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Research paper

Multi-scale governance in agriculture systems: Interplay between national and local institutions around the production dimension of food security in Mali

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ABSTRACT

Enforcement of rules and laws designed at the national level is still one of the dominant institutional mechanisms for effective multiscale governance in most countries. At times, such blanket regulations are not only unable to meet practical needs at local levels, but they may conflict with local institutional logics, thereby creating new challenges. This study looks at three institutional arrangements in the agriculture and food security sector in the district of Koutiala, Mali to analyse the institutional variety across scale and the underlying institutional logics. On one side, the Cooperative Law as well as the Seed Law both designed at national level to enable famers' access to agriculture services and improved seeds have yielded mixed results with regard to anticipated outcomes. The cooperative law is believed to degrade the social cohesion and the mutual support on which vulnerable farmers rely when facing climatic and non-climatic risks whereas the new seed system is found onerous and unaffordable for farmers. On the other side, the local convention for the management of natural resources established as part of ongoing decentralised governance policy seems to resonate with local culture but challenged by other stakeholders. Through exploring these cases, this paper tests bricolage as an analytical framework for doing an institutional diagnostic. It aims at contributing to methodological and theoretical insights on the way sustainable institutions can be generated in conflicting institutional logics in the context of multi-scale governance

1. Introduction

Achieving food security and improved nutrition is at the heart of the sustainable development goals (Herbel et al., 2012). If there is a consensus on the importance of food security as substrate for development, the critical steps for achieving this goal in developing countries are still under debate. Some proponents advocate for expansion of technologies and more intensive use of agricultural inputs and equipment, reminiscent of the Asian green revolution (Ejeta, 2010). Other scholars stress the need to have an enabling institutional environment in place to support the uptake of agricultural technologies (Glover, 2011; Hounkonnou et al., 2012). They warn against the de-contextualized blueprint approach of one-size-fits all solutions as the remedy for strengthened food security in the highly diversified agriculture systems of Africa. In this regard, most studies associate food insecurity with structural causes (Gregory et al., 2005). It is believed that political commitment, effective institutions, and a system approach of innovation and adequate investments can improve the living conditions of smallholder farmers.

In Mali, crop production has traditionally formed the basis for pursuing food security. This has been a long standing priority of successive governments since the country's independence, in 1960.

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Structural responses to food insecurity in Mali have primarily consisted of policy reforms to enable increased agricultural production. Such reforms include the *Loi d'Orientation Agricole* (LOA), a comprehensive agricultural development framework enacted in 2006 that aims to promote sustainable and competitive agriculture in the country (Bélières et al., 2008). This framework advocates for land reform that encourages ownership right to secure long-term investments on agricultural lands. The LOA was also designed to support the management of natural resources and to facilitate farmers' access to inputs (fertilizer and seeds), equipment and government subsidies (Mercoiret, 2006).

Overall, ensuring food security may require a synergy of interventions both with the use of innovative agricultural technologies and with the creation of an enabling institutional environment. In this paper, we are interested in understanding the *mechanism* through which conducive institutional conditions are created that enable increases in productivity (Glover, 2011). Many approaches have been sought for creating an enabling environment for agricultural innovation. One of these came from the Convergence of Sciences – Strengthening Innovation Systems (CoS-SIS) program, which tested a collaborative approach – Innovation platforms- for institutional changes. It took a group of stakeholders through a process of learning and interaction, with the explicit aim of building synergy among them to enhance their innovative performance (Hounkonnou et al., 2012; Kilelu et al., 2013). The 'Innovation platform' approach takes into account limiting factors, mostly institutional, that may hinder the increased use of technologies (Hounkonnou et al., 2012; Nederlof and Pyburn, 2012). While innovation platforms have revealed valuable insights into institutional change, there has been less understanding of whether and how the position, interests, and commitments of facilitating agents may interfere with the platform agendas and outcomes (Turner et al., 2016).

Additional research on institutions has tended to emphasize how organizational processes are shaped by institutional forces that reinforce continuity and reward conformity (Garud et al., 2007). A body of literature has recently emerged that examines "institutional entrepreneurship" through which organized actors leverage resources to create new institutions or to alter the existing ones (Leca, 2009). In spite of their valuable contributions, this research faced criticism for overemphasizing the heroism of powerful entrepreneurs while ignoring the context and the agencies of these actors (Leca, 2009). The gaps in these approaches to studying institutional change show that there is still much to do in understanding institutions and how they operate in practice. As Rodrik (Rodrik, 2010) proposes in his macroeconomic analysis to diagnose what an economy "is good at", this paper aims to contribute to the diagnostic of institutional variety across scales. It aims at understanding what institutional logics at different scales are "good at" in terms of creating and sustaining enabling institutional environment for food production and subsequent food security.

The paper documents the institutional logics of three case studies. The first case study focuses on farmer cooperatives and analyses the rules and routines enforced by new national legislation in replacement of traditional village associations. The argument behind this new arrangement was to better facilitate members' access to agricultural inputs and services to enhance food production. The second case is about the institutional arrangement of seed systems in Mali. The new agricultural development framework includes a Seed Law aimed at facilitating farmers' access to high quality seed. Seed is considered a major driver of production increase and the government has devoted significant effort to improve access of farmers. The third case, offering another example of a cross-scalar institutional divide, relates to the institutional arrangement established through the local convention for the management of natural resources. This case highlights the process of the devolution of tasks and responsibilities to local communities through the decentralization policy. The reactions and controversies relating to these three examples of institutional arrangements are analyzed below to bring insights on diagnosing institutions.

