framework of Turner *et al.* (2003), for social-ecological systems, was then adapted to the food system framework of Ericksen (2008), fostering the operationalization of the theories of vulnerability and resilience through a set of causal models and the combination with literature review.

Results

A conceptual hierarchical framework was identified for modeling the complex relationships between food and nutrition security. A feedback-structured framework of the food system formalized eight selected causal models of vulnerability and resilience and identified intrinsic properties of the food system, shaping the interactions where a set of drivers of change directly affect food and nutrition security outcomes at a subregional level. Each interaction was disentangled in exposure, sensitivity and resilience (Figure 1).

The understanding of the food systems as social-ecological systems helped answering questions about the sustainability problems that affect the functions of the food system (Food system framework: Ericksen, 2008). Food and nutrition security is considered the principal outcome of any food system and is a multidimensional concept and relies on the several properties and activities of food systems (Ingram *et al.*, 2010). Various elements of food systems are altered by – and actively impact – the socioeconomic and environmental conditions of the system across local, regional and global levels. These interactions are featured by – and bring with themselves – high uncertainties, that can be explored through a vulnerability and resilience analysis, being vulnerability the propensity or predisposition of a system to be adversely affected by a change (IPCC, 2014). Food systems can be vulnerable, and resilient, to a set of stressors (Adger, 2006) such as environmental pressures, socioeconomic instabilities and institutional and policy factors (Vulnerability framework: Turner *et al.*, 2003; Ericksen *et al.*, 2010). A food system is considered vulnerable when it fails in delivering one or many of its intended outcomes, because of even small stresses that might bring to significant social-ecological consequences (Adger, 2006; Eakin, 2010). Fulfilling the food system outcomes remains challenging because of socioeconomic and biophysical stressors affecting the food system. Food systems are then considered social-ecological systems that comprise biophysical and social factors linked through feedback mechanisms (Ericksen, 2008).

This approach proved helpful for a general causal analysis of the vulnerability of the food system outcomes at a regional level, in the Mediterranean area. Several global and regional drivers of change

affect the structure and processes of the food systems (Brunori *et al.*, 2009) putting at risk context-specific food and nutrition security outcomes (Ericksen, 2008). The research targeted the identification of the main variables to formalize and operationalize the abstract and multidimensional concepts of sustainable food systems. A feedback-structured framework of the food system, combined with a large literature review, helped formalize eight causal models of vulnerability and resilience, and identified intrinsic properties of the food system, shaping the interactions where four external drivers of change (Water depletion; Biodiversity loss; Food price volatility; Changes in food consumption patterns) directly affect food and nutrition security outcomes at a subregional level (Nutritional quality of food supply; Affordability of food; Dietary energy balance; Satisfaction of cultural food preferences) (Brunori *et al.*, 2009; Brunori & Guarino, 2010; Freibauer *et al.*, 2011; HLPE, 2011; Ingram and Kapadia, 2010; Kearney, 2010; PARME, 2011; UNEP, 2012; UNSCN, 2000; UNWATER, 2014; WHO, 2014).

The challenge for social-ecological system frameworks analysis, here, was to identify the pathways leading to vulnerability, and the characteristics and opportunities ensuring resilience of the food system in a context of change. The identification of a causal pathway (adapted from Metzger and Schroeter, 2006; Fussel and Klein, 2006) allowed locating the role of the three variables of exposure, sensitivity, and resilience. Exposure represents the first point of contact between the perturbation and the system. The understanding of exposure, as interface with a specific driver of change, helps differentiating it from the sensitivity or resilience components, which might be influenced by other drivers of change. Building on the GECAFS food systems approach (Ericksen, 2008; Ingram *et al.*, 2010), coupled with Turner *et al.*'s (2003) conceptualization of vulnerability, the suggested framework represents the modeling of food systems' dynamics, with feedback from outputs to inputs. The three components of vulnerability are the intrinsic features of the system that mediate the impact of the drivers of change on the food system's outcomes. In particular, these sets of characteristics are indicating how changes in water, biodiversity, food prices and food consumption patterns are transmitted through the food system, including the sequence of events and the scale of interactions; how the food system is sensitive to these changes; and the subsequent adaptive capacity of the food system.

Conclusions

Understanding the causal mechanisms that regulate the interactions between drivers of change and vulnerable food and nutrition security issues can help analyzing and interpreting available information, developing metrics, and anticipating new hazards and changes. The investigation on causes, effects and response to socioeconomic and biophysical changes can provide analytical tools to further understand the problems that affect the sustainability of the food system.

Building on Social-Ecological Systems frameworks, the Mediterranean Latin Arc presents several socioeconomic and biophysical drivers of change making the food system vulnerable in its functions. Several causal models of vulnerability were identified, describing the interactions where drivers of change directly affect food and nutrition security outcomes, disentangling exposure, sensitivity, and resilience. The further operationalization of the theories of vulnerability and resilience, through an indicator-based approach, could contribute to additional analyses on the socioeconomic and biophysical aspects and interlinkages concerning the sustainability of diets and food systems.

This study wants mainly to fill the theoretical and methodological gaps that are generally beneath a numeric assessment of sustainable diets and food systems. However, further food systems' outcomes could have been studied, such as environmental and socio-economic outcomes related to employment or equity. Food systems, in fact, are responsible for various environmental, economic and social outcomes. The set of food systems' outcomes and defining elements could be extended to other dimensions to further develop the modelling approach. Further current key socioeconomic and biophysical changes acting on the food systems, and additional food and nutrition security problems specific to the Latin Arc – as well as for the larger Mediterranean region – can be explored.

In conclusion, food systems are systems of variables connected to each other through causal pathways operating at different geographical or time scales. It is, therefore, desired to develop interventions that treat the underlying causes, rather than the symptoms of the unsustainability deriving from food systems, and the concepts of vulnerability and resilience can bring food security into consideration in a different way than in the past. Through the vulnerability and resilience theories and approach it is suggested to capture the food system as a whole, think prospectively and identify the system elements that policy can control or mitigate. The distinction in three components – exposure, sensitivity and resilience – allows the model specifying which attributes need to be measured and how to structure the different indicators in a coherent assessment framework for improved decision-making and policies for sustainable food systems.

Assessing the potential of territoriality in advancing agricultural and rural development

Valerie Nelson[1] and Julian Quan

Sustainable landscapes and agri-supply chains: Exploring territorial and land governance dimensions Introduction

This paper presents findings of preliminary research on the potential of emerging policy approaches to sustainable forest and agrarian landscapes to deliver scientific and policy goals. We explore the proposition that effective land governance is fundamental to sustainable agri-food chains. We review the potential of current non-state market initiatives and hybrid approaches to value chain governance to respond to multiple interests, in the context of current global policy and market drivers.

We argue that for food security, sustainable environmental services and inclusive, broad-based economic development, territorially grounded approaches to development are needed. We outline a research agenda to support operationalisation of land governance at a landscape or mesoterritorial scale, alongside other pertinent policy and practical measures.

Background and Rationale

We identify three key global policy drivers of current approaches to land and agri-chain governance:

- The Sustainable Development Goals (a clear framework for governments/all stakeholders to respond to major global environmental and social challenges).
- New Climate (or Green) Economy (Efforts to strengthen corporate responsibility in reducing climate risk, improving carbon capture, maintaining other environmental services).
- Shift of emphasis in rural development from livelihoods oriented approaches focused on small farmers and rural poor to commercial agriculture, with interest in large scale inward investment, land rush processes.

There is an emerging global consensus on principles of tenure governance and responsible investment in agri-food systems (Voluntary Guidelines on Governance of Tenure [VGGT; CFS & FAO 2012]; the World Committee for Food Security Guidelines on Responsible Investments in Agricultural Supply Chains, or CFS-RAI [2014]). Land rights are closely related to human rights. Land is increasingly recognised by corporate investors as a key element of Environmental,

Social and Governance risk. Current policy discourse emphasizes private sector responsibility and private standards/global instruments in ensuring corporate land investments "do no harm" to established, legitimate land rights in situations of weak legislation and/or enforcement or as part of hybrid governance. Multiple dimensions of "inclusive" agri-business receive widespread attention in public and private sectors (GDPRD 2016), but land rights feature relatively weakly in vertical value chains and specific commodity sectors discourse, largely detached from place. Aims and Methodology

Our research aims to address a inter-related questions:

- How can value chain initiatives move beyond the chain to better address landscape and sectoral initiatives? How do value chain initiatives shape land governance processes? What extra-territorial factors influence local outcomes?
- What combinations of governance instruments are capable of fostering more sustainable landscape management /more inclusive economic development? How effectively do such innovations address

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livelihood, justice and power issues?

- How can land and agribusiness investment assist in strengthening land and NR governance at a landscape/territorial scale, while contributing to more locally driven agri-food systems? What can alternative investment models, public policies and land governance approaches contribute?

Preliminary findings are outlined, based on literature review post-2004, covering thematically interrelated, academic and grey literatures on land governance and investment, landscape and territorial approaches, global value chain governance, and standards, forest risk commodities and zero-deforestation. Multiple combinations of key terms and a 'snowball' approach drawing on previous research / ongoing engagement in international donor supported initiatives on land forest governance and responsible business were used to identify relevant literature.

Findings

The post-2008 "Land Rush" is partly explained by agribusiness drives for greater control over security of supply /strengthening competitive advantage, in context of rising global demands for food and energy, resource competition, and increasing climate risk (Cotula 2012). Governmental power over productive resources has lessened. Emphasis has fallen upon diverse non-state governance mechanisms, linked to established initiatives (*e.g.* private standards and certification, commodity roundtables, geographical indications, payments for environmental services) (Lambin *et al.*2014).

The process of globalization (outsourcing of production, processes of market concentration) and governmentality of associated non-state market initiatives has created new extra-territorial power relations shaping local processes (Tallontire *et al.* 2011). The rise of non-state market mechanisms in **global value chains** has occurred as different actors have sought to advance sustainability, but questions arise as to how sustainability issues are framed, by whom, with what ideological basis, in whose interests (Nelson and Tallontire, 2014). There is significant market penetration of private standards in several sectors, but impact analysis of sustainability standards has shown mixed results/clear limits to effectiveness without complementary measures (Nelson and Martin, 2013). UNRISD research (2016 forthcoming) on social and solidarity economy finds that mainstream responses tend to result in piecemeal and incremental reforms. Emergent sector transformation theory focuses on the current status of national productive sectors and their evolution over time (Simons, 2004; Aid Environment, 2016), but does not fully address diverse stakeholder interests.

Land governance has taken a vertical, top-down "flow-based"-turn related to investment projects, stakeholder uptake of agreed global sustainability and human rights standards and corporate reporting across supply chains (CFS & FAO 2012; CFS 2014, OECD 2016), to the neglect of territorialised aspects, risking neglect of food production and other landscape dimensions (Sikor *et al.*2013). Nevertheless research by Jayne *et al.* (2014) identifies concentration of agri-investment in Africa in high population areas, growing prevalence of small-medium scale and domestic investors, and constraints on smallholder intensification and absorption of surplus rural labour. Land Matrix (2016) reports a tail-off in numbers of land deals and total area covered by investments but ongoing consolidation of large scale projects, with more information on potential impacts and risks for local communities and small-scale producers.

There is much criticism of current donor, corporate and governmental approaches from social movements / peasant studies perspectives that focus on agrarian political economies, indigenous and community rights and livelihood strategies. They propose alternatives founded on secure land rights, principles of food sovereignty, and agro-ecology. For those already integrated in value chains, improvement of the terms on which they are integrated is the priority question (Ros Tonen *et al.* 2015). In some sectors market concentration has increased agribusiness control over global value chains and land fragmentation leads to calls for more concentrated farms – both problematic for smallholders. Current policy debates risk polarization and much analysis inadequately addresses roles for national / local governments, community and farmers' organisations, business and civil society in local/regional collaborative efforts.

The expansion of Commodity Roundtables particularly for forest risk commodities and corporate commitments on zero deforestation, signal potential shifts in the global governance of environmental impacts. However, roundtable initiatives alone do not protect against insecure tenure, or address changes affecting people beyond the supply chain itself (Fortin and Richardson 2013). Debates on agri-chain governance, sustainability standards and responsible business tend to emphasize vertical, single commodity approaches and inadequately address people-centred development / the root causes of unsustainable production and trade.

A **landscape focus** has taken centre stage in international development / conservation policy circles, notably via the Global Landscapes Forum, which mobilizes investment to better balance conservation and development / meet diverse stakeholder interests. A focus on climate risk tends to emphasise biophysical dimensions and trade-offs between land use change, productive development, resource conservation, environmental services, carbon capture, contributing to a spatial turn in analysis. There are growing efforts to understand the systemic biophysical dimensions of landscape change and governance responses, including the environmental consequences of agriculture / other investments. Forest literature remains strongly focussed environmental issues including deforestation, biodiversity, carbon stocks and environmental services, with little attention to weaknesses of land governance and institutions (Byerlee and Rueda 2015).

Companies, standards organisations and donors increasingly recognize that achieving sustainable production requires tackling social and environmental issues beyond individual farms. Hybrid governance approaches involve: Articulated public – private actions; Governance instruments across scales; Potentially stronger regulation by states / international institutions; Greater consumer power; Civil society advocacy (Bernstein and Cashore 2012, Dauvergne and Lister 2012, Lambin *et al.* 2014, Meyfroidt *et al.* 2013). Emerging jurisdictional approaches to landscapes/agri-chains (Denier *et al.* 2015) encourage: Stronger roles for devolved local government; National legal or commodity-based reforms: the institution of territorially negotiated land use rules. Instructive experience is emerging in the oil palm sector, SE Asia.

Territorial development approaches, well established in Latin America (Schetjman and Berdegue 2004), emphasise socio-institutional perspectives, social identity, diversity and political economy regional rural dynamics, offering deeper understanding of agri-chain processes. While multi-level governance is central, there is scope to strengthen horizontality. Meso-scale approaches may deepen stakeholder engagement, and establish appropriate territorial configurations for planning, regulation, practical governance. Territorially embedded value chain collaboration may integrate smallholder livelihood trajectories and local food concerns into landscape governance through social learning (Ros Tonen *et al.* (2015). Territorial certification is being explored.

Questions remain as to the effectiveness of these innovations and whether justice issues are addressed (distributive, procedural, recognition). Many challenges remain in identifying / scaling up successful approaches, including resistance from laggard companies and disinterested governments.

Conclusions

To transform agri-food systems and realise multiple development objectives, none of the approaches reviewed here are individually adequate /empirical evidence is lacking. To address land governance risks, and achieve sustainable outcomes, policy-led, responsible business initiatives need to be viewed through a territorial lens. The latter would help to focus greater attention on power and agency in specific places issues of non-state governance mechanisms, and tensions between responsible agribusiness and food sovereignty narratives. Trading relations that deepen inequality are rarely challenged, and poverty is addressed through a narrow focus on marginalized groups rather than on structural processes of concentration / value capture within agri-food systems. In many contexts, capacity, institutions and

incentive structures for good land administration, land use, spatial analysis of economic development and meaningful stakeholder participation in governance processes remain weak.

Further empirical assessment/analysis is necessary in different landscape / political economic contexts, with greater interaction of relevant research and policy initiatives. A research agenda includes assessment of the territorial development potential of responsible land investments and voluntary standards initiatives in specific places, plus interdisciplinary analysis of vertical flow-based and horizontal place-based governance intersections in context of overall trends for specific commodities and regions, foregrounding questions of planetary thresholds, social goals and political-economy.

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Understanding the impact of economic globalization on local sustainability with global value chain governance – literature review and research agenda

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Concerns regarding the (un)sustainable use of natural resources, which is targeted by SDGs and notably SDG 15, are increasingly related to international agri-food trade.

Nonetheless, this relation remains mostly analysed on a *quantitative* basis. On the one hand, focusing on the local level, neo-institutionalist scientists, following Elinor Ostrom's work (1990), address the role of local and nested institutions to solve social dilemmas related to the famous 'tragedy of the commons'. Actors, once provided with clear rights over resources, are supposed to create robust rules which regulate the use of natural resources they depend on, in order to sustain their livelihoods. In turn, these local institutions allegedly mediate market pressures and population growth on natural resources (Agrawal & Yadama, 1997). There lie predominantly researched "horizontal" issues of natural resources, livelihoods, poverty, labour, gender, etc., at the local level (territorial scale).

On the other hand, recent improvement in data collection and treatment has allowed, through the analysis of supply chains, now global, to link trade in commodities and consumption to local sustainability, as targeted by SDG 15, and more specifically to land use change. Persson *et al.* (2014) showed that approximately a third of recent tropical deforestation in eight countries studied (Argentina, Bolivia, Brazil, Paraguay, Democratic Republic of the Congo, Indonesia, Malaysia and Papua New Guinea) can be attributed to four main commodities (beef, soybeans, palm oil, and wood products), especially agricultural exports to the EU and China. The latter indeed embodied a third of analysed deforestation.

In step with this evidence-building, action from numerous organizations, from environmental NGOs (WWF, Greenpeace, etc.) to bilateral and multilateral donor agencies (World Bank, SNV, AFD), have promoted interventions on supply chains in order to decrease their negative social as well as environmental impacts. Labels, certifications, round tables, zero deforestation pledges and plans are some practical examples of initiatives recently promoted.

Those approaches provide robust and clear evidence of the relationship between local environmental problems and global trends of consumption and production. Yet, due to their quantitative focus, they mostly characterise global supply chains as "black boxes", *i.e.* they link consumers of commodities to local sustainability in source countries but do not provide for analyses of actors, power plays and governance along the chain.

This type of knowledge is to be complemented with an understanding of the social and political systems that explain and govern the relation between agriculture, forestry and local resources on the one hand, and the global market on the other hand. Indeed, a thorough understanding of actors and power plays has to be added to the technical and economical data that describe agri-food chains. Supply chains, in particular their organization and structure, affect producers' incentives' structure, thus their practices at the local level, and finally in turn associated impacts on land use change, natural resource use and biodiversity.

For this, we contend, we nonetheless need to vertically explore in more detail the actors' strategies, relationships between them along the supply chain, the latter's organization, etc. At the heart of such an investigation, lies the analysis of governance within the chain, understood as "an effort to craft order, thereby to mitigate conflict and realize mutual gains" (Williamson, 2000, p. 599 emphasized by Williamson). In turn, issues of power, relations, and strategies become critical objects that need to be researched.

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Building on a literature review, the proposed article puts forward a conceptual and strategic framework to pursue this objective. It rests on the working hypothesis that "*sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*", as stated in SDG 15, depends not only on the consumption quantity but also on the internal organization of global supply chains.