The next section describes the context of the three cases and highlights the key elements relevant for understanding the embeddedness of institutional logics (Section 2). The theoretical framework of institutional bricolage against which the empirical data are analyzed is described in Section 3. The research methods used to generate data are captured in Section 4, followed by the findings which consist of the contextualized analysis of the three case studies (Section 5). The discussion and conclusion are presented in Section 6, as well as an analysis of the way institutional bricolage plays out in different contexts.

2. Description of the context of the studies

Mali is a landlocked country of West Africa that spreads over 1,241,000 square kilometers. Mali belongs to many organizations, at sub regional, African and international levels including OHADA (*Organisation pour l'harmonisation du droit des affaires en Afrique*). Since its independence in 1960, different ideologies on governance have been applied as those in power have changed over the years. From 1960–1968 the first governing body ruled the country under soviet socialist influences (Amselle, 1978). This first government was overthrown in 1968 by a military coup, and the single-party military regime that followed lasted 23 years. Since 1991, a new era of democracy has opened the political and administrative systems to decentralized governance. The decentralization is aimed at encouraging the transfer of responsibility over resources from the state onto local authorities at the level of municipalities (Fay, 2000).

The country is divided into 10 regions (two new regions have been recently created in the North and the North-East of the country) and Bamako the capital city. The administrative decentralization created 703 municipalities of which 666 are rural. The total estimated population of the country in 2009 was over 14,000,000 inhabitants of which 50.4% were women. Nearly 65% of the total population is under 25 years of age. About 70% of the population live in rural areas and base their livelihoods on agriculture. Agriculture makes up 45% of the gross domestic product (Anderson and Masters, 2009).

The farming system includes cotton as the main cash crop, alongside with millet, rice, maize; herding cattle, sheep, goats and fishing. In the South (Sikasso Region), the farming system is organized around cotton. In areas crossed by the Niger and Senegal rivers and their tributaries, the farming is organized around irrigated rice production, with greater or lesser control over water depending on the irrigation scheme in place. Similarities in the organization of extension staff around these two farming systems can be seen with the overall importance allocated to different forms of farmers' organizations as a means of channeling services between extension offices and producers. Along with the specific extension organization around rice and cotton, a central extension office providing rural advice and farm guidance to producers is in charge of crops that fall outside the rice and the cotton farming systems. Overall, these approaches to the farming system in Mali are aimed at the diversification of activities to minimize risks. This diversification also includes natural resources management, seed production, and off-farm activities.

3. Theoretical framework

In this article, we draw on institutional theories of polycentricity—the relationships among multiple authorities with

overlapping jurisdictions—to investigate the institutional logics of the three cases. A growing body of theoretical literature has developed on polycentric governance (Oakerson, 1999; Ostrom, 2009). This literature has made the case that the study of political systems needs to consider the degree and forms of *nestedness* of political actors within larger political systems. In contrast to a structuralism approach to institutional change in which human action is limited to the implementation of rules, the patterns of interaction and outcomes depend on the relationships among governance centers at different levels and the problems they are addressing (Oakerson, 1999). In their analysis of the governance of natural resources, Anderson and Ostrom (Andersson and Ostrom, 2008) explain that imperfections may exist at any level of governance. They argue that analysts should consider the extent to which complementary backup institutions exist at higher or lower level of governance that can help offset some of the imperfections at any one level.

In the context of polycentric governance in Mali exemplified in the diversity of political institutions on one side, and administrative decentralization on the other, we consider the institutional bricolage as an interesting theoretical perspective to look into for diagnosing how institutions work in practice. Different bodies of institutional thinking have been deployed to explain how community members, as heterogenic entities with different trajectories respond to externally driven processes (Adjei-Nsiah and Klerkx, 2016). Cleaver provides a framework of '*institutional bricolage*' to highlight how people adapt, transform, and find new solutions to their challenges. She explains the bricolage as a "*process in which individuals consciously and subconsciously draw on existing social formulas to patch or piece institutions together in response to changing situations*" (Cleaver, 2012). The bricolage indicates the different ways in which stakeholders respond when new institutions are introduced into pre-existing settings. Cleavers assumes that there are at least three plausible outcomes of bricolage. First, when a new institution is introduced it can be accepted by stakeholders, and then recombined with different types of existing socio-cultural elements. This is what Cleaver named *aggregation*. The second plausible scenario is called *alteration* and happens when stakeholders decide to adapt the introduced institutions to make them better fit their livelihoods. The third option relates to a possible resistance by stakeholders to new institutions by maintaining their institutional identities and culture (*articulation*) (Cleaver, 2002; Cleaver and Franks, 2005).

While institutional bricolage aims to understand how institutions work in practice, it is acknowledged that the embedded context – historical legacies, cultural influences, political logics, and economic drivers- is not neutral and cannot be ignored (Hassenforder et al., 2015). For example, in the analysis of irrigation systems in rural Ethiopia, Gutu et al. (Gutu et al., 2014) highlight that a comprehensive assessment of the institutional bricolage requires a complete understanding of the characteristics of people's agency, of the existing constraints and enablers that lead people to behave in one way or another. Likewise, by building on the case-study of the Rwenzori forest in Uganda, it is established that attempting to explain how institutions work cannot be done in isolation without understanding the historical, social and cultural context in which the arrangement is introduced (Hassenforder et al., 2015). External factors could limit or enable the effectiveness of a bricolage process.Therefore, the way stakeholders respond to introduced institutions must be analyzed in close relation with external factors as well as social, historical and economic drivers.

Decentralization reforms aiming at transferring power from central to local authorities, are a major catalyst for the participation of local communities in the control over existing natural resources (Ribot, 1995). By introducing local governance structures, the decentralization reforms expect at furthering 'good' governance of natural resources at the local level. But in practice, decentralization may also generate tensions between natural resources management structures, often comprised of public servants and local communities with different expectation and stakes. We recognize that decentralization itself may appear as an institutional arrangement to which community members and administrative officers respond in different ways depending on whether or not each category of actors perceive their interests are affected. In this arena of tension between possible antagonistic interests, the decentralization reforms can be seen as key contextual factors, which may influence the "bricolage"outcomes.

In this paper, we analyze the way bricolage plays out in three case studies of institutional arrangements, of which two are characterized by state driven top-down governance and one consisting of local stakeholder driven management of natural resources whereby local people have space to design their own rules, guiding the collective use of the forest resources. The paper looks into these two cross-scale institutional logics to derive insights on what each institutional logic is good at and how does this speak to institutional diagnostic in multiscale and polycentric institutional environments.

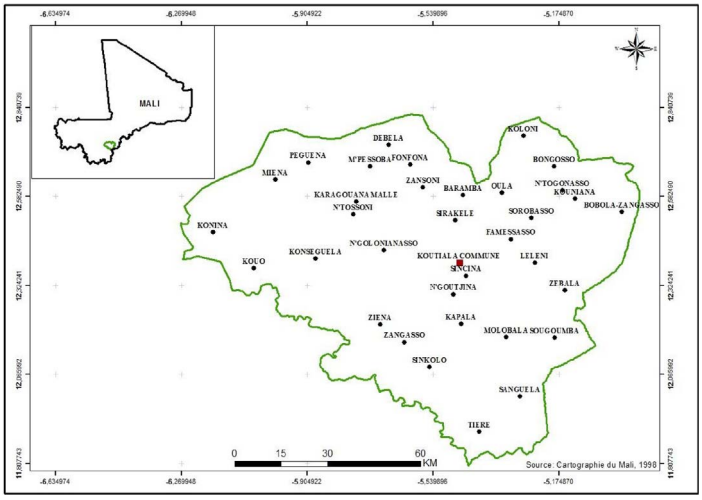
4. Materials and methods

4.1. Site characteristics

The research presented in this paper has been undertaken as part of the Adaptation at Scale in Semi-Arid Regions (ASSAR) project. ASSAR is an interdisciplinary research initiative, which aims to better understand the barriers and enablers for adaptation to climatic and non-climatic risks in semi-arid regions of Asia and Africa (Padgham et al., 2015). In West Africa, it covers the *trans*-boundary transect that crosses Wa in Ghana, Bobodioulasso in Burkina Faso and Sikasso in Mali. The transect is characterized by a generally intermediate level of food security (supply of calories per capita) but poor nutritional status (e.g. lowest national ratings in Mali) in spite of Mali and Ghana scoring relatively high overall among 187 countries in terms of dietary quality (Imamura et al., 2015).

The ASSAR research site in Mali is the Koutiala district (Sikasso region). Koutiala is known as the district of "white gold" in reference to the importance of cotton production as the main driver of the agriculture system and food production in the area. Rainfed cotton production started in this area at the end of the colonial period. Ninety percent of the district's population numbered at over 575,000 people according to the census in 2009 is involved in cotton production. The intensive production of cotton, combined with population growth and climate risks have resulted in the degradation of land and other natural resources such as forests, water sources and grazing areas.

More than a cash crop, cotton production is critical for food production. In Mali until now, fertilizers have been subsidized for cotton, maize and rice, but not for other cereal crops, which are also widely grown alongside cotton. Therefore, the membership in cotton cooperatives is considered by farmers to be a strategy for accessing subsidized inputs for crops that are not covered by the subsidy policy. The central role of farmers' cooperatives in addressing agricultural challenges including access to improved inputs and management of natural resources makes the three case-studies presented here a relevant entry point to diagnose how institutions work, in practice, around the production dimension of food security.



4.2. Research design

A qualitative multi-scale comparative design (Lawrence et al., 2002) has been combined with an in depth analysis of three case studies of the following institutional arrangements: farmers' cooperatives, the seed system and the local convention for the management of forest resources. Selected techniques including collective-choice arrangements, monitoring, and conflict resolution mechanisms from the design principle (Ostrom, 1990) are combined with institutional logics to analyze the three institutional arrangements. The collective choice arrangement relates to the extent to which individuals affected by the institutional arrangement are authorized to participate in making and modifying their rules. The monitoring refers to the level of trust and reciprocity among appropriators of institutional arrangements to keep levels of rule-breaking down. Conflict resolution refers to the question of how appropriate the institutional arrangement is in terms of rapid, low-cost, local conflict resolution among users or between users and officials (Ostrom, 2009).