As such, this paper aims not only to contribute to past and current research on global supply chains and their impact on biodiversity at the local level, but also to help designing better (public) policy and economic arrangements to reduce these impacts.

To do so, a systematic literature review will be presented, and this will allow analysing how the existing literature has so far studied impacts of global supply chains on local environments. Secondly, we will mobilize two literature corpus which were noticeably absent in our literature review results, however they could usefully inform our two research questions and objectives. On the one hand, it will be shown that literature on "global value chains" (GVC), led by works by Gary Gereffi and his colleagues (1994) deals almost exclusively with developmental and social issues related with global value chains (one noticeable exception being Bolwig *et al.* (2010)'s paper), and still lacks a more thorough applying to the sustainability and singularly the SDG 15 agenda. Its deep understanding and analysis of power relations and governance within the chain, embedded in the very term of "value", will then critically be applied to our research agenda. On the other hand, we will investigate political ecology studies, which have focused their research on causes of land change and degradation and the associated consequences, mainly social, on human-environment interactions, through lenses of surplus extraction, social relations of production, control, and knowledge.

By doing this, this paper will allow us to propose (i) combining an horizontal analysis of local impacts with a vertical analysis of power relations along chains and (ii) mobilizing GVC methodological tools, so far widely applied solely to developmental issues (poverty, inequalities, labour), to environmental problems. Building on this, the paper will propose a new tentative research agenda. Three main aspects are considered. First, governance as well as technical / quantitative dimensions of global value chains have to receive an equal analytical consideration when dealing with sustainability issues. There is then a critical need to analyse and link both vertical and horizontal dynamics of global value chains, although the former can not be reducible to the latter and vice-versa. Eventually, the role of actors who do not directly take part in the economic process of production such as states and NGOs has to be carefully considered.

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Sustainability assessment in local and global food chains. A comparative study in the French wine industry

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The distinction between "local" and "global" has emerged as a hot topic of debate in food sectors, in relation to the challenges of sustainability. "Local food"and "local food chains" have been promoted by social movements that criticize the globalization of food, but the notion of "localness" has now been appropriated by global players such as supermarkets and policy makers. As it is drawn into a wider social arena, the distinction between "what is global" and "what is local" has become less and less obvious, reflecting the complexity of the concrete food economy and the diversity of judgments among its actors.

The GLAMUR European FP7 research project was launched in order to clarify this issue and to propose assessment tools for local *vs.* global food chains. The objective of this communication is to address this local *vs.* global issue in the case of the wine industry through the multidisciplinary approach that was adopted in the GLAMUR project. The GLAMUR project evaluated 39 cases of local, intermediate or global supply chains across different commodities and countries, including the wine chains presented in this communication. Covering environmental, economic, social, health and ethical sustainability dimensions, GLAMUR highlighted the need to complete "hard" methodologies, such as Life Cycle Analysis, through "soft" methodologies which are often more able to identify critical issues, trade-offs and best practices (For details on the GLAMUR approach, see Brunori *et al.* 2016).

In this communication we combine the GLAMUR approach with an economic sociology theoretical framework. We argue that the attempt to objectivize the local and global dimensions of wine chains cannot be achieved by a descriptive and analytical approach, and must therefore be complemented by an evaluative approach of food chains sustainability.

First we will present the five aspects of local *vs.* global that have been studied in the wine industry: the geographical distance between consumption and production, the number of intermediaries, the nature of incorporated resources, the product identity built along the chain, and the level of governance. For the first step, using an analytical approach, we have applied the five key aspects to differentiate local *vs.* global chains, and to understand how "global" and "local" are manifested in the case of Languedoc wines. Both primary and secondary data have been used to describe "global" and "local". Three main archetypes of wine chains in this vineyard are highlighted: case A combines the characteristics associated with local chains in each dimension; case B gathers all the characteristics of global chains, and C is an intermediary case that is linked with both local resources and Protected Denomination of Origin (PDO) wines, and oriented towards the export market. The three cases have been fully described using diverse sources of data and with the help of the Global Value Chain approach in order to delve deeper into the governance dimension.

However, the description of each chain highlighted local and global characteristics as assets, tools or constraints in strategies rather than as structural components of chains. In line with the GLAMUR project, we therefore developed an evaluative analytical step for the purpose of assessing the strategic components of the three chains from the point of view of sustainability. We selected the attributes that are most relevant to wine chains from the list of the 24 performance attributes defined in the GLAMUR project frame: Creation and distribution of added value, Connection, Resource Use, Biodiversity, Food Safety, Territoriality. Qualitative indicators of these attributes of sustainability have been scored and benchmarked by experts to compare local vs global practices in the three wine chains. This consequentialist approach revealed that: i) in all concrete situations local and global practices are interlinked; ii) many actors are taking advantage of their involvement in global and local wine chains; iii) the main local

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chains perform better than the global one, as far as social and environmental dimensions of sustainability are concerned, but the global chain has higher and complementary contribution to economic development; iv) the improvement of solutions for sustainable practices is partially specific to either a local or global orientation in the chains; v) sustainability assessment of local and global practices in the wine chains finally depends on the values, capacities and networks built by the actors, calling for further research in economic sociology.

A hybrid perspective of political economy and socio-ecology to study multidimensionality of agri-chains and complexity of sustainable development: connecting scales and dynamics throughout selected case studies in Colombia

Martín Bermúdez-Urdaneta[1] and Sebastián Restrepo-Calle[1]

Short abstract

This paper presents an analytical and methodological framework to analyse the interlinkages between agricultural chains for domestic food consumption and sustainable development, and the challenges of organizing and governing those agri-chains to achieve more egalitarian, inclusive and sustainable forms of development. We offer to combine concepts and methods from political economy and socio-ecology to examine economic, social and environmental sustainability of such agricultural chains. More specifically, we propose to analyse the domestic agri-chains as being embedded in specific political-economic contexts *and* socio-ecological systems.

We apply our framework to analyse the agricultural chains and the associated ecosystem transformations in four selected regions in Colombia. We argue that the particular ways that agricultural chains are governed are markedly shaped by *regional* political-economic, as well as ecological dynamics. And in turn, they engender transformations in the socio-ecological systems within which they are situated. These transformations bear on the sustainability of the ecosystems, and the well-being of the populations that live in and from them.

Rationale for the research

Ending hunger, ensuring food security and promoting sustainable agriculture has been placed in the framework of Sustainable Development Goals (SDGs). Given that in many developing countries food demand is still to a large extent met by domestic production, mostly by small and medium family farmers, understanding the agricultural chains through which food is produced, distributed and consumed domestically is crucial to meet this goals. However, the relevance of these agricultural chains for sustainable development is not restricted to a single specific SDG. The workings of these chains cross-cut other dimensions of sustainable development, and consequently relates with other SDGs, such as those concerning access to and use of water, and protection and restoration of terrestrial and water-related ecosystems, halting land degradation, protecting biodiversity, efficient use of natural resources, and sustainable consumption patterns among others.

The analysis of these multiple and complex linkages between agri-chains and sustainable development requires going beyond the traditional focus of value-chain analysis that focuses on the creation and distribution of economic value added along them, and the governance mechanisms that shape these processes. To contextualize our analysis in the debate of sustainable development of this conference, we identify a group of targets from the SDGs for which agri-chains are important in order to advance and achieve sustainable improvements. The specification of particular targets is aimed to provide a systematic approach to pin down the links between agri-chains and sustainable development highlighted from our political economy and socio-ecological hybrid perspective, and to evaluate the governance and transformation of the agri-chains with respect to their contribution to progress towards sustainable development.

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Theoretical and methodological framework

In order to understand complex and multiple linkages between agri-chains and sustainable development, we present a conceptual framework grounded on two theoretical bases: the perspective of political economy and the approach of socio-ecological systems. In doing so we ask ourselves, how agricultural value chains can be better strengthen and governed to contribute to the sustainable development goals? We assert the need to understand the processes that shape their trajectories and governance, and the economic, social, political and environmental impacts that these forms of development and governance have in specific territories. To do both, we suggest focusing on the regional scale within which the agri-chains are embedded, and the ecosystems that support them operate.

Political economy approaches to value chains have focused mostly on understanding the power relations governing those chains at the global level, and how these in turn affect specific local communities with respect to income, marginalization, equity and other facets of uneven economic and political power relations between rural communities, private economic agents and social actors. Yet, agri-chains and agri-food systems are often embedded in regional ecological contexts, where different economic activities simultaneously shape territorial transformations. And within the framework of sustainable development, we need to better understand the ecological dynamics, for which political economy approaches fall short.

Hence we suggest complementing its perspective with that of the socio-ecological systems, which provides more conceptual and methodological tools to analyse the ecological transformations at the level of regional landscapes. For the study of the sustainability of these transformations, we find the concepts of vulnerability and resilience particularly useful (Folke, 2006). Through these concepts, socio-ecological systems approach integrates ecological dimensions, such as ecosystems, agri-systems and landscape diversities with social dimensions, including the management of common pool resources, maintenance of traditional knowledge, distribution of access to and rights over productive resources, in their assessments of sustainability and proposals for sustainable management (UNU-IAS *et al.*, 2014).

The studies from socio-ecology of productive landscapes to understand and measure vulnerability and resilience are helpful, and are starting to integrate elements of inequality and well-being in their assessments. Yet, they underemphasize the power relations that influence the resilience, and the constraints to better socioeconomic change and governance, hence the needed political economy emphasis. The study of socio-environmental conflicts from this perspective places special attention to elicit competing social groups with different economic and political powers. For political economy of the environment (Boyce, 2007) is key to investigate the social, economic, political and environmental facets of distribution, allocation and dispute over environmental costs and benefits, as well as historic patterns of usage, access and enjoyment of natural resources. This multidimensional approach can shed some light in the discussion of environmental justice and governance (Martínez-Alier, 2002) in rural settings, allowing an overarching assessment of the contributions and challenges that agri-chains exhibit in relation to sustainable development.

We assume a regional economic perspective to understand intra and inter-sectorial patterns and characterize current productive activities and possibilities of adding-value change. We also pay attention to regional structures, institutions and discourses at play in processes of decision-making at distinct state-levels, economic development at regional scale, and involvement of institutions and organizations at the local scale. Inspired on the emphasis placed by rural studies on family farming and productive systems, on agri-food systems, fair trade and new rurality, we advocate for a systemic inclusion of social and environmental dynamics through an enhanced Sustainable Livelihoods Frameworks (Scoones, 2009) observing human, social, natural, built, and financial capitals.

Complementarily, we use the analysis of local processes with the focus of rural landscapes socioecology. From the perspective proposed by UNU-IAS *et al.* (2014) to study socio-ecological production landscapes (SEPLs), we were inspired by the Toolkit for Indicators of Resilience in SEPLs that defines five

areas of resilience research: 1) landscape diversity and ecosystem protection; 2) biodiversity (including agriculture diversity); 3) knowledge and innovation; 4) governance and social equity; and 5) livelihoods and well-being.

During our field-trips we constructed landscape characterizations at regional and local scales in participatory workshops and observational accounts, interviewed key-informants and local inhabitants alike, and in some cases we were able to developed meetings with public and private incumbents of territorial development planning. The different and complementary research-tools were grounded to account for both the multidimensionality of the Sustainable Livelihoods Framework, and the variety of areas of interest proposed by the aforementioned Toolkit. We are currently integrating these selected cases in different spatial and temporal scales to connect and relate flows, interlinkages, markets and landscapes into a coherent presentation of the resulting agri-chains in relation with agri-food systems and distinct regional development trajectories. By doing so, we expect to integrate local cases of agri-chains with the global dynamics of sustainable development.

Case studies and preliminary findings

The first case is in the Andean highlands of eastern mountains of Colombia, specifically in the basin of Lake Tota and its economic structure based on intensive agriculture, trout farming, livestock and various forms of tourism. Despite a common judgement about the unsustainability of this socio-ecological setting, we have accounted on the complexity of strategies deployed by local inhabitants, allowing them to tackle rapid and deep transformations of regional production structures, and managing vulnerabilities in a resilient fashion.

The second case is in the mountains of southwestern Colombia, in the valleys of the Cauca River basin. In this case, we highlight the role played by discussions and proposals on adding-value projects, under a socio-political construction of territorial appropriation, strengthening of use and governance systems, and socio-ecological transformation of landscapes, all entangled in a troubled regional development process crossed by national armed conflict dynamics. In this case, despite the conflicting socio-political setting defined by violent events and illegal coca-cultivation, local strategies mixing agricultural and traditional mining have created a window-of-opportunity for social learning processes and interconnections amongst distant rural communities.

The third case is on the Pacific coast of Colombia's Choco where the community of fishermen, environmental organizations, state institutions and tourism operators partnered in the creation of an Integrated Management Regional District to ensure sustainable use and conservation strategies. Among other results, we have been opening up routes of interconnection, rather than value chains for sustainable local development. The creation of a territorial brand and a funding strategy for the District are highlighted to integrate geographical and cultural complexity of agri-chains and fishing activities in a local sustainable development.

The fourth case is associated with the capital city (Bogotá) and its surrounding regions (Department of Cundinamarca). From a description of the agri-food system challenges in a metropolitan area, the experience of an association of agricultural producers is presented and contextualized, describing how they have developed and consolidate market connections and routes to participate in the regional agri-food system centred in Bogotá. The case also shows the transformation of the provincial production systems, the coping strategies of rural communities and livelihoods, and the effects of infrastructure and particular forms of entertainment and tourism to the socio-ecological resilience of representative production landscapes.

Reflections on sustainable development goals

We consider that our hybrid approach from political economy and socioecology can reveal the multiple dimensions of agri-chains to argue that studying, fostering and empowering them is a sound strategy at national, regional and local levels to tackle the complex and multifaceted challenge of the Sustainable

Development Goals. We present some epistemological and methodological challenges on characterizing the multidimensionality (social, environmental, economic, political and cultural) of the agri-chains, which rises from the current discussion, implementation and evaluation of SDGs concerning their number, their diversity of scales and times, their complex and intricate interrelationships, and concomitant uncertainty.

The interrelationships between SDGs relevant for agri-chains and socio-ecological production landscapes are contextualized in a global framework inspired by several research proposals grounded on planetary boundaries (Rockstrom, Steffen *et al.* 2009, 2015) and their implementation in social and economic planning and monitoring (Dearing, Raworth *et al.* 2014) as well as for environmental performance (EPI-Yale, 2016). We identify 39 targets of 13 SDGs for which the proposed perspectives on agri-chains and rural landscapes suggest how relevant is our combined political economy and socio-ecological systems approach at local communities and regional territories.

General reflections from a work in progress

The presented approach uses as units of analysis both landscapes and regional systems of value, investigates the value flows between communities, and the routes of economic interconnectedness, to understand the relations between single elements of agri-chains, to obtain an interesting perspective to study the characteristic complexity of the SDGs. We consider that traditional analysis of value chains appears overly linear, industrial and mechanical for agricultural activities and livelihoods. We rather propose an analysis of values-flows to obtain a more organic, systemic and comprehensive framework to understand multidimensionality and complexity of agri-chains and sustainable development.

We think that a hybrid perspective from political economy and socioecology allows a more integrative and holistic view of agri-chains by connecting communities and markets, escalating actions and territories, raising awareness of economic agents and social actors, and integrating dimensions and objectives. Processes at different scales and of different magnitudes underlie their territorial expressions. Consequently, there is only one local and global reality interacting, but with different gradients, influences, levels of organization, discourse referents and forms of relations between distinct social actors. Therefore, environmental and rural transformations become an extremely rich and complex phenomena in which the dominant rationales are models and local forms of production and use of nature.

Session 12

Methods and challenges in assessing sustainability in agri-chains

A porter diamond-based approach to assess the role of innovative local food systems in the territorial integrated sustainable development: the case of Cilento Eco-Region

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Introduction

The EU's rural areas cover 91% of its territory and contain over 56% of its population (EU Commission, 2008). Farming remains crucial for the management of natural resources in EU rural areas and for the economic development of rural communities. The main problems faced by EU rural areas are social: ageing, unemployment, migration/ depopulation; Environmental: soil erosion/ deforestation/biodiversity/pollution and economic: lack of infrastructures, low value added activities; low incomes/slow growth (EU Commission, 2008). An integrated rural development strategy seems the most adequate to tackle the above-mentioned challenges.The role of Eco-Regions can be extremely relevant within this context since they represent an important innovation linking integrated rural development to organic agriculture principles and techniques (I.N.N.E.R, 2016).The rapid growth of Eco-Regions in Italy and throughout Europe runs the risk of losing its momentum if not carefully monitored and managed. An effective management of the Eco-Regions is needed to support their sustainable development (economic, social and environmental).The Porter's Diamond approach to industrial districts analysis (Porter M. E., 1998) could be adapted to monitor the Eco-Regions performances. A Likert scales related performance assessment, already adopted in different contexts (Bakan I., Doğan I. F., 2012; Gunter M., 2014) and an evaluation of the compliance of Eco-Regions to their ethical and social values, can be useful to this end. The Cilento Eco-Region, the first Eco-Region in Italy, started in 2004, provides a broad range of initiatives and experiences, which can be monitored to test this integrated analytical approach.

Objective

Define and test a theoretical and methodological framework for the monitoring of Eco-Regions' performances.

Materials and methods

Different assessment methods have been considered, defining an organic analytical framework for the Eco-Region monitoring and development strategies' definition (See fig.1).

In particular:

a. Analysis of the Eco-Regions Social, Economic and Environmental Specific Competitive Performance

The different dimensions influencing the local economies development, designed by Michael Porter (Porter M. E.,1998), have been integrated with the analytical frameworks of Flexible specialization and Collective Efficiency, by other authors (Neven, D. Dr^{ö}ge, C. L. M. 2000), have been assessed (see fig. 2).

The choice of indicators to be included in the analysis follows the above-mentioned theoretical approaches and considers that:

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- if the Eco-Regions are characterized by:
  - a population of small-sized firms concentrated in some area
  - specialized in different phases of production related to organic farming.
  - which find their labour and other inputs supply in a single local market
- then the community will become more competitive; their development will be more sustainable and effective the more the following conditions apply:
  - the firms relate with people who live in the same territory
  - the local people, in turn, possess the social and cultural features (social values, cohesion and institutions) appropriate for a bottom-up development process
  - the local stakeholders are effectively related to external institutions (public and private) providing further support to their development
  - the firms exploit external economies of scale and generate positive externalities (benefits for the community not accounted for in the products' value)
  - the Eco-Region focal activity is characterized by:
    - flexibility of the workers (able to perform different mansions) and of the organization (adaptable to changes in the supply and demand conditions)
    - Exploitation of Economies of Scope
    - Produce innovation and/or stimulate product differentiation thanks to cooperation/competition between producers involved in the focal activity

The data, collected through interviews to local stakeholders, have been measured based on a scale from 1 to 5, (Bakan I., Dogˇan I. F., 2012) and (Gunter M., 2014). Three respondents have been selected, covering the different dimensions of the Eco-Region integrated development (technical, economic, social/political and environmental): a policy maker: the Major of Ceraso Municiplaity in the Cilento Eco-Region, the Director of the Cilento Eco-Region representing the farmers and other local stakeholders, a representative of the Campania Region Organic Farmers Association (AIAB), which provides technical and managerial support and is strongly involved in the Eco-Regions creation and valorisation process.

The scores vary from 1 to 5 in ascending order of contribution to the indicators' value (1 most negative 5 most positive). The aggregated Eco-Regions social, economic and environmental specific competitive performance dimensions and score, are reported in Graph. 1. These aggregated scores have been attributed by the authors on the base of the most frequent score provided (mode) and further verified through the quantitative indications coming from the Context Analysis. The same score aggregation criteria have been applied to the analytical approaches described at points c and d.

b. Context analysis of the Eco-Regions' physical and social structure. Secondary data from quantitative statistics, administrative documents, have been considered. Within the context analysis a stakeholders' analysis and a description of the Eco-Regions supply chain were also produced.

c. Assessment of the compliance to the specific values upon which eco-regions are based. It has been performed comparing the objectives defined in the Eco-Regions' Statute (I.N.N.E.R, 2016) (see Graph. 2) to the information gathered from the Porter and Context Analysis results. The different Eco-Regions values are reported in.

d. Eco-Region development stage. It has been assessed adopting a theoretical framework for the clusters' classification defined in the study of David Nieven and Cornelia L.M. Dröge (Neven D., Dröge C. L. M. 2000). The factors listed according to the theoretical framework, and the related scores, are reported in Graph.3.

e. Eco-Region present and potentially most efficient market orientation. It deeply influences the definition of sustainable strategies of development for the Eco-Regions, based upon a focal economic

activity: organic agriculture. This influence involves the Eco-Region Business model related to agriculture production, processing and distribution of organic products, including the local production structures and the infrastructures; social aspects like the Eco-Region food sovereignty, the relations within and outside the Eco-Region, environmental aspects related to *e.g.* the tourism development model and consequent impact of new residential areas etc.). Nine types of market orientation have been identified (see tab.1)

Results discussion and conclusions

The Analysis showed that the Cilento Eco-Region is at an initial stage of development, close to a take off stage (Graph.2). The contribution to the Eco-Region performance, provided by the high quality goods and services supplied, and by the local governments' support, is reduced by the lack of coherence, coordination and continuity between the different development initiatives (Graph.1). Compliance with the Eco-Regions' social and environmental values is high; the main problem is the still difficult inclusion of small farmers, due to the expensive and complex access to organic certification schemes (Graph. 2). The Cilento Eco-Region belongs to the market orientation type "*Present: Local resident population oriented, Potential: non-resident population (tourists)"* (table 1). A recommended strategy is to encourage tourists' demand to increase the resources necessary to invest in the Eco-Region growth and integrated social and environmental development. The necessary increase in the critical mass of organic farms asks for a more accessible certification scheme application (*e.g.* collective certification). The role of the Cilento Eco-Region in coordinating and jointly promote the many initiatives taking place in the Eco-Region should be reinforced. The approach adopted showed a very good capacity to analyse the different dimensions of an integrated territorial development. Both data collection and results interpretation can be applied to an Eco-Region context since they do not require specific academic or technical skills to be understood and discuss.

Future researches should consider extending the study to other Eco-Regions in order to test the chosen variables capacity to effectively monitor the Eco-Regions' performances in different contexts and push the different Eco-Regions responsible persons towards a more systematic data collection, mostly as far as the economic performances are concerned.

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Practical analysis of inclusive and sustainable value chains: the case of rice value chain in Mali

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Description of the rationale for the research and/ or Development project

Value chains (VC) play a major role in the agricultural growth in market economies, so they are a cornerstone of sustainable development and it is essential to support them along their various stages. Formulating and funding projects and policies to foster their development require systematic diagnosis and monitoring methods.

In order to understand the operations from a value chain perspective a methodological framework must be defined. It should allow for identifying the relevant performance criteria and indicators to be measured. An "evidence-based" quantitative approach, framed according to the "sustainable development essentials", will shed light on the reality of development for the stakeholders, especially farmers and private sector, help innovation processes to develop (technology dissemination, market coordination...) and assist decision makers for steering development actions. The measurable indicators allow for appraising the multiple impacts of the VCs, allowing for comparisons (between chains, regions, countries...) and monitoring of the changes overtime.

A relevant quantitive VC analysis clearly indicates how the VC contributes to the 3 main domains of sustainable development (economic, environmental and social) and introduces the key steps of the process of mobilization of stakeholders in a dialogue for development action towards more inclusive and sustainable value chains.

Theoretical/conceptual framework and Methodology

The purpose of the methodology consists in conducting four separate analyses starting with the functional analysis of the VC, then and in parallel the economic analysis, and also the environmental and the social ones. All those analyses are linked and complementary. They are realised by specific experts knowing the most relevant tools to be applied for each of the pillars of sustainable and inclusive development. As a result, the objective is to give the elements to answer the four following questions:

- What is the contribution of the VC to economic growth?
- Is this economic growth inclusive?
- Is the VC environmentally sustainable?
- Is the VC socially sustainable?

Functional Analysis

Functional analysis can follow different pathways. It will largely depend on the team's organization with 2 major goals:

- overall description of the VC actors and the way they operate
- assess some fundamental characteristics needed to carry out ECO/ENV/SOC analyses

3 main steps:

- General description of the VC system: mapping of the VC, with quantitative data on actors and flows and geographic distribution
- Elements of technical diagnosis: typologies, productivities, technical benchmarking, physical constraints...
- Understanding the governance: general organization, vertical coordination, horizontal coordination, support services, policies

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Economic analysis methodology

Economic analysis will particularly give answers to the 2 first questions and be divided in the following steps:

- 1/ First steps, the "financial analysis",
- 2/ Assessing the economic performance: effects and viability,
- 3/ Assessing the growth inclusiveness.

Environmental analysis methodology

Life Cycle Assessment (LCA) is used to evaluate the environmental sustainability of rice value chain in Mali. Environmental LCA has the advantage of taking into account the whole value chain of a product, from the raw material extraction till the final disposal through the transport, the production, the distribution, the use and the maintenance instead of focusing on the production site only. The upper level references for this methodology are the ISO 14040 and 14044 standards (ISO, 2006a and 2006b). The scope of LCA consists in three areas of protection: Human health, Resources and Ecosystem quality, to which a set of environmental impact categories and corresponding indicators are associated.

Social analysis methodology

Social domain can be analyzed through many layers of people's life and livelihood. The elaborated framework attempts to elaborate an image of the main outcomes of the VC activities in 5 basic domains:

- Working conditions
- Land and water rights
- Gender
- Food and nutrition security
- Social capital and infrastructure

A list 55 of questions was established in order to help guide the reflection, keeping in mind the main elements of appraisal decision-makers have in mind taking into account strategic goals for sustainable development.

Main results on the methodology applied on the Rice VC in Mali

The methodology applied comprises four pillars for the analysis: functional, economic, environmental and social. For each of the four pillars of the analysis, practical analysis tools are suggested to conduct the analysis. Tools have been applied to the Rice VC in Mali in December 2015 and January 2016. Here are the main results of this VC sustainability and inclusiveness analysis.

Functional analysis results

Functional analysis shows a dynamic and expending value chain, growing medium and longterm productivity and reacting positively to market incentives (increased consumption) and supply (subsidy and provision of inputs, grant infrastructures).

However, a regional opening up of production areas and a real vertical coordination of the sector through a future inter profession appear to be the priority recommendations, combined with greater consistency of public policy support and a dismantling of the cartel wholesale importers.

Economic analysis results

The financial analysis of the value chain of rice in Mali covers the main players: producers, processors and consumers. As noted above, the functioning of product distribution systems between players is difficult to perceive quantitatively.

The objective of the financial analysis of the key players is to measure their financial viability and analyse the distribution of added value to the value chain through these players.

From an economic point of view, the value chain is also analyzed to verify that it contributes much to economic growth and that this contribution is sufficiently inclusive. The contributions of the value chain in Gross Domestic Product and Gross Domestic Product Agriculture Sector were analyzed. The effects of imports and exports of rice were also studied.

It is also important to check that the rice value chain in Mali is viable on the international market. It is necessary to realize the risks that the value chain may face in terms of economic sustainability.

The objective of applying a Financial and Economic Analysis to the Rice VC in Mali was to answer as exhaustively as possible to the following questions (detailed sub questions implying quantitative data have been elaborated):

- Does the VC conduct to sustainable economic growth?
- Does the VC conduct to inclusive economic growth?

The rice value chain is globally economically sustainable. It is competitive and contributes to inclusive growth for the actors, and even when public support for the value chain decreases.

One third of Mali's population is directly affected by this value chain. Income is distributed reasonably fairly.

Distortions are nonetheless observed vertically and horizontally in the chain.

The horizontal scaling up interventions, such as the opening up of regional markets, combined with a better vertical tracking players and improved confidence among stakeholders, is expected to strengthen producers' incomes while reducing transaction costs.

Similarly, the dismantling of oligopolistic cartel positions of three importers and the stopping of duty exemptions and import taxes (not justified by a real emergency or tension on the market), should allow better market transparency and consistency public policies to support the sector.

In addition to price risk on the international market, relatively low risk as the pest risk, the main risk of the value chain regarding availability and long-term competitive uses of irrigation water.

The exclusive support interventions to production undertaken in total control of water seem irrelevant and certainly less resilient.

Environmental analysis results

- Does the value chain conduct to environmental sustainability?

The environmental analysis allowed calculating the environmental impact of the four main rice production systems (irrigate rice, controlled flooded rice, uncontrolled flooded rice and rainfed rice) in Mali, taking into account the entire value chain. The irrigated rice has the lowest impact for most of the considered indicators. This is mainly due to the high yield per hectare, a better control of the water supply and a good compliance with cropping calendars. However, the rainfed rice has environmental scores which are comparable to irrigated rice.

- Is the Value chain intervention leading to increased potential impacts on human health?

The rice value chain has a potential impact on human health due the use of herbicides and fertilisers. The use of herbicides leads to the emission of heavy metals (in soils, surface and underground waters) which may have a carcinogenic effect. The use of nitrogen-based fertilisers generate NH3 emissions which may cause respiratory diseases.

- Is the value chain intervention leading to increased potential impacts on ecosystem quality?

The rice value chain has a potential impact on ecosystem quality due to the use of fertilisers and herbicides. The use of fertilisers generates PO4 emissions which are the main cause (85%) of the eutrophication

of fresh waters. The emissions of NH3 could lead to terrestrial acidification and eutrophication. The use of herbicides could lead to the eco-toxicity of fresh water. The direct field emissions of methan will contribute to the global warming which may have a negative impact on ecosystem quality.

- Is the value chain intervention leading to increased potential impacts on Resources?

The use of soil, the (river and rain) water consumption and the use of fertilisers and herbicides are the main contributors to the depletion of resources. The depletion of natural resources will increase with rice production systems with low yields (*e.g.* controlled and uncontrolled flooded rice).

The environmental analysis allowed identifying the production systems with the lower environmental impact. Additionally, the main challenging stages of the value chain as well as the unit processes with the higher environmental impacts are easily identified with the proposed approach. However, it is not possible to predict if the potential environmental impacts will increase or not. The results of the ex-ante diagnosis (environmental assessment before the intervention) of the value chain could be used to build the baseline scenario. A second environmental assessment after intervention, could then be used to evaluate if the impacts on the environment increased or not and in which proportion.

Social analysis

The social analysis of the Rice VC in Mali was intended to answer the following question:

- Does the value chain conduct to social sustainability?

Comparing the five social analysis areas shows 'differentiated' progress in terms of level of change even if "embryonic" contributing to the overall improvement of living conditions of the populations concerned. It is currently difficult to draw "stable" conclusions on the "effective contribution" of rice VC to these improvements.

To illustrate, in the share capital and access to social infrastructure, people's living conditions have gradually improved in particular in access to school infrastructure, water health and also to energy where household access rate increased from 2001 to 2014 from 6.4% to 39.6% (INS, 2015). On the school infrastructure, the area of the Office du Niger has 753 primary schools that make this area one of the most endowed with infrastructure in this category.

The most "critical" area is access to land and water. Despite the existence of new land legislation, the reality remains insecure household / family farms. The issue of access to land remains highly problematic with the Office of Niger's land management rules and the land patrimony of the irrigated area with a complete control system of the water. This pattern of land tenure insecurity, even if it is general to many other irrigated areas of Mali, remains an issue to improve in the future.

Conclusion and proposed presentation of the results

Results of the Practical Analysis of inclusive and sustainable Rice value chain in Mali will be presented by field of analysis (functional and economic, environmental and social) and by the experts who carried out the study in Mali.

Towards a harmonized framework for assessing the sustainability of agricultural value chains: identification of key challenges and perspectives for research

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Background and objectives

In recent years, public authorities and society at large have expressed a growing concern about sustainability issues, which have officially been captured by the signature of the 2030 agenda and the formulation of the 17 Sustainable Development Goals that guide international development cooperation operations.

As a consequence of these trends, new needs are emerging in terms of assessment of value chains including agricultural value chains. On one hand, the actors of the value chains increasingly look for assessment methods that can measure the performances and impacts of their operations not only in terms of competitiveness but also in terms of contribution to sustainable development, in order to comply with private standards, national or international regulations and also to anticipate reputational risks. On the other hand, public and private actors and international donors need to evaluate their policies and programs in support of agricultural chains' development not only in terms of their potential as economic multipliers and generators of foreign currency, but also in terms of their capacity to contribute to the sustainable development of the territory where they are based.

As an institution focused on applied research for agricultural development, CIRAD has long lasting records of partnership with a large range of players of agricultural value chains, both in a local and national context or at the global level (Griffon 1990; Fabre *et al.*, 1997, Temple *et al.* 2007). Over the decades its field of investigation went beyond agronomic issues per se, encompassing socio-economic and environmental challenges from the production level down to the supply of agricultural processed products. As part of an institution in charge of supporting public and private decision making, CIRAD staff is challenged by its partners on how to evaluate the impact of, and contribution to sustainable development of value-chains. CIRAD has accumulated a significant capital of expertise in the field of agro-technical analysis, economic analysis, Life Cycle Assessment (LCA) and more recently developed new capacities in the evaluation of social impact of agri-chains (Feschet, 2014). This asset provides the ground to participate fruitfully to the assessment of value chains' contribution to sustainable development.

The purpose of this paper is to discuss the objectives pursued and propositions made by a task force of CIRAD scholars working on a harmonized conceptual framework for evaluating the contribution of agri-chains to sustainable development.

Issues

Historically, Value Chains have been assessed on the basis of their financial (from the entrepreneur perspective) or economic (from the policy maker perspective) performances using a range of benefit/cost indicators (Fabre 1994, Monke, 1989). Since the seventies the development and methodological consolidation of Life Cycle Analysis (LCA) offers a sound ground to assess the environmental impacts of the VC. The social and commonly called third dimension of the sustainability framework has been so

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far much more difficult to capture through methodologies that are unanimously recognized and applied by professionals (Seuring 2012). The Corporate Social Responsibility (CSR) relies on a battery of indicators defined within a specific context and is relevant for global value chains driven by large and formal companies and their suppliers with reputational and organizational interest in implementing a CSR strategy. However, beyond the specificity of value chains where this approach is applied, it also lacks a proper conceptual framework linking the human interventions with actual impacts on social well-being.

Besides, there are very few attempts to build an integrated measure of the contribution of a value chain to sustainable development. Most of the analytical tools developed for an integrated assessment of the sustainability in the past decade are conceived at a macro-scale such as the Genuine Progress Indicator or the Sustainable Net Benefit Index (country or global) (Lawn, 2003, Anieleski, 2001). They cannot be straightforwardly adapted to an integrated assessment of value-chains that include only a limited share of resources allocation and thus cannot capture the total impact, direct within the systems and induced effects (outside the system at national, global scale) in environmental, economic and social terms.

At the value-chain scale, in line with the establishment and increasing dissemination of CSRs by value-chain drivers and their suppliers, a number of indicators are defined, measured and reported but they do not provide or proceed from an articulated/integrated measure of the impact of the companies on sustainable development. They rather constitute a list of indicators that take into account the various dimensions in parallel. Furthermore, these tools are by construction limited to socio-economic and institutional aspects where a formal corporation can be accountable for their impacts and performances. The various attempts to build up a framework that can be applied and provide a sound base for assessing VC performances, or contribution to sustainable development have so far been very limited (Hassini, 2012).

Challenges and working hypothesis

Based on a first range of brainstorming sessions among CIRAD scholar involved in assessing the impacts of VC along different dimensions of sustainable development, the paper aims to present working hypotheses and challenges that the group has so far identified putting them into perspective with current literature. These key challenges are briefly presented in the following.

Which definition of sustainability

While there are clear references for assessing individually each dimension of sustainability, a combined or harmonized conceptual framework requires defining clearly what sustainable development means and how the different dimensions interact. A metric of value chain impact on sustainable development can only be operational in decision making terms (choice, tradeoffs, and ranking) if it relates to an explicit conception of sustainability.

Shifting from a global scale to the scale of a value chain.

Assuming that impact on sustainable development cannot only be thoroughly assessed at the global level (considering the socio-biosphere as a closed system), a value chain as an open subsystem cannot be sustainable as such, so we rather aim at assessing its contribution to sustainable development. The delineation, the mapping of the value-chain perimeter plays a key role in locating the point where the value chain sub-systems interact with “outside the VC system”. The functional analysis of the VC, how the systems operate and interact with the outside of the system are key steps in the different approaches and can be an entry point for developing an articulated methodology addressing the different dimensions of the sustainable development. In LCA, one key challenge remains the modelling of local impacts at the scale of the whole value chain which spreads over the world. Important efforts have been made to spatialize the impact assessment especially for eutrophication, acidification, water deprivation impacts etc. This is particularly important for agri-food chains which have important contributions to such local and regional impacts for which the local parameters play a key role.