Mediated by different institutional logics, namely the top-down and the local accountabilities logics, the three cases have been selected to cover the interlinked social and biophysical dimensions of agricultural production, including farmers' organizations, the seed system and the management of natural resources. Koutiala has been named as one of the most vulnerable districts in Mali to climatic and non-climatic risks due the negative implications of the long history of cotton production in combination with population growth (Dietz et al., 2006). Mpessoba, the national hotspot in terms of degradation of natural resources, is located in the district of Koutiala (Ellis-Jones et al., 2014).

The research presented here combines various sources of data collected at different stages of the project, including semi-structured interviews carried out in the course of a scoping phase of 3 weeks, which was conducted in 5 villages. Over the scoping phase, 26 focus group meetings involving 150 farmers were conducted to identify major challenges that face the communities. The scoping phase was intended to embed the research in key issues of concern for the population. It identified the governance and institutional challenges around farmer cooperatives, the seed system and the management of natural resources as some of the major concerns in the district.

Following the scoping phase, twelve more focus group discussions, and 63 semi-structured interviews and informal discussions helped to lend greater contextual detail to the three cases. These data were enriched with information collected during previous fieldwork in July 2015 and October 2016. The data focuses on perceptions and decision making processes in uncertain conditions of food security. Interviews were digitally recorded with permission of the interviewees. The recordings were transcribed and transcriptions were thematically analyzed through coding.

5. Findings

5.1. The institutional arrangement around farmers' organizations

The history of farmers' organizations (FO) stems from the colonial period. These organizations were originally promoted to facilitate local communities' access to extension services. FO were developed from the traditional forms called "*tons*" which were the foundation of the social organization and the repository of the village authority. Groups were organized along socially defined lines including women, youth, and hunters, and endowed with tasks of performing collective, socio-cultural actions and securing the village against aggressions (Droy et al., 2012).

Following Malian independence, socialist ideology inspired the post-independence government to adopt so-called "*cooperativisation*" of production based on household membership. Farmers' groups were then established around specific tasks of collective interests such as mutual support in farming activities, marketing, and fighting against bush fires in the villages. Over time, these organizational forms were manipulated by elites for as channels for political messages (Bratton, 1990). Such an intermingling of farmers' organizations and specific political agendas resulted in tensions and the abandonment of farmer organizations by many people who were unhappy with the political undercurrents.

After being rebutted by the second republic after the coup in 1968, farmers' cooperatives gained momentum in the 80 s with the liberalized economic policy. Production and household-based membership to village organizations called "*Associations villageoises*" were created to encompass collective interests and to establish trust between cotton farmers and extension officers. However, in this new system, extension officers were accused of cheating on the cotton weight as well as the production inputs and cotton revenues (Droy et al., 2012; Girard et al., 2008). Resulting frustration led to many farmers dropping from cotton production altogether. To prevent a spillover effect of farmer exit, structural reforms were implemented in the village associations. Village associations were then tasked with keeping records of the amount of inputs distributed, weighing cotton production, and recovering credits after selling the cotton production. Though they have no lawful status, farmers' associations took the responsibility of ensuring the trade of cotton, the distribution of inputs, and the diffusion of technical advice to members.

In 1988, new reforms were introduced to enable the establishment of "*Ton villageois*", but different from the traditional social groups. *Ton villageois* became an umbrella for several village associations, created in a location controlled by both the cotton company and the Office du Niger, the management body of the rice irrigation scheme, around the Markala dam.

Table 1
Evolution from traditional Associations Villageoises to Cooperatives.

Events	Organizational forms
2010 (Harmonization of business rights – OHADA-and endorsement by the government)	*"Societés Coopératives des Producteurs de Coton* (SCPC)"
2001 (New cooperative Law enacted)	– Formalised entities guided by the OHADA regulation – Many SCPC in the same village. SCPC formed based on members' ability to work together. – Existence of a form of social guarantee known as the *caution solidaire* in which all the SCPC members are held responsible for re-payment of loans and inputs
1988 (Structural adjustment reforms)	"*Ton villageois*" – Inspired from the traditional groups, but one *Ton* at the village level – Village based membership group organized around cotton
1980 (Emergence of liberalized economic policy)	*"Associations villageoises"* – Household-based membership and groups organized around cotton production – Many *"Associations villageoises"* coexisted in the same village
1968 (Political coup and rejection of socialist regime)	Failure of collective interest groups and break-down of "*Cooperativisation"*
1960 (Independence)	"*Cooperativisation"* – Inspired from the socialist ideology. – One "Cooperative" for each village – The group is based on household membership. – Farmers' groups were established around specific tasks of collective interests (mutual support in farming activities, marketing, and fight against bush fire)
Before **1960**	*"Tons"* – Traditional groups organized around social groups (women, youth, and hunters) – Many "tons" co-existed in the same village – Groups were endowed with tasks of collective interest (socio-cultural actions and securing the village against aggressions)