Impacts / performances

Another key aspect of the evaluation approaches relate to the level at which the indicators are defined and how close they are from the actual object to protect. In the LCA approach, one should evaluate the poten-

tial impacts of a human intervention and the indicators should have a clear and scientific link with the final object to protect or "area of protection". Conversely, in other approaches, indicators might be defined close to the human intervention with no explicit link to the final effect on human well-being or ecosystems.

Static versus dynamic approach and applicability

Distinction should be made between assessing the performance/impacts of a VC for a given configuration of the system observed at a specific period and having the capacity to include a temporal/dynamic perspective. Modeling of flows, input/output feedback measures, is certainly the most comprehensive way to assess the impact of a system such as VC on sustainable development (Ukidwe. 2011), but this option is highly demanding in terms of data and skills and might not be easily applied in contexts where data and analytical time is limited.

An assessment limited to a number of indicators is likely more feasible but will require an explicit and sound analytical framework explaining how different categories of indicators are articulated.

The starting point of the working group with the systems definition and identification of convergence in terms of methodology will be developed through a collective ontology process and is further presented in a companion paper submitted to the conference (Martin *et al.*, 2016).

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POSTER

Using SMART to compare social, economic, environmental and governance impacts of certification at smallholder farm level

Brian Ssebunya[1], Lukas Baumgart, Jan Landert and Christian Schader

There are contradicting reports on the impacts of standards and certification on various elements of sustainability. The Sustainability Assessments of Food and Agriculture Systems (SAFA) framework, published by the Food and Agriculture Organisation (FAO), aims at harmonising sustainability assessments and making methods and results more transparent and comparable (FAO 2014). The Sustainability Monitoring and Assessment RouTine (SMART) is a multi-criteria analysis tool, which analyzes the degree of sustainability goal achievement with respect to the 58 themes defined in the SAFA guidelines. SMART uses an impact matrix that defines 327 indicators and 1,769 relations between SAFA sub-themes and SMART indicators (Schader *et al.* 2016). We use SMART to assess and compare the effects of organic and fair trade certifications on the sustainability of smallholder coffee production in Uganda. The assessment covered 360 farms, categorized as fair trade organic (FO), fair trade (FT) and conventional/non-certified (CN) in both Arabica (A) and Robusta (R) systems – 60 farms randomly drawn from each of the six categories.

Generally all farms have high scores in the social, followed by environmental, and low in economic and governance themes, irrespective of the certification status. Specifically, farms scored high (above 50%) in most social themes, except 'capacity development' theme which relates to access to training opportunities and extension services. Scores of environmental themes are evenly distributed, but low (below 50%) for 'soil quality, land degradation, material use, waste reduction and disposal, air quality and greenhouse gases' themes. High variation in scores is observed in the economic and governance themes, with low scores in 'internal investment, long-range investments, risk management, liquidity, value creation economic themes, and sustainability management plan, full cost accounting, holistic audits, transparency mission statement themes' respectively.

The Analysis of Variance (ANOVA) test results show that the sustainability scores between the Arabica and Robusta systems and within the certification categories are significantly different ($p< 0.05$), with higher scores among certified than non-certified farms. In terms of the scores of specific themes within each of the four SAFA dimensions (social, environment, economic and governance), a typical pattern is observed in each sustainability dimension. This implies that sustainability performance of farms is influenced by other contextual factors than certification. Sustainability scores of Arabica farms are significantly higher than Robusta farms in corresponding certification categories. Arabica farms are smaller and remote but more organized with proper management structures at group level than the larger and more resource-endowed but less organized Robusta farms. As a result, Arabica farms scored higher than Robusta farms in the governance themes. In addition, it is a key requirement for fair trade certification to which all certified groups belonged, to work in groups. Working in groups facilitates collective action for example collective sales, access to inputs, group savings and credit schemes, and access to information among others. In compliment, organic certification emphasizes good agricultural practices in coffee production that positively influence environmental and economic scores. We therefore conclude that certification improves the sustainability performance of smallholder farms mainly through the enhancement of the 'cooperative effect' which has direct positive impacts on the governance themes, and indirect positive impacts on social, environmental and economic themes of sustainability.

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No time to rest on one's laurels – A SMART sustainability assessment induced further optimisation on a banana plantation in Costa Rica

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Introduction

Bananas and plantains are the second-most important agricultural export product from Costa Rica. In 2013, Bananas contributed almost 20 per cent to the total export value of agricultural products (FAOSTAT, 2013), making them a key product for the Costa Rican economy. The other side of the coin is that typical banana production can lead to negative environmental and health impacts, mainly due the broad application of pesticides (van Wendel de Joode *et al.*, 2016). In addition, workers' conditions on banana plantations are sometimes critical, because of low wages and temporary hiring (Murray and Raynolds, 2000). Consequently banana production in its current form has a large impact on both the local environment and economy and there are significant trade-offs between the former and the latter. The Sixaola watershed in the south-eastern part of Costa Rica is an important production area for bananas. Due to a weak legal framework and the lack of knowledge on health and safety practices, pesticide applications on banana plantations are major concern within this region and pose a risk to humans and aquatic wildlife (Polidoro and Morra, 2016). The Platanera Rio Sixaola S.A. is a banana plantation farm, producing both conventional and organic bananas in this region. The aim of the farm is to be a pioneer for sustainable banana production, considering environmental and social aspects. Since the formation of the plantation in 1990, the farm abstains from using herbicides and nematicides. Nowadays the farm complies with voluntary standards such as Rainforest Alliance, GlobalGAP, and ISO 14001, and is carbon neutral since 2015. Going beyond a basic fulfilment of standards and singular measures, the goal of the present study was to assess the actual sustainability performance of the farm in a holistic way in order to gain an encompassing status quo analysis. Moreover, in doing so optimisation measures towards a more sustainable banana production can be identified and implemented.

Methods

In 2015, the sustainability of Platanera Rio Sixaola farm was assessed with the help of the Sustainability Monitoring and Assessment RouTine (SMART) farm tool, developed by the Research Institute of Organic Agriculture (FiBL). The SMART farm tool is based on the Guidelines for Sustainability Assessment of Food and Agriculture Systems (SAFA Guidelines) from the Food and Agriculture Organization of the United Nations (FAO, 2014). The sustainability assessment according to SAFA considers four sustainability dimensions: good governance, environmental integrity, economic resilience, and social well-being. For each dimension, SAFA defines 21 different sustainability themes, as well as 58 sub-themes, which are rated according to the degree of goal achievement. The SMART farm tool uses 327 indicators to quantify the degree of goal achievement. The indicators are assessed by independent expert based on farm visits and interviews with farm managers (Schader *et al.*, 2016). As the Platanera Rio Sixaola is an important employer in the region, with over 100 employees, in addition to the SMART farm tool questionnaire used for the interview with the farm manager, a questionnaire for the employees was developed. This questionnaire contained 34 questions about different labour related topics, such as wages, contracts, health insurance, labour unions, or equal opportunities. The interviews with the farm manager and 91 employees were held during a three day farm visit in 2015.

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Results

Good governance: The farm performed well 13 of the 14 sub-themes linked to good governance, with a degree of goal achievement of over 60 per cent. They have a clear mission statement towards sustainability, and their sustainability reports are publically available. The only sub-theme, where the degree of goal achievement was rather low, was 'full-cost accounting', with a degree of goal achievement of only 27 per cent. So far, the farm did not consider externalities in their accounting.

Environmental integrity: The farm achieved at least a degree of goal achievement of 50 per cent on all 12 sub-themes related to environmental integrity assessed. In the sub-theme 'water quality', a key topic in the Rio Sixaola watershed, the farm scored with 65 per cent. This high rating was achieved, as the farm did not use neither herbicides nor nematicides. However, the farm still used synthetic insecticides on a large part of its area, and these pesticides were sprayed by airplane. The two sub-themes related to animal welfare were not assessed, as the farm has no livestock.

Economic resilience: The degree of goal achievement on 12 out of 14 sub-themes related to economic resilience was above 50 per cent. Some weaknesses could be identified in the subthemes 'local procurement' and 'liquidity'. In the case of local procurement, the farm only sourced part of their inputs locally, as some of the inputs, such as fertilisers or pesticides, were not available from local sources. The comparably low rating for the sub-theme liquidity was caused by a lack of insurance against natural hazards and due to a low diversification of income sources. In other words, there was no urgent issue with liquidity, but there was a risk of financial strain in case of unforeseen events.

Social well-being: In all but one of the 16 sub-themes related to the social dimension, the farm scored 50 per cent or higher. Only for the sub-theme 'freedom of association and right to bargaining', the degree of achievement was below 50 per cent. A majority of the employees reported that they do not think they have the freedom to engage themselves in labour unions.

Discussion

Platanera Rio Sixaola was the first banana plantation assessed with the SMART farm tool, therefore it was not possible to compare the results with farms of a similar type. Yet, in comparison with farms with different agricultural production systems that have so far been assessed with the SMART tool, Platanera Rio Sixaola was an outperformer. The enthusiasm of the farm manager for sustainability was clearly noticeable throughout the process. Already during the SMART interviews, he identified further room for improvement. Many of his ideas were already put into practice or are in the pipe line. In collaboration with the non-profit organisation Organisation Asociacio´n Nacional de Alcaldías e Intendencias (ANAI), a monitoring program for waterways was established. Not only waterways on farm, but also within the region are monitored, and if necessary actions are taken to ameliorate the water quality or to provide a suitable environment for fish and molluscs. The farm also offers new ways for employees to engage themselves, for example through a photo contest, where the best pictures of wildlife species discovered on farm are awarded. Soon, another contest will start, where employees can suggest activities to improve sustainability. They also established a workers' council, whose members were recently elected by the farm's employees. The most ambitious project, however, is certainly the introduction of a true cost accounting system, with focus on positive and negative externalities of the farm's activities on soil quality, biodiversity and water quality As up to now, practicable methods for true cost accounting for banana plantations do not exist, Platanera Rio Sixaola is currently initiating a research project in order to develop such a system (Lena Hansen, pers. comm. 1st September 2016).

Not only has Platanera Rio Sixaola benefited from the sustainability assessment, it was a process of mutual learning for further development of the SMART farm tool. As the farm was the first farm with such a high number of employees, it was important to include not only information provided by the farm manager, but also consider the employees directly. The employee questionnaire used for Platanera Rio Sixaola has now been integrated in the SMART farm tool, and will be applied in all cases where farms employ a large number of workers.

Conclusion

The present study outlines how a farm can be supported by the SMART farm tool on its pathway to sustainability – even if the farm is already as engaged as Platanera Rio Sixaola. The process of the interview on farm pointed the manager at sustainability aspects that were so far not on his radar. On the other hand, the work with such a pioneering farm also challenged the tool itself, and induced further development. As sustainability reporting is a key interest of many farms and companies applying such tools, further testing and research is ongoing in order to adapt the tool to demonstrate the contribution of a farm or company to the Sustainable Development Goals (SDG).

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Towards a harmonized framework for assessing the sustainability of agricultural chains: propositions for building a multidisciplinary dialogue

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Introduction

In recent years, we assisted to a rise of concern about sustainability issues, by public authorities and by society at large, which is officially captured by the signature of the 2030 agenda and the conception of the seventeen Sustainable Development Goals. As a consequence of these trends, new needs are emerging in terms of assessment of value chains including agricultural ones. Value chains have been assessed historically using a socio-economic approach often coupled with the agro-technologic one. These two approaches consider the social and the economic dimensions of sustainability but do not account for the environmental impacts of value chains. Life Cycle Assessment (LCA) methods were developed with a focus on evaluating this dimension. More recently, Social LCA, following the life cycle thinking approach, was also launched to include social-economic considerations in the analysis.

In order to obtain a comprehensive picture of the sustainability and contribution to sustainable development of value chains, multiple parallel analyses should be done. However, the results so produced are often hard to compare and integrate. Thus these assessment efforts reveal to be expensive and inefficient.

This paper intends to addressing the issue of initiating a fruitful multidisciplinary dialogue and investigating the possibility of integration of the above discussed methods. The paper will therefore confront these different perceptions, by mapping their similarities and differences and taking into account the lexical ambiguity of the vocabulary (synonymy, polysemy, etc.). The final objective of this work is to bring the different methods as close as possible and to propose a multidisciplinary harmonized framework for assessing the sustainability of agricultural chains. This framework will consider, on the one hand, the system representation and, on the other hand, the data types required by each approach to produce the assessment.

Methodology

The construction of the harmonized framework is conducted using a knowledge management approach. It is based on an ontology developed according to the NeON methodology.

Discussion and conclusion

This work started in June 2016, through a series of meetings and will proceed during autumn 2016. Associated to the ontology, a thesaurus will manage the lexical ambiguity of the vocabulary.

A first operational outcome of this work will emerge within the EuropeAid programme “Inclusive and Sustainable Value Chains” (2016-2019), where CIRAD experts as part of the AGRINATURA consortium,

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are called to assess the sustainability of thirty agricultural chains in developing countries. The harmonised framework will facilitate the coordination and joint work of experts of different disciplines involved in these assessments and will allow the identification of a harmonized dataset required for the different approaches. The latter will improve data collection efficiency, in terms of costs and of employment of time.

The harmonized framework will also contribute to develop a CIRAD Knowledge Base System devoted more broadly to the investigation of the topic: “agricultural chains & sustainable development” (2016-2019).

Finally, building the harmonized conceptual framework is the first step of a broader effort to develop an interdisciplinary method for assessing the contribution of value chains to sustainable development. Later steps will require a strong investment in the underlying theory of the four approaches in order to generate a general inclusive theory.

EX-ACT VC: an innovative tool to assess multi-benefits of food value chains

Bockel Louis[1], Debrune Orane and Anass Toudert

In order to help transforming agri-chains towards sustainable development, FAO recently developed an innovative technical tool which provides co-benefits appraisal of value chain. By analyzing agri-chain performances it helps identifying strategic options for improving their resilience while generating co-benefits for every sector of the food production. EX-ACT VC (Ex Ante Carbon Balance for Value Chain) is a tool based on the EX-ACT tool, developed within the Economic and Agricultural Division in FAO in order to face rural poverty, enhance climate resilience of population and ecosystems and de-carbonize agri-food systems. The methods used in the tool strongly take into account contributions of food value chain in integrating simultaneously both environmental and socio-economic benefits.

Numerous disciplines are covered, such as climate change science, ex-ante estimations, environmental economics and social analysis. This tool might challenge, extend or complicate existing work in our field by gathering all these dimensions together, but it is a new approach and a new way of linking the three main components of sustainability within one tool. Developing a simple tool able to analyse the multi-dimensions of a value chain and adapted for every stakeholders within the agri-chain was the main challenge that we faced.

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Session 13

Multi-stakeholder partnerships towards food security and sustainable value chains

Institutional food procurement programmes: key aspects for programing and policy design

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Rationale

Inefficiencies in the food system and limitations in market access for smallholder farmers are important aspects hindering food security in developing countries. Public sector institutions buying food such as schools, hospitals, food reserve authorities, prisons, the military and humanitarian programmes can create effective demand for nationally produced food and, as such, potentially constitute important markets for smallholder farmers.

In the last few years – and especially after the 2008 global food price crisis – the use of the regular demand for food on the part of government entities and other institutions (*i.e.* institutional demand) has been seen as an instrument with the potential to support production by smallholders, their integration into the formal market and to drive development.

The theory behind it is that connecting large, predictable sources of demand for agricultural products to smallholder producers can reduce uncertainty and risk associated with smallholders' engagement with food markets, and encourage improved quality, leading to improved food systems, increased income and reduced poverty.

The benefits of linking institutional demand for food to local smallholder production are multifaceted as it has also the potential for governments to simultaneously address different social, economic and environmental development goals.

For instance, fostering smallholder engagement with large public buyers may increase access to close-to-home and familiar market outlets with less demanding requirements compared to more stringent export markets. This type of approach could also promote the formalization of markets – a crucial component for transforming agriculture into a legitimate and competitive sector for poverty reduction and economic growth.

Public food purchase from smallholders are also a good example of how market-oriented strategies can improve food and nutrition security for vulnerable communities; support diversification of local production and value local dietary habits and ingredients; increase the adoption of agroecological and climate-sensitive agriculture practices; while fostering economic development and small farmers market participation. Both developed and developing countries recognize the role of institutional food purchase in promoting sustainability, environment and social agendas.

Recognizing these benefits, the Food and Agricultural Organization of the United Nations (FAO) is supporting governments to design and implement food procurement programmes from family farmers for public institutions.

Methodology

This paper is based on the lessons learned from the implementation of the Purchase from Africans for Africa programme (PAA Africa) launched in 2012. In this programme, FAO supports linking local food production to food assistance and school meals programmes in five African countries[2] by working closely with WFP, local communities, schools and smallholder groups. The programme objective is to contribute to food and nutrition security and income generation for smallholder farmers and vulner-

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able communities by supporting and promoting adapted local food purchase initiatives. (FAO & WFP, 2014) In order to achieve those outputs this overall objective PAA Africa works at three levels; policy, programing and implementation, combining knowledge and operational components. Learnings from this field programme were completed with 8 cases studies on the World Food ProgrammePurchase for Progress (P4P) programme and the Brazil's Public Food Procurement Programme and National School Feeding Programme.

To learn from P4P, country scoping missions took place in close collaboration with WFP in 2013 to eight countries where the P4P is operational – Rwanda; Kenya; Tanzania; Ethiopia; Ghana; El Salvador and Guatemala[1]. The focus of these missions was to gather evidence for country case studies on the role and experiences of P4P within the overall framework of inclusive food systems and to appraise other models of public food procurement in the same countries, if they existed.

To learn from the Brazilian experience, two case studies were commissioned to appraise the enabling environment history for PAA and PNAE. Using primary and secondary sources, these cases gathered evidence over a ten-year period on Brazil's iterations of its policy, regulatory and institutional reforms introduced to address constraints for public food procurement from smallholders.

Main results

This paper presents some findings and policy recommendations covering the areas on policy and legal framework constraints and good practices required for the successful implementation of IPP as a driver of local food system development. Policy framework: fostering intra-ministerial collaboration

The goals of public food procurement programmes vary from country to country and programme to programme, however common to all is their multi-faceted nature in trying to address a number of development and economic goals, from child nutrition to linking smallholder to local formal markets and poverty reduction.

As such, the multifaceted nature of Institutional Procurement Programmes (IPPs) requires an equally multifaceted policy and institutional enabling environment. This in turn calls for a coordinated and collaborative multisectoral coordination approach.

The overall analyses show that the level of success for IPPs achieving their objectives is highly dependent on clear institutional roles and their capacity to coordinate with one another from Ministerial level down to the local level where is food procured and delivered.

A coordinated and multi-sectorial approach has been attributed also, for instance, as one of the main factor for the successful implementation of Brazilian PAA. Inspired by the Brazilian experience, also PAA Africa promote a multisectorial approach for both the design and implementation of IPPs programmes.

Aligning policy, legislation and institutional processes

Political will and policy reform are key to the transformation of local food systems and IPPs implementation. However, policy reform and political will are not enough, if the institution and legal frameworks are left unchanged. The most salient lesson emerging from PAA Africa research agenda and field experience has been the critical role that policy and institutional reforms need to undergo together and interlinked with operational choices or issues in order to lay out the foundation for sustainable and inclusive public food procurement. Equally important is the need for legislative reforms to accompany the development of these programmes, which are analysed in topics d, e and f bellow

Customizing decentralized public food procurement

Generally decentralized procurement systems are considered more effective for reducing waste, avoiding large-scale fraud, improving responses to end-users needs, while also encouraging growth of the market

1. The series of case studies are available at http://www.fao.org/ag/ags/ivc/institutional-procurement/en/

economy to rural areas and towns. A decentralized system means that there are more opportunities for local-to-local linkages that suit local small farmers and enterprises supplying food and end-users such as schools, with spill-over effects for the rest of the local community. As the information interface is more immediate, delays can be avoided, and costs with transportation and storage reduced. Furthermore a decentralized system facilitates the supply of fresh food, may increase in the quality and variety of food, and could be compatible with local eating habits and tastes. Nevertheless, decentralization may means also a decrease in the potential advantages of bulk buying and economies of scale and will necessarily requires a decentralized administrative capacity as well as a well-functioning accountability system and in communication with more a centralized administration level. More centralized processes can ensure greater standardization of procedure, facilitating its monitoring and control.

Pilot initiatives, such as the ones implemented through PAA Africa, provide a great opportunity for testing and choosing the best procurement systems adapted to the country context.

***Aligning legislation*: the law on public procurement**

Without the development and/or adaptation of different laws which not only allow but also facilitate the integration of smallholders into institutional markets, it is very likely that an IPP would not succeed in its objectives of supporting smallholder production and access to markets and, in particular, of acting as a driver of development. One of the key legal issues linked to IPPs is the regulation of public procurement.

The main issue of the regulation of public procurement for IPP is that most often public procurement legislations impose a procurement process (bidding process) which, due to its complexity and high level of requirements, may hinder the participation in institutional markets of a section of population – the smallholder producers – which cannot easily compete with larger producers and traders at these same conditions.

For the implementation of an IPP which has the aim to facilitate the access of smallholder farmers to institutional markets, it is recommended to adapt the legal framework – and in particular the legislation on public procurement – to those programme objectives. The Brazilian experience is a key example in this sense.

It is also necessary to develop procurement mechanisms more adapted to the capacities and characteristics of smallholder supply. Nonetheless, the adaptations or reforms should continue building and relying on the basic principles of the public administration, ensuring that accountability mechanisms and transparency are envisaged, regulated and requested for the differentiated procurement mechanisms.

Developing procurement mechanisms that respond to smallholders' capacity

New procurement mechanism need to be designed according to the characteristics of smallholder suppliers, while still maintaining the core principles that protect the interests of the institutional buyer and public sector funds, which will requires some improved capacity from smallholder farmers as well.

Developing a proper legal framework to regulate the organizational structure of farmer's organizations

Farmer's organization (FOs) is the main entry point adopted and supported by both Brazilian and P4P experiences for linking smallholder producers to institutional markets. The importance of this model is not only because of the economy of scale that it brings, but also due to its capacity of helping producers to upgrade access to other markets and achieve higher outcome.

It is important and advisable the alignment of regulations on farmers organizations and the IPP's objectives. This can be done by improving and updating the related legislation, but also by developing new ones, based on organizational and also contractual arrangements.

Measuring impact and monitoring IPPs

Attention is needed on measuring impact of results and monitoring implementation in order to support efficiency and effectiveness and to promote social accountability. In several contexts of IPP's policy

implementation, monitoring systems and transparency remains a challenge to be overcome. Resources are not always devoted to this important aspect and as a result, information and clarity on the implementation performance is not always available on a timely manner for managers and for the society in general.

Comprehensive and experimental impact evaluations of IPP, especially considering impacts on transformation and formalization of food systems, rural development, food security and poverty reduction have not yet been properly addressed globally.

Concluding remarks

Institutional food procurement programmes have a great potential to create, stimulate and support transformative development of food supply systems.

Despite the challenges of measuring impact and monitoring IPPs, overall anecdotal evidence from the IPPs reviewed here, together with initial results of PAA-Africa monitoring and evaluation activities, confirm the potential of IPPs.

In Brazil, for instance, different studies assessing the impact of the IPPs in the country on a range of aspects including impact on income and production indicate positive trends for improvement in (i) family farm income; (i) diversification and increase of family farm production; (iii) strengthening and development of collective organizations. Further impacts assessed through qualitative studies include improvement in beneficiaries' nutrition and health, including not only food consumers but also family producers themselves; improvement in the quality of products; transition towards higher added-value production, including processed products and organic and agro-ecological production and stimulus in local economy.

Nevertheless, the development and implementation of this kind of programme is not a simple or straightforward task. It requires a series of conditions that must be coordinated and matched together. Those conditions depend – but go far beyond – the governmental will and availability of demand; they are linked to policy, institutions, legal frameworks and operational choices and issues, as well as agricultural enabling environments on the supply side and market enabling environments on the demand side. The findings outline above address some of those pieces and provides some guidance on the topic. Nevertheless, further tailored research for guiding policy formulation and scaling-up, as well as to guide policy makers through the operational options and related challenges and opportunities of IPPs is still needed.

POSTER

BiomassNet: a stakeholder network for promoting innovation in food and non-food biomass-based value webs in Africa

Christine Schmitt[1], Dady Demby[2], Tina Beuchelt[1] and Manfred Denich[1]

Global demand for biomass as food, feed, source of energy and industrial raw materials is putting increasing pressure on the agricultural sector and food production worldwide. There is a strong need for strategies that can ensure food security while attending growing demands for non-food biomass. The research project BiomassWeb aims at contributing to food security in sub-Saharan Africa by promoting innovations in the value webs of the food and non-food biomass sector.

Biomass-based value webs are complex systems of interlinked value chains in which food and non-food biomass is produced, processed, traded and consumed. The value web approach allows identifying synergies and trade-offs between the value chains of individual crops, especially when incorporating coupling uses of biomass. The approach also provides a conceptual framework for incorporating the expertise of a wide range of experts and scientists from different disciplines.

The BiomassWeb project specifically addresses the role of maize, cassava, plantain/banana/enset and bamboo in value webs in Ghana, Nigeria and Ethiopia. Capacity development and the integration of local and national stakeholders in the partner countries are an inherent component of the project. As part of its outreach activities, the project will launch the first pan-African expert network in the food and non-food biomass sector (*BiomassNet*) in December 2016.

BiomassNet is an expert network, which will link up scientists, experts, policy makers, authorities, development organisations and practitioners to strengthen the African biomass sector at local, national and international levels. It aims at promoting more efficient and sustainable biomass production, processing and trading to enhance food security and support the emerging bio-economies in Africa. In particular, the network will encourage using the value web approach in tackling biomass issues in Africa to enhance system thinking and innovation in this sector. It is also expected to boost pan-African collaboration and international partnership initiatives.

BiomassNet will be implemented through an interactive website that allows users to create profiles, contact each other through the website and upload and download information. In addition, the *BiomassNet* Dgroup provides a platform for moderated email discussions on pertinent topics that can capture the opinion and ideas of a large number of group members – see https://dgroups.org/groups/biomassnet/. The initial members of *BiomassNet* will be experts linked to the African and German universities, research institutions and international agricultural research organizations that form part of the BiomassWeb project. Using the snowballing effect, advertisement campaigns and workshops, we envisage enhancing the visibility of this new network and increasing membership. First experience from setting up the network will be used to highlight the challenges related to building a new partnership and innovation network in the highly diverse food and non-food biomass sector in Africa.

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Local products for urban markets' supply : experiments in the region of Seam Reap (Cambodia)

Martine Francois[1], Lucie Reynaud[1] and Sokarith Touch[1]

In Cambodia, the small farmers have had to adjust local production to the rapid increase of the population in the region of Siem Reap and consumers' new preferences for healthy, and quality food.

The Gret has started to create producer groups in Cambodia because so much of the fruit and vegetables is imported from neighbouring countries. This allows smallholders to sell their produce at local markets as well as at markets in Siem Reap.

The Gret's approach is based on reinforcing an inclusive value chain that allows an equitable division of profits. Aid is given to collective activities : to smallholders and micro-entrepreneurs who work together and sell their produce locally.

Since 2011 the Gret has been working in partnership with the Institut Cambodgien pour la recherche rurale et le développement (CIRD) and the Département Agricole de la région de Siem Reap to improve links between smallholders and local and regional markets, implementing the APICI programme – semi-intensive agriculture with sustainable low-input practices – financed by the Conseil Général du département des Hauts-de-Seine.

The objective is to help the farmers organise themselves into producer groups at a village level and elect representatives as well as drawing up internal regulations and a collective production calendar adapted to the market. These decisive factors produce and guarantee enough regular high quality produce.

Technical training in harvesting, classifying vegetables according to size and quality, storage, helps the farmers to improve the quality of the vegetables they deliver.

15 vegetable producer groups and 15 collectors developed a system of collecting and selling the products. Now 290 farmers, of whom 243 are women, provide an average of 100 tonnes of vegetables a month at Siem Reap markets through two distribution models based on short circuits like restaurants, hotels and canteens, but also the local and regional wholesale markets.

The communication will also examine the comparison between the advantages of short and long circuits for producers and stakeholders in the value chain.

At the same time, the Gret et Cird help farmers to moove towards a sustainable agricultural system which produces healthy local vegetables. To achieve this, agroecological practices are fostered by technical training, demonstration farms and exchanges with reference sites so that now the 290 farmers can grow a great variety of quality crops: on average 50 kinds of vegetables on a total of 52 hectares.

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Development of the rice value chain in Guinea though support for female rice parboilers and a collective, interprofessional trademark

Floriane Thouillot[1] and Cécile Broutin

This communication explains the Gret and MGE's initiatives to support the rice value chain in Guinea :

- *It details the ways in which women have been able to rise in the value chain and the new balance of power within the trade.*
- *It shows the results and what has been learned from the establishment of the first collective trademark of a processed product in West Africa and the issues determining its sustainability.*

The reinforcement of parboiling rice

Traditionally many women in the countryside parboil rice to feed their families and to earn extra money. This plays a central role in rural production and consumer markets, as Guineans prefer parboiled rice. The women parboiling the rice are responsible for quality control. They have become progressively more organised and more professional, first forming associations and then unions to deal with shared challenges. The original objective of the projects was to generate revenue and jobs and allow women financial and social independence, hoping to maximise impact on poverty. Different methods of support were tried between 2005 and 2015 in the three rice-growing regions. Support for women should, in the long term, allow recognition for both their profession and their participation in the territory's economy as well as the sustainable structuring of the value chain for food security. Today these organisations are super-structured lv federations and play an increasingly important role in the value chain, causing a definite change in equilibrium. They protect their own interests towards rice paddy producers, who are still not inclined to recognise their profession nor their place in the value chain.

- Creating a collective trademark for mangrove parboiled rice: Parboiled mangrove rice (*Böra Maalé* in Sousou) is greatly esteemed by Guineans and more expensive than any other rice on the local market. The Gret and MGE have supported the creation of an interprofessional collective trademark to limit the sales of other rice or mixtures of rice under the name *Böra Maalé* and to make sure that the profits from this particular rice remain for the value chain's stakeholders. The brand *Böra Maalé Fanyi,* created in 2014, is a more expensive niche-market product for restaurants and supermarkets, etc. The leading trade organisation, *Böra Maalé Network,* has representatives from all the different stages in the rice value chain in Lower Guinea. This project was created by the Gret, the MGE and the BSD to bring technical and organisational support to the Network while the brand takes off, due to growing demand. The principal challenges are encouraging cooperation and agreement among members of the Network, independent sales management and self-regulating specifications. The Network must be able to develop the market, undertake more dynamic sales techniques and avoid delays or ruptures in delivery as well as disseminating its experience for an appropriation from the government authorities. The project will also explore organic and fair-trade markets in Europe and even designate a geographic indication (identification phase). A cheaper high-grade rice market could also be developed, allowing a lower sales price.

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Session 14

Connecting value chains, natural resource management and sustainable farming systems
Participatory diagnosis and collective action

Environmental impacts of agricultural practices and water and soil conservation works : the case of the Merguellil catchment

Meriem Jouini[1], Julien Burte[1] and Carole Sinfort[2]

Abstract

Semi-arid agricultural areas are fragile territories where water and soil resources must be preserved. In such zones impact evaluation is difficult due to the lack of data. We focused on the upstream Merguellil watershed, located in central Tunisia, where several water and soil conservation works were built since 1990 to control water erosion and to protect the downstream area. The rapid expansion of such conservation measures raised the issue of their impact on soil and water resources. Our main goal is the impact assessment by LCA of the most relevant farming systems in our territory, taking into account on-site and off-site contributions to local and global impacts. Our strategy is to combine LCA with a participatory approach to integrate knowledge and perceptions of local actors and to provide elements on environmental impacts for all stakeholders. The first step was a territorial systemic participatory diagnosis to characterize the dynamics of the territory, to identify the natural resources and their uses, the developments of the agricultural practices and the characterization of the existing farming systems. This diagnosis was achieved through technical field visits and interviews with farmers. The second step was a territorial LCA of representative systems, mapping the different systems to consider the characteristics of their location (access to water, soil type…). Systemic territorial participatory diagnosis allowed to define a typology of production systems and to model the territory considering the interactions between these systems. Four types of production systems were identified to proceed with territorial LCA: olive and apricot system and olive and cereals system both in rainfed and irrigated combinations. LCA results are discussed for the most important midpoint indicators. This study demonstrated two major issues of LCA use for sustainable development in semi-arid watersheds: i) LCA results communication with stakeholders to fit with their understanding of the system and ii) localized impacts on soil and water resources, taking into account Water and Soil Conservation Works.

Introduction

In semi-arid areas, agriculture is based on resource “water and soil” limited, fragile and often overused. Indeed, it is essential to assess the impacts of agricultural practices in semi-arid regions on the use and degradation of these resources to choose and to develop an intensive and environmentally sustainable systems. Such impact assessment is difficult in semi-arid areas due to the lack of data. Our study area is the upper watershed of Merguellil, located in central Tunisia, characterized by a semi-arid climate, which brings together major environmental challenges: over-exploitation of water resources, accelerated land degradation and low availability of data. We Focused on the upstream Merguellil, Where Several water and soil conservation works Were built since 1990 to control water erosion and to protect the downstream area. The rapid expansion of conservation measures raised the issue of their impact on soil and water resources.

The environmental assessment method chosen for this study is the approach of the life cycle assessment (LCA), it is an international normalized method widely used to assess the potential environmental impacts of a system to optimize existing processes. It presents a characteristic of a global approach (all environmental impacts are considered) and life cycle (“cradle to grave”).

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The main goal of this study is the impact assessment by LCA of the most relevant farming systems in our territory, taking into account on-site and off-site contributions to local and global impacts. Our strategy is to combine LCA with a participatory approach to integrate knowledge and perceptions of local actors and to provide elements on environmental impacts for all stakeholders. The first step was a territorial systemic participatory diagnosis to characterize the dynamics of the territory, to identify the natural resources and their uses, the developments of the agricultural practices and the characterization of the existing farming systems. This diagnosis was achieved through technical field visits and interviews with farmers. The second step was a territorial LCA of representative systems, a mapping the different systems to consider the characteristics of their location (access to water, soil type…).

Study area: Merguellil Watershed

Our study area is the Merguellil watershed located in Tunisia, a Mediterranean country. Indeed, in the Mediterranean region, soil degradation and water resources is a serious threat to humans and the natural environment. Agriculture in the Mediterranean is characterized by small size farms witch a large number of farms are less than 10 hectares and they are economically less effective (Lacombe *et al.*, 2008).

The Merguellil Watershed is located in central Tunisia, it is characterized by a semi-arid climate with high rainfall variability. Its area is 1183 km2 dam El Haouareb. To protect the downstream watershed of Merguellil against floods, the dam was built in 1989. The problems of the study area are the variable and limited resources, the high water use, low control over access to water, etc. These problems are also encountered in the whole Mediterranean basin, the basin Merguellil can then be regarded as an exemplary case (Leduc *et al.*, 2004).

The upstream of the Merguellil watershed, where a runoff is an important water resources and for the aquifers recharge, was equipped Water and Soil Conservation Works (WSCW) in the years 1990. They are built to address the problems of land degradation by erosion and a water scarcity. The WSCW are classified into two categories: the WSCW essentially consist of benches and wscw of the hydrographic network consisting mainly of hillside reservoirs.

The WSCW allow then the surface runoff reduction, the upstream flow collect and increasing the local infiltration and provide an additional water for irrigation. However, the study area is characterized by solar radiation and high evaporation rates, characteristic of the Mediterranean climate. Lacombe (2007) estimated that over 90% of runoff water collected by the WSCW are lost through evapotranspiration, without increasing the agricultural production.

Methodology

Our strategy is to combine the approach of the life-cycle assessment (LCA) with a participatory approach in the upstream of Merguellil watershed in central Tunisia to integrate the knowledge of local players and to create knowledge on the impacts environmental to policy makers, farmers, etc. The first step in our approach is to make territorial systemic participatory diagnosis that allows us to characterize of the dynamics of the territory, to identify the natural resources and their uses, the change of agricultural practices and the factors of these evolution, and the typology of farming systems.

The second step is the adaptation of the life cycle assessment framework for the use and change of land use. After that it will be necessary to define the indicators of impacts and the methods to calculate them. The third step is the identification of scenarios for our territory on which our methodology will be applied. The scenarios will be built with all stakeholders during a collective workshops.