In 2001, things changed again when a new national cooperative law was enacted to provide a juridical status to all cooperatives. Today, the current forms of cooperatives called *Societés Cooperatives des Producteurs de Coton* (SCPC) are resulting from that law. These cooperatives were tasked with the role of ensuring the distribution of inputs for cotton and cereal crops among members. They also collect the cotton produced by members and channel it to the cotton company. Further, they are responsible for the management of input credits for their members. These reforms were pushed for by the International Labor Organization (ILO) and implemented in the framework of the production systems improvement program called *Programme d'Amélioration des Systèmes d'Exploitation* (PASE) with the anticipation of creating a more conducive regulatory environment for the autonomy and accountability of producers. Beyond the shift from *Associations Villageoises (AV)* to cooperatives, the PASE also introduced the idea of an inter-profession umbrella organization endowed with economic and extension service functions oriented toward all agriculture commodity chains.

In the meantime, in 2010 the uniform act of the Organization for the Harmonization of Business Rights in Africa (OHADA) was endorsed by the Malian government. The OHADA act overrules the national cooperative laws, and as a consequence, all forms of farmers' organizations in Mali were required to harmonize their bylaws and functioning with the OHADA act by May 2013. This harmonization was one the prerequisites presumed to make farmers' organizations eligible for institutional supports such as public funding. One farmer who is still member of the SCPC offers his view of this top-down process when he states: "*we were not involved in the advent of cooperatives, they have been imposed by the law and we are victims of a situation over which we have no control. Nobody asked our point of view before the advent of cooperatives*".

The trajectory of the organization around cotton, from traditional Associations Villageoises to Cooperatives is captured in Table 1.

According to farmers, the shift from *Associations Villageoises* to cooperatives did not materialize in practice at all. Respondents argue that the written regulation of the cooperatives in French is problematic because many farmers do not read in French. Further, in practice, they see no difference between the routines of the newly created cooperatives and the former village association. A cotton farmer from N'Goutjina stated: "*Though at odds with the provisions of the cooperative's bylaw; the selection of the members of the steering committee as well as the duration of their terms in duty are still inspired by the practices and routines based on trust that have prevailed in the former village associations"*. In other words, rather than being elected, members of the steering committee are designated by influential members in the village. In addition, despite the roles being well defined in the bylaws, the secretary of the cooperative is still carrying out several functions outside his mandate, which is not recognized in the official cooperative structure. The terms of the steering committee is not renewed and for many members exceeds the 3-year term defined in the bylaws. Some members of the cooperative in N'Goutjina are reported to be in place since its inception in 2006.

However, previously organized by the cotton company, the members of the cooperative seem happy to be fully entrusted with the responsibility of organizing the trade of cotton to the company, including the provision and the management of input credits and the distribution of cotton revenues. As stated by a cooperative member: '*We are no longer cheated with the weight of our production and we feel no pressure from extension officers for the repayment of credits.*' Respondents agree that the management of collective funds has improved. The resources of the cooperative coming from members' contributions are now kept in accounts opened at the agriculture bank rather than being kept with the secretary. According to respondents this prevents the cooperative from the misuse of the resources by the secretaries as was the case previously in the village association. The withdrawal of funds from the accounts requires the signature of 3 members. It is therefore recognized that the management of funds has improved in the cooperative compared to the VA form. The contribution of the cooperatives to the development of the community, including through infrastructure construction, is also acknowledged with some reservations.

Tensions do exist though, between cooperative leaders and traditional authorities. Some farmer leaders are blamed for using cooperative investments meant for infrastructure and village development for their personal promotion in spite of the guidance of the traditional authorities. This practice is rebuked by many interview respondents as they believe it results in more interference of the cooperative members in village decision making and the erosion of the village institutional authorities.

Some respondents also report the degradation of the inter- and intra-household social cohesion, and the traditional mutual support among villagers. The binding liability, one of the rationales of the cooperative, did not produce the expected outcomes. This is the process through which all the cooperative members are held responsible for repayment of loans, and is blamed for degrading social cohesion. It obligates the better-off farmers to pay the credits for the poor ones. *"This resulted in several cooperatives collapse"* explained several respondents. *"In surviving cooperatives, the individualistic interests are taking over at the cost of the collective interest which is one of the alleged rationales of the cooperatives"*, one respondent goes on to explain: *"Those who fail to pay their credits for inputs and equipment run the risk of being brought to court."* One farmer who was subject to this process commented on the time consuming nature of the juridical procedures and explained that he was called upon in a very difficult, high-workload period for a farmer. He states the following: *"I ended up by calling upon a brother living in Bamako to repay the credit to save my agriculture season. He advised me to leave the cooperative but I cannot as I have no other option to easily access subsidized fertilizers"*.