Results and conclusion

A systemic territorial participatory diagnosis allowed us to understand the dynamics and functioning of the territory as well as the factors of this evolution, the typology of the farming systems and the conservation works and to model the territory considering the interactions between these systems. At territorial

level, the most significant event that has played an important role in the landscape and landuse, the access to water and to aquifers, the farming system adapted by farmers, is the series of 1969 floods. After the floods of 69, there was a intervention by the state at the level of territory with the construction of Water and Soil Conservation Works and there is also the development of irrigated agriculture more and more intensive; and therefore the change of cropping system from rainfed to irrigated cropping system. Indeed, it is important to assess the environmental impacts of uses and changes in land uses. It is also important in this study to consider the diversity of farming systems. The most common cropping system is arboriculture. For the irrigated systems, many farmers have abandoned the practice of vegetable crops due to lack of water availability and high consumption of inputs. The apricot is a demanding crop in water, it takes a lot of agricultural practices compared to olive trees and is sensitive to weather conditions (tree mortality in case of sustained lack of water) but is very productive. The apricot is a water consumer crop and it takes a lot of agricultural practices compared to olive trees and it is a very sensitive to weather conditions (tree mortality in case of a lack of water) but it is a very productive. Farmers believes that the apricot crop adequate to meet their needs but the olive tree which guaranteed the sustainability of their farms because it is resistant to extreme weather conditions and the lack of water.

Systemic territorial participatory diagnosis allowed to define a typology of production systems and to model the territory considering the interactions between these systems. Four types of production systems were identified to proceed with territorial LCA: olive and apricot system and olive and cereals system both in rainfed and irrigated combinations. LCA results are discussed for the most important midpoint indicators. This study demonstrated two major issues of LCA use for sustainable development in semi-arid watersheds: i) LCA results communication with stakeholders to fit with their understanding of the system and ii) localized impacts on soil and water resources, taking into account Water and Soil Conservation Works.

The limits and opportunities of the entrepreneurship injunction in collective irrigation: the case of horticultural value chain in Mozambique

Raphaelle Ducrot[1,2], Wilson De Sousa, Etevaldo Cheveia, Joaquim Faduco and Paiva Muguambe

Introduction and justification

To face food security challenges and more inclusive development many African countries need to increase the productivity of small scale agriculture. Yet, many policies and research interventions to have failed to raise farm productivity and the despite massive resources invested, the impact and visible effects of technology-driven productivity interventions (green revolution, modernization) are negligible at the local level.

This has led to a review of agricultural policies and discourse focusing on the conversion of low productive peasants into small entrepreneurs fully integrated into dynamic value chains and market as a pathway for agricultural growth and poverty reduction. In parallel, in search for solution for complex real-world problem and the acknowledgement that the success of complex innovation is related the extension and solidity of the socio-technical network that supports it, new approaches for innovation using transdisciplinary approaches have been experimented. Such approach which aims to promote complex innovations that tackle in the same time the technological, social, organizational and economic dimensions of change relies on transdisciplinary approaches. Multi-stakeholder platforms help to facilitate the innovation process, exchange, learning and reflection between academia and people outside academia and to develop institutional arrangements that support vertical and horizontal coordination.

Irrigation which allows for mitigating climate variability is a key factor to increase productivity. But many small scale collective irrigation scheme have had limited success due to various issues such as inadequate return on investment, poor governance, poor maintenance and weak market integration. In recent years various projects have focused on increasing irrigation productivity by mobilizing new innovation approaches. This is the case of the ACIAR project "Increasing irrigation water productivity in Mozambique, Tanzania and Zimbabwe through on-farm monitoring, adaptive management and agricultural innovation platforms". The project encourages transdisciplinary interactions at plot level to increase on farm water management and established 'Innovation Platforms' comprising farmers, political representatives and players across the market value chain, to identify institutional and market constraints and to stimulate opportunities for change.

By combining the analysis of existing database and outcomes of participatory workshops in Mozambique, we argue that the coordination processes which are necessary for the good functioning of collective irrigation are particularly demanding in the most challenging situations. These coordination issues which suppose the development of specific capacities and capabilities are generally overlooked when focusing on the economic and technical aspects of irrigation.

Methodology

The methodology mobilized various tools: (1) analysis of the baseline surveys of irrigators in two pilot case study in the Maputo Province, Mozambique (Boane and Khanimambo scheme) characterized by differentiated market access. (2) An analysis of secondary data mainly a survey of 272 horticulture producers in the Boane and Moamba district conducted in 2014 as part of the trilateral partnership

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between Mozambique, Brazil, and the United States survey and price analysis of 8 crops in the Maputo and Boane market (3) a series of participatory activities to characterize crop choice, value chain functioning and strategies in the two schemes studied.

Results

There were clearly two different types of market situation: In the Boane district that bordered the metropolis of Maputo-Matola, 27 different horticultural crops mostly irrigated were grown and sold. Locally, the price of local traditional food and some horticulture crop is higher than in the capital revealing an existing local demand. There was no information on economic margin for these crops. The price of other horticultural crops was more volatile locally and in the capital market revealing a competition between schemes and/or importation from neighboring South Africa. In the Khanimambo case located 150 km from the capital, the market was very limited and strictly local.

Not surprisingly, small scale irrigated schemes gathers different types of farmers depending of the size of the irrigated plots, workforce availability, the education level and social connections. Farmers of the Boane scheme identified themselves more specifically in 4 types. In the area, a clear pattern of crop preferences by farmer type was identified depending of farmers 'objectives, workforce availability and access to funding. In the second case, the irrigation difficulties (flood risks, poor market access) have tended to discourage farmers and only a small number of farmers, principally women kept on cultivating with a food security objective.

In practice farmers in the Maputo surrounding identified three main marketing strategies and value chain functioning for horticulture crops depending of the importance of demand and the types of interactions with buyers. In Khanimambo, very restricted local market and distance from the main consumption area meant that a collective organization was necessary to make profit.

Collective action was limited in the Boane scheme as even irrigation was an individual activity. The dynamic market situation provided different market opportunities for the different types of farmers. Collective action focused on connecting the association with the external powerful actors as a way to increase association assets. This strategy was successful and limited the irrigation costs at farmers' level by providing periodic rehabilitation and alternative funds for the functioning of the association irrigation. The outcomes from the innovation platform fall within this model: it permitted a rehabilitation of the scheme and access to a new credit scheme but did not modify the coordination modalities between external actors and farmers. Thus the capacity of adaptation of the association mobilizes mostly political connections rather than internal capabilities. But the innovation process is leading to more cooperation at scheme level as the irrigation pattern needs to be reviewed due to the technological changes.

In Khanimambo, there was a stronger need for collective action both for the commercialization and maintenance of the scheme as technology and market did not permit the development of individual practices. Strengthening the capacity and capabilities for internal coordination is thus an absolute necessity for the sustainability of the scheme. Little attention have been given to this issue and the top-down assistance which tend to predominate might on the contrary jeopardize the limited collection action capacity by encouraging inequitable distribution of the benefits of the intervention to the better connected.

Discussion and conclusion

In irrigation, better integration in value chain has often been associated with practices to reduce the dependence of farmers to the collective aspects of irrigation, for example by developing small reservoir capacity at farm level. This is associated with the development of medium scale irrigators or emerging farmers often sustain irrigation or at least initial investment by off farm income. In parallel a stronger interest of political elites and funding agencies to support individual irrigation have emerged. But small scale farmers have often no choice but to depend in more collective irrigation practices which are far more demanding and difficult to handle than individual system.

Innovation platform are supposed to facilitate the development of new coordination arrangements between irrigators and actors of the value chain. Little attention has been given to the capacity of collection action of the association which is a crucial determinant of irrigation sustainability where the development of more individual irrigation is limited. However, in the Boane case study the unexpected consequences of a technological change are creating an opportunity to develop better internal coordination process around water management and thus internal adaptation capacity of the association. In the dynamic market context of Boane, improvement of profitability notably for the more vulnerable farmers may be more related to the improvement of on-farm practices (for example careful choice of crop association and rotation), to minimizing treatment and irrigation costs as well as cash management during a crop cycle than formalizing the relationship in the value chains.

In the less favorable context as the Khanimambo scheme a more detailed understanding of the economic profitability of the scheme is necessary including clear differentiation of production costs between the rainy and dry period. A stronger attention should be given to the development of capabilities and management capacity of the association itself in order to strengthen their ability to compensate for the limited opportunities provided by the socio-economic and natural environment. This could start by more closely associating the association in the rehabilitation of the scheme, keeping in mind that empowerment is a long term process.

The Mozambican new irrigation policy requires that maintenance of the scheme and long term management be undertaken by association. Sustainability is mainly understood in term of profitability of irrigation and capacity of farmers to pay for repairs. But the social and political dimensions of sustainable maintenance of irrigation scheme are generally overlooked in this model. There is notably a discrepancy between the association governance model which is perceived by farmers in Mozambique as an egalitarian scheme to facilitate access to external financial resources and the business orientation and sustainability injunction that will necessarily increase the socio-economic difference between farmers and the inequitable share of the irrigation expenses between farmers; Currently, the water fees which aims to cover maintenance cost are not related to plot size. With sustainability in mind, it might be necessary to encourage other form of cost sharing or even form of governance such as the traditional partnership. In this model, farmers having the capacity to find resources outside of irrigation are in charge of paying for repairs and to bring market opportunities to the other farmers; this is associated to clearly acknowledged differentiated endowment and irrigation rights between farmers

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Dealing with the challenge of sustainable water resource management in food chain development

Jean-Louis Fusillier[1] and Caroline Lejars

Global demand for agricultural products is projected to rise at least 50% over the next two decades (UN Millenium Project, 2005). Irrigated agriculture provides more than 40% of world food and uses 70% of total water withdrawals (Madramootoo and Fyles, 2010). Groundwater use in irrigation is increasing both in absolute terms and in percentage of total irrigation, leading to overexploitation both in arid and in temperate areas (Siebert *et al.* 2010). Population growth, evolution of eating habits, price volatility and markets fluctuations, all contribute to reinforcing tensions over water in the agricultural sector (Jamin *et al.*, 2011). Further growth of agricultural production will have considerable implications for water use, especially groundwater.

The need to reconcile agricultural production and water conservation has prompted widespread innovation towards more sustainable farming methods but also to more sustainable food supply chains, especially through "local" or "short" supply chain (see for instance Marsden *et al.*,1999 and llbery, 2005). Sustainability is even increasingly used as a marketing argument. Several studies conducted in France (INRA, 2006), Asia and North Africa (Molle, 2011) have highlighted the interest to support the crop diversification within irrigated farms to reduce their vulnerability both to decreasing resources availability and agricultural price volatility. These researches showed that agricultural diversification strongly depends on (1) water and land availability, soil fertility and possibility of securing mid to long term access to these resources and (2) potential marketing outlets and organization of agri-food sectors. Recent studies also showed that the relationships between farmers and agri-food operators influence farmers' production choices and production patterns (Farès *et al.,* 2012) and that farmers' strategies to decreasing water resources impact on farm and agrifood sector economy (Bouarfa *et al.,* 2011; Lejars *et al.*, 2012).

However, despite this increasing interest in more sustainable food chain or diversification, few analyses have examined the role of the overall organization of food chains at local and regional level (lIbery, 2005), including food chain competition for water resources. Emphasis on food chains at a regional level is an important departure to reach sustainable management of water resources used by agriculture, because as Cobb *et al.* (1999) recognized "the food chain as a whole is the ultimate framework for a scrutiny of sustainability". Moreover, in practice, the food chains actors and their interactions are rarely part of the water management process. They are not taken into account through the traditional toolkit of instruments for managing water demand (volumetric price, intersectoral allocation water, water rights), widely understood as being part of the integrated water resources management (IWRM) paradigm. Neither are they taken into account by the state that mobilizes formal structures in its agricultural policies, such as banks or advisory services and that only targets farmers, but fails to take the whole supply chain that has been constructed around them into consideration.

The aim of this paper is to analyse how different types of stakeholders (farmers, agrifood sector operators, water resources managers, public organizations in charge of agricultural and environmental policies) interact formally (explicitly) or informally (implicitly) around the management of water in a shared territory. Based on first experiences led in two contrasted areas, in Beauce (France) and in Morocco (Sa´'is), we showed that: (i) The availability of water resources, especially groundwater, impact on farmers' strategies and practices, and indirectly on the development and organization of food supply chains, (ii) the overall organization of agriculture supply chain(s), especially through contractual relationships, directly influences strategies and practices of farmers, including in terms of use of ground-

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water resources (iii) the amount of resource available could lead to competition between food chains (iv) analyzing relationships between supply chain actors can help identify new key actors to enhance or limit the further extension of groundwater irrigation.

Access to groundwater resource and developement of food supply chains

Some major traditional cereals growing basins as Beauce in France and Saiss in Morocco have experienced during the past 30 years a broad diversification of productions associated with the development of irrigation. This development has led to the establishment of new downstream sectors in trade or processing, that play a structural role for agricultural change. The irrigation first appears in these regions, consecutively to a drought event, to secure the traditional cereals and grains crops. Endowed with this new water resource, farmers took rapidly new opportunities of crops diversification and downstream operators also invest in these new chains as the production was quickly growing. Vegetables (beans, onions, potatoes) and seeds are high value crops that are favored by farmers when they get a secured resource for irrigation. Groundwater with individual access is generally considered as a more secured resource than surface water networks which are collectively managed and subject to organizational problems.

In the Sais, central Morocco, a pioneer area for groundwater exploitation, onion production has raised 10 times since years 2000's and it is now the leading basin in the country, covering 50% of the national supply. Individual access to groundwater through a liberalization of drilling, and diffusion of drip irrigation have led to this expansion of cultivated area and yields increase. But this economic development based on unregulated groundwater withdrawals also led to an overexploitation. A drop of piezometric levels of 60 m in the last 20 years is met in some parts of the Sais aquifer. The economic stakes of this resource abstraction have, so far, impeded the search of solutions. The valorization of productions implies for 80% of products, informal distribution channels with a high number of market intermediairies (middlemen, brokers...). For the Sais onion chain, Lejars &Courilleau (2015) estimate a number of 2000 intermediaries for 4000 producers. Despite their flexibility these operators have difficulties to integrate long term sustainability issues, and to anticipate a possible collapse of the resource.

Organization of supply chains and irrigation use

A current trend in many agri-food supply chains is the qualitative segmentation of markets to meet demand requirements and get a better valorization of products. This segmentation leads to the development of contracted crops with production specification. Irrigation is often a technical component needed to ensure this specification. In Beauce, most of the new sectors developed thanks to irrigation, have based their supply on contracts: vegetables, seeds, malting barley. Satisfaction of crops water requirements for quality standard is a contractual obligation.

Traditional supply chains of the region such as cereals and sugar be*et al.*o developed quality differentiation or contractual commitment on quantitative delivery that implies an optimized level of irrigation. For the agro-food firms, the presence of a water resource available for irrigation is considered as a key factor for their investment localization strategies.

Competition between food chains for water resource

In many situations, in particular with groundwater which is subject to individual abstraction, water is a scarce resource, not sufficient to cover all the needs. Irrigating farmers have to arbitrate the water allocation between crops. Their individual decisions have aggregated impacts on the total volume of production at basin level, and finally on the supply of downstream operators. Insufficient production can lead to the closure of processing or packing units that will affect the whole supply basin. In Beauce this problem occurs after the implementation of management rules of the regional aquifer. Farmers received individuals quotas of water withdrawals, these quotas were annually adjusted before the cropping season, subject to the level of the watertable. This management system can potentially lead to severe

restriction of water access and put at risk several industries particularly dependant on irrigation: the vegetable canning industry, the malting, the sugar and the seeds industries. Downstream operators were associated in participative workshops with farmers representative and resource managers to estimate the physical and economic impacts of water restrictions for each industry (Lejars & fusilier, 2012). Some leeways to adapt supply organization (cropping calendar, norms) or water management rules (temporary exemption, permit to carry over the quota, geographic differenciation...) to potential restrictive scenarios were also discussed.

Analyzing relationships between supply chain actors can help identify new key actors to limit the further extension of groundwater irrigation

Relationships between supply chain stakeholders require analysis and intervention because they are a leeway to improve water savings. Analyzing relationships between supply chain actors can help identify new key actors to participate to water management processes. Making them visible is the first step to including them in water management, as they clearly depend on this resource. In Beauce, first experience showed that actors of food processing sectors are interested in participating in negotiations around groundwater volumetric management and should be included in the water management processes. In Morocco, first studies showed that the state should include supply chains actors in particular inputs suppliers in its agricultural policies. They could become major nodes for the dissemination of information and innovation and they not only have personal relations with farmers, but also close links with state representatives.

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The extent and determinants of postharvest losses: evidence from the cooking banana value chain in Uganda

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Study rationale

Banana is the main staple crop in Uganda; it provides 17% of the daily caloric needs of the country and annual per capita household incomes of about US$1,244 (Kilimo Trust, 2012). Per capita consumption of cooking bananas in Uganda is 172Kg/person/year, making it the largest consumer of cooking bananas in the world. However, the crop has a very short shell life. As a result, bananas are very vulnerable to postharvest deterioration; large proportions of the crop rot, ripen and get bruised before they reach the final consumer. These losses represent inefficiencies in the supply chain and thus have far reaching effects on food availability, prices and may result into increased pressure on natural resources.

Whereas policy has prioritized reduction of postharvest losses (PHL) in Uganda, operationalization of postharvest reduction strategies and programs is still a challenge. One of the main factors hindering operationalization of such programs and strategies is the lack of consistent and empirical information on the extent and causes of these losses. The few available studies on PHL have focused more on cereals giving little attention to fruits and vegetables (Affognon *et al.*, 2015), yet fruits and vegetables suffer the bulk of PHL. Banana in particular has received little attention in postharvest research. Information on the extent and determinants of PHL can provide insights on how efficient a value chain (VC) is, helps in isolation of loss hotspots and can guide targeting and designing of intervention strategies. In Uganda, TRIAS (2012) quantified PHL in the banana value chain. However, estimates from TRIAS (2012) are based on anecdotal evidence does not disaggregate losses at the various VC nodes. Disaggregating losses along the VC is important in identifying loss hotspots and weak links amongst value chain players. The current study contributes to literature by estimating the extent and assessing the determinants of PHL in the banana VC in Uganda.

Conceptual Framework

PHL refer to measurable quantitative and qualitative food losses in the postharvest system (de Lucia & Assenato, 1994). PHL threaten food, income and nutrition security for smallholders. PHL can be subdivided into "food loss" and "food waste". The distinction between "food loss" and "food loss" is however not well defined in PHL literature. In this study, we followed FAO (2014) which distinguishes between "food loss" and "food waste" with respect to the stage of the food supply chain. We define losses at farm, collection, wholesale and retail levels as "food losses" and losses at consumer level as "food waste." In this study, losses at consumer level are defined as food "waste" are not used in estimation of PHL in cooking banana value chain. We define the extent of PHL in the banana value chain to be the sum of losses at farm, collection, wholesale and retail levels, which are hypothesized to be influenced by a number of factors including social, economic, and infrastructural factors. We conceptualize that high PHL reflect inefficiencies in the value chain. This is because the chain fails to move original quantities of bananas produced from the farm to the forks in a cheap and timely manner as proportions of the crop are lost along the chain.