The tensions emerging from these situations are jeopardizing the mutual support in the village. According to respondents, those who own enough equipment and animals are no longer helping the most vulnerable, ill-equipped farmers. They report that the trust between villagers is fading away. They argue that it is becoming harder for the most vulnerable people to fall back on the generosity that allowed better-off farmers to loan or gift some cereal grains or credit to poor farmers who faced food shortage. The form of social guarantee constituted in the binding liability supposed to help the poor farmers access the basic agriculture equipment by credit is therefore quite controversial. The reluctance of getting these credits paid back by the better-off farmers is causing the cooperative to step back from this commitment. The access to credit is limited for poor farmers. According to some farmers, including the one who was brought to court, "*as they have no other alternatives, they stay members mainly to benefit from the inputs, including subsidized fertilizers for their cereal plots which they cannot afford otherwise"*.

Despite the degradation of the social cohesion within the villages, the workers of the cotton company have different opinions about the implications of the shift. All respondents from the company enthusiastically believe that the shift from VA to cooperatives has improved the finances of the company. They report having achieved the objective of full repayment of the credits owing to the binding liability in comparison with the period of the VA during which their credits constantly suffered backlog. Furthermore, they believe that farmers are happy as there is no longer pressure from the extension officers for the repayment of credits, all being handled now within the SCPC. When the company purchases the cotton production of one village, credits are deducted from the village revenue; the rest of the funds are managed by the cooperative members. In this way, in spite of the grievances the cooperatives are recognized to contribute to the development of the village.

5.2. The institutional arrangements around the seed system

In Mali, seed production, distribution and use are regulated by the new agricultural development framework – *Loi d'Orientation Agricole* – enacted in 2006 to promote sustainable and competitive agriculture. Following the seed regulation, only certified seeds are qualified for sale. The certification gives official endorsement of the seed meeting the national requirements in terms of germination rate and testing dates. This seed regulation aims to ensure farmers' access to high quality seed and therefore to increase agricultural productivity and food security.

However, in spite of the seemingly helpful seed regulation, the majority of farmers continue to rely on their traditional seed. More than 80% of the seed used still comes from the "unregulated" traditional seed systems (Diakité et al., 2017). Farmers' associations find the certification process onerous and expensive. According to the estimates by the national farmers' associations in Mali (AOPP) the certification of one ton of sorghum seed, for instance, costs on average CFA 85,000 (Euro 130) for both field inspections and laboratory operations. The seed certification facilities are based in Bamako, the capital city. The farther the production area from Bamako, the more costs the certification incurs. In this regard, although farmers register as seed producers, they often continue to sell their seeds via informal networks with no quality control, which affects the crop yields and undermines the effort to promote improved varieties and to adapt to the changing agricultural conditions (Van Mele and Guéi, 2011).

To help deal with these challenges, private seed companies have recently emerged and begun partnering with farmer associations (Sanyang et al., 2016). The seed companies pay for the seed production and certification costs and purchase the resulting seeds from farmers. The challenge these arrangements face is that the agreement between seed producers and private companies restricts direct sale between seed producers and individual farmers. At the same time, the seed companies sell the certified seeds at a relatively higher price than most smallholder farmers can afford. Furthermore, with this arrangement in which seed enterprises are playing the intermediary role between seed producers and users, the producers neither have contact with the seed market nor cannot develop the necessary skills and knowledge to properly market their seeds (e.g., determining the market's preference, developing mechanisms of price formation, and strategies of advertising, packaging and branding).

In general, although the seed regulation was enacted to facilitate farmers' access to high quality seeds, the gaps between the seed regulation and the local conditions in which farmers operate hinder the implementation of the regulation and prevent the majority of farmers from access to improved seed, therefore creating unintended negative impacts on their production and food security.

5.3. The institutional arrangement around natural resource management

The first democratic government in 1991 adopted the decentralized governance system and transferred executive mandate (decision power) over natural resources to local communities. Local conventions for the management of natural resources became part of the institutional setting at the community level.

The local convention, according to respondents, has been established after the villagers realized that because of the depletion of resources, the distance to access firewood has become longer and unbearable for women alongside the erratic rainfall they attribute to that depletion. In this regard, the village N'Goutjina set local rules, which imposed a 10-month ban on the logging of woods in the forest. During the remaining two months of the year, women are allowed to fetch a volume of firewood which amounts to 4 loads of a donkey-cart. According to the head of the committee, the regulation, which is inspired from their traditional rules for the management of natural resources, aims at maintaining the contribution of natural resources, which he believes is closely related to agriculture production and food security. A committee including men and women selected within the community is in place to ensure that people enforce the regulation. Violators are expected to pay a fine of FCFA 20000 (Euro 30.5), a goat and a rooster. According to respondents, the local convention established for 5 years is working quite well so far. A lead member of the surveillance committee states the following: "*everybody shows understanding towards this regulation, as it has been collectively agreed upon. As you know, the development of the local convention is inclusive. So far we did not even resort yet to the fine which is used just as dissuasive tool"*.

A member of the community confirms that local conventions resonate better with local conditions compared to the national regulations relating to forest, which are enforced and commonly misused by the forest officers. '*They systematically impose fine to all firewood even those collected from dead trees. We do not understand what kind of regulation is*

Table 2
Comparative table of the three institutional arrangements.

Variables	National cooperative law	National seed law	Local convention for the management of natural resources
Institutional logics	Top-down; Condition eligibility for public support	Top-down; National accountability for farmers' access to high quality seed and increased agricultural productivity and food security.	Local accountability and awareness of the depletion of Natural resources
Collective-choice arrangement (individuals affected by the institutional arrangement are authorized to participate in making and modifying their rules)	Low	Low	High
Monitoring (level of trust and reciprocity among appropriators of institutional arrangement to keep rule-breaking levels down)	High	High	High
Conflict resolution mechanisms (rapid, low-cost, local arenas to resolve conflict among users or between users and officials)	None	None	None
Achieved outcomes	Coop responsible for trade of cotton products and village development but Degradation of the intra- and inter-household cohesion and mutual support Tension between coop. members and village authority	Onerous and expensive seed certification system Seed certification facilities only in Bamako Seeds sold via traditional and informal system with no quality control	Seems to resonate with the community, but, although unenforced a fine on those who bypass the rules is challenged by the forest officers

that'.

The process for developing a local convention brought together the community members and extension officers from decentralized public services, including from the forest service. However, not every participant in the process agrees with the local convention. The district officer working for the forest service finds the fines for violators to be illegal. According to him, "*only the state has the power to impose fines on a contravener to the rules*".

Overall, the decentralization of governance requires the transfer of public mandate to local communities. Though local communities seem more comfortable with the local conventions, tension still persists around the effective implementation of these local institutions. Table 2 provides a comparison of the three cases, with regards to the selected variables.

6. Discussion

The three case studies used to create an enabling environment for enhancing food production have been analyzed to explore how institution works in practice. In line with the institutional bricolage perspective, the three institutional arrangements prompted different reactions among stakeholders. Looked at from the scale perspective, both the top-down driven arrangements, including farmers cooperatives and seed regulation and the institutional arrangement inclusively crafted at the local level around the management of natural resources, exhibit both imperfections and benefits. As imperfections raise the question of effectiveness and sustainability, the diversity of the three case studies provides an opportunity for analyzing what different institutional logics are good at. The institutional diagnostic conducted with the top-down logic to elicit central regulations for farmers' access to services and inputs proved imperfect. The logic of the Cooperative Law is to facilitate the access of farmers' organizations to institutional supports. It assumes that trust and transparency are required for farmer cooperatives to be able to capture the existing opportunities, including access to funds and governmental supports. It was assumed that elected control bodies should be in place to make this change happened. The findings show however, that members of the control committee are selected by influential leaders, instead of being elected. In addition, the bylaws of the cooperative set a three-year term for the control committee, but in practice, the term of the steering committee has never been renewed. Hence, the trust building and the control rationale of the reforms have been slightly undermined and re-adjusted, which can be seen as a form of passive articulation.

Moreover, with the newly introduced regulation, the members of the cooperatives have more control over the cotton sector, which improves the transparency in management of collective resources. It has been widely acknowledged that the poor management of farmers associations was one of the major challenges that hindered cotton production in many West African countries (Sinzogan et al., 2007; Bingen, 1998). The new regulation introduced in the cooperatives after 2001 aimed at improving the resource management. For instance, the withdrawal of funds from the cooperative accounts requires at least the approval of 3 members. This new arrangement has also improved the relationship between farmers' organizations and the cotton companies. Informal discussions with company workers indicated that, for many of them, the shift from *"Associations villageoises"* to cooperatives has improved the finances of the cotton company and strengthened trust between farmers' organizations and cotton companies. The interviews also show that cooperative members seem to be happy with the management. This substantiates that an aggregation and alteration of the institutional arrangement around farmers 'cooperatives is taking place as they are quite adapted to the sociocultural context. The bricolage aspect of aggregation is also reflected in the cooperative rules. Cooperative members adhered to the principles of the new rules, which improve resource management. Of course, farmers' leaders who took profit from the old rules might not be happy, but the new regulation seems strong enough to impose a better management as reported during the fieldwork.

The Cooperative Law, in many ways, has also stimulated the alteration of relationships among community members. The research shows that the introduction of new regulation has created tension between individual interests and collective support. The cooperative rules to some extent, challenge the social cohesion. They give the opportunity to individual farmers to select the community members with whom

they have ability to work together. This new structure was designed to guarantee the repayment of loans and inputs. On one side, vulnerable farmers tend to believe that the cooperative makes them most vulnerable, since investments in collective interest such as building social infrastructures is no longer a priority. Also, this arrangement has excluded some farmers, who can no longer benefit from the collective liability for access to production inputs. In this regard, both aggregation and alteration aspects of bricolage play out. On the other side, most farmers find themselves relieved from the pressure that was exercised on them from the cotton companies to recover the inputs credits. The cotton companies are also satisfied with the management of the input credits. All the actors concur with the fact that the management of the inputs credit and the marketing of cotton is now under the responsibility of cotton farmers. In addition, there is a recognition of the transparent use of cooperative resources. Therefore, despite the grievances towards the arrangement of cooperatives, there are still at place with most farmers remaining as members.

In the seed regulation, farmers can only produce and sell seed after certification, but as they cannot afford the certification cost, they found the alternative to bypass the regulation by contracting with seed companies to supply a stated amount of raw material against a guarantee of purchase. The company has provided the contracted farmers with the seed of high yielding varieties, fertilizer, and connect with the seed officers for certification. The seed regulation has been navigated and tweaked to fit with farmes' capacity and conditions. Since they were not able to afford the certification cost themselves, they looked for alternative and this bricolage practice of alteration helped seed producers to explore new options for their local production.