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Study Description

Following Naziri *et al.* (2014) physical losses in this study were estimated as the proportion of banana that is deteriorated to the point that it is unfit for human consumption. Bananas affected by physical losses do not have alternative uses or residual value. Economic losses on the other hand refer to the proportion of bananas that are partially spoiled or damaged and whose market price is discounted. Therefore, banana affected by economic losses is still used and thus has a residual value. We used a structured questionnaire to obtain information on physical and economic losses in scarce and surplus seasons from 100 farmers, 17 collectors and 10 wholesalers in Isingiro and Rakai districts and 40 retailers from markets in the metropolis of Kampala.

We used weighted means, as opposed to simple means, in determining the average physical and economic losses at the various VC nodes across the two seasons. Total PHL at each node were in turn calculated as the sum of the respective physical and economic losses. The overall value of the PHL along the banana VC was estimated as the sum of the total physical and total economic losses at all nodes. Total Economic losses were calculated as a direct sum of economic losses at farm, collection, retail and whole sale levels. However, since bananas lost at one node of the chain actually disappear from the VC and cannot be lost again, the total amount of physical losses in the VC were calculated by summing up the losses at each node of the chain while netting off losses that occurred at the previous stages in order to avoid double counting. Because of data limitations, this study examined the factors that influence PHL at only farm and retail levels. The factors affecting PHL at farm level were assessed using a Tobit regression model. This is because a number of farmers (26) reported zero losses, making Tobit to be more robust than OLS. However, an OLS regression was used to determine the factors that affect losses for retailers since no retailer reported zero losses. Appropriate diagnostic tests were done to determine the fitness of the models.

Results

PHL along the cooking banana VC

PHL and price discounts are higher in the surplus season at all VC nodes. This is because supply of bananas usually exceeds demand in surplus seasons; as a result, bananas are stored for longer periods leading to ripening. Perishability of bananas and mishandling effects manifest more as bananas move along the chain. Bruising and ripening are therefore more prevalent at retail level. These findings are consistent with other studies (Mebratie *et al.*, 2015).

Extent of PHL in the banana VC

We estimated the total extent of economic losses in the value chain as a direct sum of the economic losses at farm, collection, wholesale and retail levels, resulting into a value of 22.07% (2.49+3.72+5.93+9.93). However, we also found that on average, only about 35% of the total cooking bananas produced actually leaves the farm for the market, the rest being consumed by the farm household. Since only traded bananas can incur economic losses, the overall proportion of harvested banana affected by economic losses in Uganda can be estimated at 7.73% (i.e., 22.1% of marketed bananas). In calculating the total extent of physical losses in the chain, we net off losses incurred at previous VC nodes since bananas lost at one node do not move to the next node (and cannot be lost again). The proportion of marketed banana affected by physical losses was estimated as (1-0.974*0.968*0.920*0.915) giving a value of 20.6%. The overall amount of harvested bananas that incur physical losses can be then computed at 7.21% since only 35% of bananas produced are marketed. A direct sum of physical losses at the respective value chain nodes would have overestimated the proportion of marketed bananas affected by physical losses at 22.1%. We then sum up the physical and economic losses to obtain the extent of PHL in the entire chain approximating to 14.94% of which 7.21% are completely lost while 7.73% are sold at a discount due to quality deterioration.

Factors that affect PHL

At farm level, female-headed households, household size, monthly banana production – have significant positive effects on PHLs, while education, specialization and an interaction between district (Rakai=1) and distance to tarmac road have significant negative effects. Banana harvesting and marketing are laborious and require a lot of mobility. Women have less mobility and prefer less laborious activities, this may explain why female-headed households have higher losses. Similarly, as more bananas are produced, household labor is stretched and less time is allocated per farm activity; this may explain why PHL increase as banana production increases. More educated farmers may have better knowledge of banana management and usually have more access to trainings. This explains why farmers with at least secondary education have lower PHL. Commercial farmers may benefit from specialization and allocate more time to the management and husbandry of bananas and may also have more access to markets, resulting into reduced PHL as shown in our results.

At retail level, female retailers have lower losses; the underlying reason could be that they are better handlers of bananas. Similarly, retailers who are organized in groups experience lower losses than non-members. The reason could be that, through collective action, group members purchase in bulk at lower prices directly from producers, which gives members access to clean, mature and fresh banana fruits at lower prices, and with minimal bruises. In addition, retailers who source banana from nearby markets and directly from producers are found to have lower PHL than those who purchase from suppliers. It may be that retailers who source their own bananas do more quality assurance and purchase bananas with less damage which spoil less. Finally, we found that traders who mostly seek information about banana quality from their suppliers suffer less PHL compared to those who mostly seek information banana prices. Traders interested in quality may do more inspection and quality assurance. In so doing they select high quality bananas that suffer minimal losses.

Significant proportions of harvested bananas are lost before consumption, which represents substantial food and income losses to farmers, consumers and traders. Because losses at one node affect losses at other, we recommend the adoption of holistic and integrated strategies that target PHL reduction at all nodes in the VC.

Implications

It is evident that the banana VC is far from efficient; substantial amounts of bananas are lost completely. This has direct implications on food availability and farmer incomes as food lost can neither be consumed nor sold. Because less food is available, PHL indirectly inflate the prices of bananas and stifle food access. PHL also indirectly increase pressure on natural resources as more production is needed to cover for the bananas lost, making banana production less sustainable. End to end vertical and horizontal interactions among actors is therefore necessary if PHL are to be reduced, banana access enhanced, and banana prices lowered. These interactions should stimulate development and establishment of product and handling standards as well as fostering loss reducing innovations such as selling of bananas as fingers and clusters as opposed to bunches, transportation of bananas in boxes for protection against bruising, use of ripening control chemicals like ethylene and the selling of packed and peeled bananas. Selling of peeled bananas has numerous ecological functions; peelings are direct sources of biomass for organic manure production on farm; it reduces weight handled at trade level allowing more quantities to be sold; and it reduces amount of domestic waste that has to be disposed-off. This is particularly important in a country like Uganda where disposal of waste is not streamlined; large quantities of waste are deposited in water channels with far reaching effects on human and ecosystem health.

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Strategic planning for sustainable organic hillside agriculture with a farming system and value chain model in Nicoya, Guanacaste

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Summary

The Nicoya Peninsula is part of the Guanacaste province of Costa Rica and is characterized by a tropical climate with a pronounced dry season marked by droughts. On 25 of July 2016, the Association of organic hillside producers *Orgánicos el Cerro Negro* was recognized with the first price in the first Regional Contest on Drought Adaptation Strategies in Guanacaste, organized by CIRAD and Fundacíon Nicoyagua, HIDROCEC-UNA, CATIE, ASADA de Huacas, MAG-Chorotega, UCR and La Voz de Guanacaste as part of the FuturAgua Project.

Two elements are considered key in the sustainable development of *Orgánicos el Cerro Negro* and of the agricultural value chain for organic products: 1) the innovative water harvesting solutions that the association has developed with the Universidad Nacional (UNA), 2) Organic certification of their production.

In 2012 *Orgánicos el Cerro Negro* started the transition towards a Participatory Guarantee System which was enabled by Costa Rican legislation in 2002. In this system the interaction with end consumers is part of a strategy to build trust, and to create feedback loops in the value chain towards a circular flow of information. This enables better production planning for the producers. Nevertheless, the association supplies a group of clients that they believe is too small, therefore they are looking for ways to increase sales and diversify products and services in order to expand their client base and reduce financial risks.

We present a value chain approach that was applied to describe and quantify the route from producer to consumer for the main organic products. On that base a strategic business plan was developed in a participative process, based on CATIE methodology for the development of strategic planning for rural associations (Gottret 2011) and on modeling farms productive hydro-agro-systems. We show how this strengthens the association by securing the consumer base, and increases its autonomy relative to government and NGO aid. The application of General Algebraic Modeling System software (GAMS Development Corporation 2013) to simulate production on farm level and the use of irrigation systems is used to back discussions to evaluate the profitability of Orgánicos el Cerro under various constraints and scenarios. We take into account the short term seasonal variations in climatologic and hydrologic conditions and long term climate prognostics, and a fluctuating, but growing demand for organic products, as well as the effect of organic certification schemes.

The development of a sound model business strategy based on innovative water harvest solutions that enables sustainable production by reducing climate variability – and financial risks can be shared and expanded in the wider Guanacaste region and other draught sensitive regions.

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A successful convergence between natural resources management and value chain development

Sara Melki[1]

Since 2009, GRET supported the sustainable development of natural bamboo value chains in Northern Lao PDR. This intervention has been led by Huaphanh Bamboo Sector Project team with the objectives of poverty reduction and protection of the natural forests by assuming that the development of sustainable and fair bamboo value chains will be achieved with the realization of a multi actor negotiation process. This paper specifically presents the progresses that have been done on developing the dried bamboo shoots value chain. The project works under the umbrella of the Provincial Bamboo Sector Development Strategy and through the framework of the innovative collective learning process.

In 2010 the bamboo Hok dried bamboo shoots value chain was at a precipice. The Huaphanh government had imposed a ban on the value chain due to the risk of deforestation (wood used for drying) and over-exploitation of natural resources. Exacerbating this situation was the illegal trading of dried shoots by unscrupulous traders compounded by lack of reinforcement of established rules. Capitalizing on these effects, producers and traders were maximizing their profits by using harmful tactics and tricks such as adding chemicals and water to dried shoots. The results were the ruination of product quality and product sanitation, similar situation as those causing the dried shoots scandal in 2011 in Vietnam.

Recognizing the potential, the project organized a workshop with local communities, private sector and government, to show the stakeholders socio-economic potential for developing the value chain with particular attention on the sustainable management of natural resources through the implementation of participatory forest management plan. In 2012, through collective negotiation, as an experiment phase, the authorities authorized four businessmen to officially start trading by allocating quota and licenses. A year later, success of this experimental phase created a suction effect in which unscrupulous businesses tried to maximize profits by setting up temporary processors using considerable amount of wood and sulphur to process dried bamboo shoots for the Chinese market.

To overcome the situation, a market study and a study tour was organized in Vietnam seeking out a niche fair-trade market. A new business model was proposed and discussed on producing high quality dried shoot by establishing four village processing units whose products can reach the organic and Vietnamese PGS market. Since 2013, these units signed contracts to supply to a Vietnamese 'social' enterprise. The collected village fees were used to pay the forest monitoring and evaluation conducted by the communities, while providing the units operating capital.

Simultaneously, collaboration began with the Lao Certification Body, a state actor, to experiment the implementation of PGS certification on dried bamboo shoots. Since bamboo is a non-timber forest product, the quality product is certified thanks to the forest monitoring and evaluation of the communal forests. The improvement of the product quality to access this niche market and the producer organization has positively impacted the value chain on creating jobs and adding local value. The PGS certification seeks the recognition of a quality product, through the sustainable forest management and the producer's organization to reach a niche market in Vietnam.

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Session 15

Building sustainability in value chains
Assessing firm strategies

On the learning curve: sustainability in the making in the Laotian coffee sector

Isabelle Vagneron[1], Chitpasong Kousonsavath[2] and Maiyer Xiong

Introduction

A small, poor and landlocked country of Southeast Asia, the Lao PDR has experienced rapid economic growth over the past 15 years, part of which is related to large inflows of foreign direct investment (FDI) into the country. As a result of the new policies implemented by the government of Lao PDR, FDI in the country grew from USD 31 million to US$350 million between 2000 and 2010 (IIED, 2012), while its share in total GDP more than quadrupled from 3.3% in 2001 to 15.9% by 2008 (World Bank, 2010). With 360 investment projects over a total area of 140,015 hectares, the agricultural sector represented in 2011 approximately 14% of all investment projects and covered 13% of the total area under investment (Schönweger *et al.*, 2012). 60% of these investment projects –and almost 80% of the total area concerned– were made by foreign investors. Closely related to the surge in FDI, the allocation of land concessions by the government of Lao PDR is a recent but rapidly expanding phenomenon. Through the concession system, the government of Lao PDR allocates land to local or foreign enterprises to invest and organize production. This enables the government of Lao PDR to reach a variety of policy objectives (*e.g.,* increase farm land productivity; eliminate swidden agriculture; develop rural employment, infrastructures and the local economy; increase its incomes). Foreign investors benefit from cheap access to available land and labor and from the close proximity to major markets.

Land concessions are a matter of heated debate in Lao PDR, due to their potentially negative impacts on local livelihoods and the environment. Potentially positive impacts of concessions include the creation of jobs and incomes, the contribution of large enterprises to local community development (*e.g.* through electrification projects or investment in infrastructure) and the diffusion of new production techniques/ innovation, possibly through the development of out-grower schemes (provision of technical training, high quality inputs and equipment to the farmers located at the periphery of the plantation). In a context of insecure rights and weak land governance, negative impacts of concessions include: deforestation and loss of biodiversity; loss of access to land; threat to local livelihoods; eviction of other potential investors; and adverse impacts on employment. In 2007, land conflicts following the establishment of large industrial plantations in the South of Lao PDR resulted in the Prime Minister Bouasone Bouphavanh announcing a moratorium on the allocation of new plantations of over 150 hectares for industrial trees, perennial plants, and mining (Baird, 2010a, 2012; High, 2010; Kenney-Lazar, 2010). The allocation of concessions over 150 hectares resumed in May 2009 before being suspended again in July 20091. On June 2012, the government of Lao PDR announced its decision not to allow any new investments in mining or grant further land concessions for rubber and eucalyptus plantations until 2015, and to undertake an evaluation of all approved investment projects. These moratoria responded to growing concern over the impacts of concessions on local livelihoods and the environment, and over the lack of clarity of land allocation procedures.

Rationale and implication

The above-mentioned pressures on land are particularly manifest on the Bolaven Plateau (Southern Laos) where coffee is traditionally grown by thousands of smallholder coffee growers, and where a large number concessions of various kinds (*e.g.,* hydro-electric, mining and large plantations) have been granted. Located some 700 km south of Vientiane, the Bolaven Plateau is typically located *"on the edges of state authority"* (Das & Poole, 2004). As a locus of the aggressive expansion of market capitalism

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located at the margins of the State, the Bolaven Plateau can be simultaneously interpreted as a space of exclusion/inclusion and as a transition space where new ways of doing things and new relations between people are being invented and tested – this includes new production processes, labor relations, land uses, etc.–, within the boundaries of pre-existing social networks, and new relations of power and authority. The downside is that the margins are often areas of great vulnerability for those who cannot make their voices heard (*e.g.,* local communities, migrant workers, smallholder farmers) as they may be made invisible to public policies if they are muffled by more powerful voices. Ultimately, what happens in the margins depends on how individuals (from within the area and from outside), endowed with different types and levels of capital (cultural, economic, social and symbolic), are able to negotiate and re-imagine the web of relationships within which they live and work.

This paper aims to assess changes in current land allocation practices on the Bolaven Plateau, and in the perception that coffee stakeholders have of the evolutions that are currently taking place. Namely, we focus on the learning process through which new models of corporate social responsibility can emerge in association with FDI investments. In this process, we question the role and responsibilities of transnational corporations operating at the margins of weak States.

Materials and methods

This article is based on qualitative and quantitative fieldwork carried out in 2014-2015 in the Lao coffee sector. Qualitative surveys enabled us to document: 1/ the detailed procedures for land acquisition on the plateau, and showed how these procedures were progressively strengthened following a land conflict that opposed in 2010 Outspan Bolovens Limited (OBL, a subsidiary of the Singaporean trading company Olam) to local communities; 2/ the efforts subsequently made by OBL to better interact with smallholder farmers (*e.g.* through contract farming agreements and certification schemes), mainly to protect their reputation on global markets, but also because they needed the coffee that their plantations were unable to produce to feed their factories; 3/ the perceptions of smallholder coffee farmers, who mainly viewed these large plantations as new potential buyers for their coffee, and as providers of new job opportunities.

Main results and findings

The paper provides a detailed account the slow but genuine changes in how stakeholders (smallholders, plantations and government agencies) interact together towards sustainability. Namely, we document the evolution of the conflict that opposed OBL to smallholder farmers on the Bolaven Plateau and analyse how, several years after the confrontation, the various stakeholders look back at the unfolding of events. We show how following the adverse publicity triggered by its poor interaction with neighboring smallholders, OBL progressively modified its approach to negotiating and interacting with neighboring farmers, and how government agencies improved their procedures to screen foreign investment demands for land. We show how smallholder coffee farmers interacted with and perceived large coffee investors operating in their neighborhood. In a highly contested space, we show that for genuine social and economic development to emerge from current practices will require that new contractual arrangements between the farmers and the companies be closely monitored to ensure that they do not lock producers into unfair relations, and that future land deals involve a much higher and earlier participation of local communities than is currently the case.

Conclusion

CSR has been rapidly developing in Asia since the 2000s for a variety of reasons, including: economic development has brought new challenges (*e.g.*, pollution, inequalities); a better-educated and informed population that is more able to express its concerns on a variety of issues; the increasing pressure from civil society organizations; and the internationalization of supply chains, which has spread the use of responsible business practices and rules (Chapple & Moon, 2005). There are however important dispar-

ities between Asian countries, with a high level of CSR adoption in Japan, Korea, or Taiwan, dynamic trends in China, Vietnam and Thailand, and a low level of adoption in the Lao PDR and Cambodia.