Some seed farmers also save part of their production, and against the formal seed regulation, sell it locally to their peers. They do so, because the certified seed is hardly available at the village level and the price of certified seed is relatively higher than the traditional seed. Although the national seed regulation is accepted with the establishment of a new form of collaboration with seed companies, farmers also resisted to accept the rule because of the high cost of the certification process. While the national seed regulation intended to limit the use of traditional seeds, many farmers are still using them. Therefore, both the aggregation and the articulation forms of bricolage are reproduced.

The locally designed regulation for the management of natural resources also exemplifies the imperfection of institutional diagnostics and logics that the locally designed regulation would help to reduce the pressure on the natural resource. The rules based on the local conventions are both an aggregation and an alteration of the polycentric decentralization process in Mali. On one side, community members are allowed to play the key role in the management of local resources. On the other side, the enforcement of a fine on those who bypass the rules is challenged by the forest officers who think this level of governance lies with the state. The community members think the local rules resonate better with their culture and expectations compared to the national regulations, believed to be designed without knowledge of the context in which they are supposed to be applied. It is not clear however whether the rules resonate with local culture because they are good, or because of a lack of enforcement. The interviews show they did not resort yet to the fine. That begs the question of what could happen if the fine is operationalized. As the response to this question remains to be seen, it is difficult to conclude about the sustainability and the effectiveness of local rules and the way they could inform the national institutional mechanisms and governance of natural resources.

Overall, each case of institutional arrangement combines different dimensions of bricolage suggesting positive and negative sides (Table 2). The questions remains of what could be learnt from the three cases in terms of diagnosing institutions. Whether accepted in the form of aggregation or alteration or rejected in the form of articulation, the three institutional arrangements share the characteristic of stimulating the debate about what institutions are good at.

The positive and negative outcomes visible in the institutional arrangements substantiate Anderson and Ostrom's view, in their analysis of decentralized resources regimes, that imperfections may exist at any level of governance (Ostrom, 2009). In such conditions, the scalar institutional diagnostics that precede the release of new rules and regulations are flawed and may result in institutions that conflict with different contexts. This also suggests that each institutional logic is therefore good at revealing its own pitfalls once put into praxis. In this regard, we argue that rules do not exist in a vacuum and are then difficult to be fully diagnosed with only the partial picture of the context in which they are used. They make sense only when put into practice. Regardless of the scale from which new institutions are introduced, in the context of polycentric governance, the institutions and institutional diagnostics and subsequent logics are good at providing raw material to be refined in the process of institutional bricolage. Therefore, regardless of from where grievances are voiced, institutional bricolage provides a framework for creating more appropriate institutional arrangements by bringing corrective measures to imperfect institutional diagnostics. This suggests the need for a flexible mindset and behavior from development practitioners. Rather than focusing solely on outputs and immediate results to craft a new institutional arrangement there is need to learn from the outcomes and long-term sustainability embodied in the problem-solving, process-driven genesis of existing institutions (Herbel et al., 2012). Farmers' organizations, as well as the seed law and the natural resources management rules were crafted to address practical problems communities are facing. We therefore argue that the different institutional logics could synergize through flexible *process driven* mechanisms. In this regard, national and district level actors can proactively engage in collaborative institutional bricolage with local actors gathering around contextualized needs and problem-solving capacities. From this proactive institutional bricolage around praxis (Hounkonnou et al., 2012; Nederlof and Pyburn, 2012), cross-scalar institutional logics will likely emerge to form what Lawrence refers to as proto-institutions. These may become fully fledged institutions as the collaboration matures across scales (Lawrence et al., 2002). We therefore share the hope that shifting the focus to the flexible practical work of actors will help lead to an easier and more compelling translation of institutional ideas into non-academic discourses (Leca, 2009).

7. Conclusion

The three cases resulted from different logics. The topdown arrangement was based on the assumption that creating conditions that facilitate farmers access to agricultural services and inputs would enhance food production. The bottom up approach was used by community members to design local rules for managing natural resources. While the topdown approach faced grievances from local community members, the bottom up arrangement failed to support changes beyond community boundaries and generated tension with public officials. In general, whether the regulation was designed at national or local level, neither were fully accepted by users. The controversies around these institutional arrangements show that both approaches failed to consider either agency of local players or the national guiding principles. This indicates that institutions cannot be effective when proposed by high level actors who assume to know enough about local communities' needs and conditions to design rules for them. Likewise, bottom up approaches designed from within a particular local context are unlikely to achieve management goals for a much larger scale without broader organizational structure. Overall, the institutional diagnostic is likely incomplete when conducted at one scale in isolation from social embeddedness of other scales. The study highlights the need for integrated top-down and bottom-up planning approaches to support effective institutions that work across scales.

The research also shows that a single institutional diagnostic cannot capture all reality with one sequence. The diagnostic should therefore be an ongoing and iterative process which may require long term investigation with multiple sources to cross-check and provide a deep

understanding of historical, political, and social contexts that all play a role in institutional mechanisms.

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