CSR is a new concept in the Lao PDR. While a few examples of CSR initiatives are piloted by large international companies –especially in the mining, hydropower, forestry and agro-industrial sectors– the overall level of CSR awareness by local companies and government actors is quite low (GIZ, 2014). Challenges to the implementation of CSR in Lao PDR include: a lack of stakeholder involvement in and understanding of CSR; a low level of adoption of CSR practices, which provides little incentives to improve performance; a weak policy environment (lack of policies, weak enforcement of existing regulations); a relative lack of linkages between buyers, supply chains and markets in destinations sensitive to CSR; a weak civil society (Hicks, 2009). Although there is still little space within the Lao PDR's one-party State for policy advocacy over land issues (l*et al.*ne popular contestation or resistance), recent initiatives have emerged to promote sustainability in agribusiness deals. A workshop on "*Corporate Social Responsibility for Sustainable Development in Lao PDR across the Land Sector"* was organized in November 2015 by the Ministry of Planning and Investment, the Mekong Region Land Governance Project, and local and international NGOs with the support from international donors and the ASEAN CSR Network. OBL and Stora Enso (Finnish pulp and paper company that owns several eucalyptus plantations in the Lao PDR) shared their experiences during this event. A "Corporate Social Responsibility Study Tour" was subsequently organized in Southern Laos to document best practices and to identify company needs in implementing CSR. In the absence of a broad public debate on how to make foreign direct investment more sustainable, leveraging large companies that are sensitive to any risk to their reputation might be an efficient way to foster dialogue and social engagement among local actors, to fight poverty and to improve living conditions. These efforts might coincide with those of the government (if it decides that foreign companies should contribute more to economic growth, social welfare and environmental sustainability within the country) for whom graduating from LDC status by 2020 is a priority.

Fish labels as firm's strategic tools for sustainable aquaculture and traditional fisheries

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Introduction

Over recent years, a number of private label and certification schemes were established to promote sustainable fisheries (Oosterver and Sonnenfeld, 2010). The fishing industry has been responding to an increasing consumer demand for traceable and sustainable seafood products with the introduction of labelling schemes (Morgan *et al.*, 2015). This practice is quite recent for the fish industry (Roheim and Sutinen, 2006) and – as a fast growing voluntary and market-based labelling – is being recognized as an important instrument in global environmental fisheries governance (Oosterver and Sonnenfeld, 2010).

Eco-labelling is basically a private, voluntary, market-based tool, complementary to public policy instruments, providing environmental information to products in order to influence market behaviour. These tools encourage the behavioural change of producers and consumers towards long-term sustainability and allow selecting products and services according to specific environmental and social criteria. Eco-labelling can be differentiated and classified through several approaches such as organic farming, integrated agriculture, regional products, industrial labelling, sustainability certification of natural resources, and fair trade (de Haes and de Snoo, 2010). In this preliminary analysis we will focus on two certification schemes relating to sustainability certification of natural resources, and to regional products.

The increasing competition in the seafood market has recently brought producers to adopt differentiation strategies aimed at increasing profits (Grunert, 2005). Meanwhile new voluntary schemes, such as sustainability certifications for sustainable fish and related labels were adopted (*e.g.* Marine Stewardship Council, Friend of the Sea, etc.). Beyond business profit, sustainability certifications bring equal attention to environmental and to social and economic issues (de Haes and de Snoo, 2010).

Regional product strategies such as Slow Food movement Presidia represent an example of relevant initiatives aimed to promote quality products from vanishing, safeguard unique regions and ecosystems, recuperate traditional production activities, and protect local biodiversity (Migliorini *et al.*, 2010).

Aims

Through this initial analysis we aim to explore how different context-driven strategies for labelling sustainable seafood products – namely, international sustainability certifications and regional product strategies – can help achieving common market-oriented performances, for both capital intensive traditional fishers and fish farmers, as well as improving fisheries and aquaculture sustainability.

Methods

Derived from industrial organization (Porter, 1981) and agrofood value-chain management approaches (Rastoin & Ghersi, 2010) – combined with both a broad and context-specific literature review and semi-structured exploratory interviews with primary producers – a causal dynamic framework (Grando *et al.*, 2016) is applied for analysing labelling schemes through investigating related conditions, strategies and performances of primary producers of fisheries. The Conditions-Strategies-Performances framework focuses on the agency capacities of the primary producers and their ability to differently interpret the contextual conditions building on their business activity's characteristics (Prosperi *et al.*,2016).

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This preliminary analysis explores the strategies related to the choice of a labelling scheme from two different companies of fish farming and traditional fisheries in the southern coast of Tuscany, as well as the related performances in terms of entering large retailing markets and increasing the profitability of the labelled seafood.

Findings

Different fish label-related strategies were identified from interviews to producers (of the two aforementioned companies) combined with the review of relevant information through producers' and retailers' websites, and referring to literature review from previous studies on seafood environmental and regional labelling.

The aquaculture retail Consortium studied sells farmed fresh and processed fish products to few wholesalers and mainly to national and international big retailers. All consortium products – sea-bass, sea-bream and meagre – are branded with an own label that certifies an agreed Protocol between the consortium partners that guarantees the control of quality all over the production and retail process. The own label is an independent brand identifying the geographical area of production. The consortium – and therefore all its suppliers – is also certified under ISO-9001 (for quality management systems), ISO-18001 (for occupational health and safety management systems), as well as under the label "Friends of the Sea" (FOS).

The lagoon fishing Cooperative activities involve fish farming (sea-bass, sea-bream and meagre), traditional lagoon fishing (mullet and eel), and seafood processing (fish sauces, smoked fish and cured roe). Fresh and processed fish products are sold directly to few wholesalers and, to a larger extent, to big retailers, including "Eataly", a retailer specialised on high quality Italian food all over the world. For processed seafood the fishing Cooperative owns and independent label identifying the local geographical area of production. Although the Cooperative is not certified under voluntary certifications, its products and business activity are protected, and then branded, by three Slow-Food Presidia.

Both companies are situated in the same geographical context and adopted independent brands which refer to this specific area. However, the fishing Cooperative, for its traditional and diversified activity, as well as for the particular food production, is much more connected to the territorial and local community dimension, especially from the stakeholder and consumer perception. On the other hand, the fish farming retail Consortium – for its main intensive fish farming activity – could be perceived to be less connected to the sociocultural and territorial dimension.

Within this local framework both fishery companies were able to enter their products in the large retail system of big retailers. Through these first exploratory steps of our study it was possible to start an analysis about how common and different context conditions, and related labelling strategies, can contribute to establishing business relationships with big retailers, affirming the presence of the products in large retail markets and increasing the profitability of the labelled seafood.

With regards to the aquaculture retail Consortium, the voluntary certifications such as the independent own label, the ISO (9001 and 18001) including the adoption of the "Friend of the Sea" (FOS) label, are considered key for guaranteeing supply to big retailers. In particular, our analysis focuses on the role of the eco-label FOS. Eco-labels and related certification schemes are a significant feature of global fish trade and marketing since key buyers – mainly large retailers and commercial brand owners – have incorporated them in their business. The FOS certification for sustainability is crucial for the aquaculture Consortium in order to be placed on large retail markets; in fact, for high profile company it helps avoiding risks related to negative publicity about production practices and help keeping relationships with retailers within their corporate social responsibility programs (Roheim, 2008). Therefore, guarantees for obtaining only fish and seafood certified as sustainable are progressively included in the buyers' procurement strategies. At now supermarkets are strongly dominant in the retail of fish and seafood products and sustainability is more and more representing a fundamental pillar of fish and seafood procurement policies (Schmid and Connelly, 2009).

On the other hand, the lagoon fishing Cooperative have the benefit of three Slow-Food Presidia related to food products such as for the Orbetello Grey Mullet Roe, the Tuscan Sea Palamita, as well as for the Orbetello Lagoon Traditional Fishing. Presidia are products for which Slow-Food implement projects for protecting the related production systems from disappearing (Brunori *et al.*, 2013), they are acknowledged by Slow Food after a specific agreement, and have been also registered as trademarks (Brunori and Di Iacovo, 2014). Slow-Food Presidia, in this case, can be considered key for allowing these products to enter in the large retailing. In fact, from the first step of the Mullet Roe Presidia (in 2004), one of the main Italian big retailers (Coop) supported the costs of the presidium. After this first phase the Cooperative could establish relationships and agreements with other big retailers to sustain the product image and respond to consumer demand (Fonte, 2005). Furthermore, Slow-Food partnerships now range through the most important Italian food companies (both producers and retailers). Slow-Food Presidia products are both sold in Coop-Italia and Eataly worldwide shops (Migliorini, 2012), as well as in other supermarkets. In particular the Slow-Food and Eataly partnership builds on matching high quality Italian artisanal food products with achievable prices through shortening the food chain (Brunori *et al.*, 2013). The economic success of Presidia projects was observed with improvements for production quantity, sales price, and product quality, by considerably exceeding the best expectations (Antonioli-Corigliano and Viganò,2002; Migliorini *et al.*, 2010).

In Local food initiatives – including Slow-Food Presidia – natural and constructed environments, social networks, and symbolic systems support each other, and then territorial capital becomes economic capital (Brunori and Rossi, 2000; Brunori and Di Iacovo, 2014). In the specific case analysed of the fishing Cooperative, the territorial capital was a key contextual factor that allowed the Cooperative products to be included within the Presidia system, and thus to establish business relationships with large retailing.

The first main feature of regional products is that they stem from a well identifiable region which brings to many quality aspects as well to a focus on gastronomy, traditional techniques and related employment. Furthermore, although attention for the environment is more and more associated with regional products, in several cases attention to the environment is not registered such as for the French Champagne, or the Parma ham. (de Haes and de Snoo, 2010).

For sustainability certifications, eco-labels such as FOS function now as marketing tools, protecting and improving the value of the brand or supermarket chain. The adoption of sustainability certification is no more encouraged by NGOs and consumers; retailers and brand owners are now driving the demand for suppliers and producers in order to be certified (Schmid and Connelly, 2009; Foley and Havice, 2016). The main fishery eco-labels orient the supply dynamics offering a method to prove that products come from sustainably certified fisheries and producers (Konefal, 2012). In that, traceability represents a crucial factor for the success of eco-labels (Schmid and Connelly, 2009). In the specific context studied relating to the aquaculture Consortium, the competitive market conditions, as well as the need for demonstrating traceability and the respect of sustainability values to retailers, were key contextual factors for adopting the FOS certification scheme and for further strengthening business relationships with big retailers.

For sustainability certifications of natural resources a first main feature is the so-called People-Planet-Profit approach (Elkington, 1997). This approach attributes equal importance to social – "people" – requirements (*e.g.* labour conditions, income, land use rights); ecological – "planet" – requirements (*e.g.* biodiversity, environmental quality, climate); and long-term economic profitability requirements ("profit") (de Haes and de Snoo, 2010).

Conclusions

Private eco-labelling further incentivizes food chain actors to drive product sustainability improvements (Chkanikova and Lehner, 2015) and can help fishery producers to differentiate their strategies in an increasingly international and competitive market. This preliminary local-based analysis, combined with

inputs from literature and previous observations, is allowing us to build and test hypotheses about what combination of contextual and internal conditions could release specific labelling strategies that allowed different companies dealing with big retailers and improving the profitability from fish and seafood products. There are certainly many differences between fish eco-labelling and Slow-Food Presidia. In Slow-Food Presidia the territorial capital provides the marketing assets which attract both consumers and retailers, while fish labels draw on transnational and global supply-oriented strategies that can be applied anywhere in the world, for global consumers. However they have in common the ability to work as business and marketing strategic tools for conventional marketing strategies to successfully enter the large-scale retailing and target consumers willing to pay higher prices. Further research should be oriented to a deeper analysis of the sociocultural, economic, institutional, environmental and management dynamics of the context that define the conditions justifying the business strategies adopted by different fishery producers within the framework of sustainability and local certification schemes.

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Author index

Abramovay, Ricardo 16
Ahmad Sidique, Shaufique 113
Ajambo, Susan 259
Akoto-Danso, Edmund 182
Alary, Veronique 28
Ali, Ahmed 28
Allebone-Webb, Sophie 95
Allen, Thomas 205
Angbo-Kouakou, Euphrasie C.M. 77
Anh, Truong Thi Van 142
Antonelli, Annarita 222
Assefa, Amanuel 100
Aubert, Pierre-Marie 20, 213
Aubron, Claire 33
Auger, Marellia 213

Barbier, Bruno 263
Barjolle, Dominique 136
Bartolini, Fabio 269
Basile, Salvatore 222
Basset-Mens, Claudine 229, 237
Baumgart, Lukas 232, 234
Belt, John 184
Benders, Jorien 180
Bermúdez-Urdaneta, Martín 217
Bessou, Cécile 237
Beuchelt, Tina 246
Beucherie, Olivier 136
Biard, Yannick 229, 237
Bonnet, Pascal 31
Boureima, Feycal 225
Broutin, Cécile 248
Brunori, Gianluca 269
Budiansky, Ethan 40
Bunn, Christian 45
Burte, Julien 250

Camargo, Marisa 23
Carneiro, Marcelo 109
Carranza, Carlos 60
Castella, Jean-Christophe 10
César, Joaquim 96
Cesaro, Jean-Daniel 31
Chaboud, Géraldine 176
Charbonnier, Clément 136
Cheveia, Etevaldo 253
Chien, Tran Manh 162
Chiffoleau, Yuna 215
Chilot, Yirga 100
Cittadini, Roberto 166
Compaore Sawadogo, Eveline M. F. W. 81, 89
Corniaux, Christian 36
Costa, Susana 96
Costet, Pierre 43, 49
Cournut, Sylvie 31

Daburon, Annabelle 28
Dao, The Anh 149, 172
De La Paix Bayiha, Gerard 93
De Sousa, Wilson 253
Defoer, Toon 92
Deheuvels, Olivier 43
Del Rio Duque, Martha Lilia 116
Demby, Dady 246
Denich, Manfred 246
Derra, Salif 81
Dervillé, Marie 33
Desclee, Doriane 225
Devaux, André 199
Diaz, Rafael 60
Djama, Marcel 113
Domingos, Mpanzo 96
Donovan, Jason 197
Dorin, Bruno 33
Drechsel, Pay 180, 182
Ducrot, Raphaelle 253
Duteurtre, Guillaume 31, 36

Ei, Khin Khin 86

Fabiano, Flavia 229, 237
Faduco, Joaquim 253

Fernando, Sudarshana 180
Feschet, Pauline 229, 237
Fort, Ricardo 102
Fournier, Stéphane 136
Francois, Martine 247
Fusillier, Jean-Louis 256

García Pinéres, Roberto 263
Garcia-Drigo, Isabel 16, 25
Gilmour, Martin 48
Goita, Mamadou 225
Grando, Stefano 269
Grovermann, Christian 94
Guéneau, Stéphane 13, 109

Harper, Malcolm 184
Henriques, Ana 96
Hitchman, Judith 133
Hogarth, Nicholas 23
Hoste, Christian 94
Hostiou, Nathalie 31
Houdijk, Jeroen 263

Jager, Matthias 196
Jagoret, Patrick 43
Jancso, Leonhardt 234
Jeanneaux, Philippe 136
Jouini, Meriem 250

Karg, Hanna 182
Karsenty, Alain 202
Kelly, Siobhan 242
Kikulwe, Enoch 259
Klug, Israel 242
Kofi Appoh, Richard 182
Kousonsavath, Chitpasong 266

Lançon, Frédéric 77, 229, 237
Landert, Jan 232
Lapeyre, Renaud 20, 213
Laurans, Yann 20, 213
Le Coq, Jean-Francois 56
Le Thi Thanh, Huyen 31
Leclerc, Grégoire 263
Lejars, Caroline 256
Lemma, Gizachew 100
Lestrelin, Guillaume 10
Lienhard, Pascal 10
Lizama, Gilma 70
Llamas, Margaux 20
Loconto, Allison 123
Louis, Bockel 239
Lundy, Mark 196

Maffezzoli, Camille 215
Manivong, Vongpaphane 106
Martin, Pierre 229, 237
Martin, Vincent 28
Martinet, Marianne 43
Marton, Silvia 234
Mathé, Syndhia 93, 95
Mathew, John 127
Mayu, Ino 145
Melki, Sara 264
Melo, Ana 96
Mendez Del Villar, Patricio 229, 237
Michel, Baudouin 225
Michelotto-Pastro, Giovanna 136
Mira Da Silva, Luís 96
Moustier, Paule 170, 172
Muguambe, Paiva 253

Nacpil, Fernando 133
Nakalanda Matovu, Julie 150
Nanziri, Diego 259
Nelson, Valerie 209
Nguyen, Thi Tan Loc 170
Nguyen, Tien Dinh 31
Nhantumbo, Isilda 23, 50
Nhung, Tu Thi Tuyet 157
Nichterlein, Karin 94
Nowakunda, Kephas 259

Okurut, Stanslus 259
Orane, Debrune 239
Ornetsmüller, Christine 10

Pacheco, Pablo 16, 25
Perez-Akaki, Pablo 52
Pham Duy, Khanh 31
Piketty, Marie-Gabrielle 16, 25
Plaisier, Christine 200
Poccard-Chapuis, René 16, 25
Poisot, Anne-Sophie 123
Prosperi, Paolo 205, 269
Pugliese, Patrizia 222

Quan, Julian 209

Rafflegeau, Sylvain 229, 237
Restrepo-Calle, Sebastián 217
Reynaud, Lucie 247
Roberts, Wayne 173
Robineau, Ophélie 166
Rodriguez Quirós, Rigoberto 263
Rota, Cosimo 222
Roy, Rajeev 184
Ruben, Ruerd 102

Sabourin, Eric 68
Saj, Stephane 43
Saley Moussa, Abdoulaye 94, 100
Santacolom, Pilar 123
Schader, Christian 232, 234
Schmitt, Christine 246
Schouten, Greetje 74
Semasinghe, Christina 180
Sheng, Tey 113
Shepherd, Andrew 188
Sinfort, Carole 250
Sonethavixay, Sengphachanh 106
Song, Xin 131
Song, Yiching 131
Songsiengchai, Patchaya 113
Ssebunya, Brian 232
Stahlbrand, Lori 173
Stoian, Dietmar 198
Swensson, Luana 242
Swiderska, Krystyna 120

Tartanac, Florence 192, 242
Temple, Ludovic 77, 93
Teriete, Moritz 234
Teyssier, Catherine 136
Thalês, Marcelo 16, 25
Tho, Pham Thi Hanh 152
Thouillot, Floriane 248
Toillier, Aurélie 81
Tonneau, Jean-Philippe 13
Torero, Maximo 195
Touch, Sokarith 247
Toudert, Anass 239
Touzard, Jean-Marc 215
Triomphe, Bernard 95
Tu, Nhung 157

Vagneron, Isabelle 106, 266
Vairavamoorthy, Visakan 180
Valenciano, Jorge 60
Van Rijn, Fedes 102
Vandecandelaere, Emilie 136
Velazquez, Marisol 64
Vellema, Sietze 74, 172
Verburg, Peter 10
Vergamini, Daniele 269
Vermeulen, Hanneke 100
Vicovaro, Marcello 123
Vignes, Romain 20
Viteri, Maria-Laura 166

Wongpit, Piya 106

Xiong, Maiyer 266

Zanasi, Cesare 222

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