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Embeddedness as a form of governance: Examining relationships among substantive seed economies in West Africa

Polanyi's conceptual work on substantive economics laid the foundation for the notion of disembeddedness, a specific form of economic activity in which the organizing principle of efficiency trumps other social principles that organize systems to meet material needs. Re-embeddedness has been used as a characterization of many contemporary movements away from neoliberal and self-regulating markets, but less analysis has been done of economic and social arrangements that have persisted in and adapted their embedded nature to the pressures of the global, formal economic system. In this paper, I apply Polanyi's substantive economic framework to the case of contemporary seed systems in Sahelian West Africa, which over the past five years have been the focus of value-chain oriented development strategies by international development actors. Using primary, qualitative and spatial data, I identify the organizing principles of traditional and adapting seed systems in the region, and highlight the social or economic value of the seed that is made manifest in each system. The persistence of systems that validate social and non-commodity economic value suggests that economies do not necessarily have to become dis-embedded before re-embedding in response to the formal economic system. When individuals choose to engage with both embedded and re-embedded systems, and formal market structures, tension has the potential to give way to hybridity and inclusive growth.

Introduction and Background

Contemporary economic sociology and related disciplines have over the past three decades wrestled with the notion of embeddedness, and how its origins in Polanyi's *The Great Transformation* (1944) can be understood in the context of that work and subsequent uses of the concept. The basic concept, that the capitalistic impetus to accumulation and acontextual, singular efficiency shifts economic systems from being embedded within and conditioned by social systems, to being the systemic foundation for all non-economic social and political systems, builds on Marxian analyses of capitalism and applies them to the industrial, mercantile period of the late 19th and early 20th century. Granovetter's (1985) revival of the notion of embeddedness, in the context of renewed interest by economists in the social institutions that structure economic activity and by sociologists in the ongoing contradictions in capitalistic development, opened the door for both broad use of the term and much critique. As theoretical constructs, embeddedness and disembeddedness operate as ideal-type bookends

to a spectrum of configurations of social and economic institutions, governance structures and political systems (see Block, 1990; Hess, 2004). As an analytical tool, however, the concept of embeddedness is often used (and often critiqued for being used) as a simple binary: a given economic system is either embedded or disembedded. More recently, the category of re-embedded has been added to help explain the renewed interest in localized, adaptive economic systems that put limits on, for example, what can be sold in a marketplace, from how far goods can travel, and even what forms of currency are acceptable.

Social science studies of changing agri-food systems have over the past decade drawn heavily on notions of disembeddedness and re-embeddedness to explain the global food system and efforts to relocalized food production and consumption. These analyses have been focused on phenomena in the context of developed countries, where capitalistic forces are critiqued for having generated a globalized, exploitative agri-food system (see Friedmann and McMichael, 1989; Busch and Bain, 2004). Hinrichs (2000) and Goodman and DuPuis (2002), for example, analyze the emergence of farmers' markets and community supported agriculture as two approaches to re-embedding the producer-consumer relationship in food systems. Bowen (2010) and Wright and Middendorf (2008) identify various types of hybrid market mechanisms, including place-identified products and Fair Trade certifications, as a symbolic, rather than geographic, re-incorporation of non-economic values into economic transactions. By identifying the problem (disembeddedness) and the goal (re-embeddedness), these studies and many others have provided conceptual tools and shared language for theorists and practitioners working to build alternative food movements and systems. There is a gap in the literature, however, about how changes in the global agri-food system have affected communities and societies that have not necessarily 'converted' to capitalistic agricultural production and consumption. Understanding how contemporary agrarian societies, mostly in the developing world, are responding to the impetus to disembeddedness has the potential to provide similar symbolic support for global agri-food movements, like those for food sovereignty and agro-ecology.

Understanding how non-capitalist agrarian communities relate to disembedding forces is doubly important in the context of international agricultural development. Not only are global economic systems pushing national governments toward an agricultural model that reflects neoliberal ideals, but development projects at a variety of scales have increasingly adopted a more localized approach to incorporating neoliberal goals into agri-food systems. Busch's (2010) analysis of agrarian change throughout the neoliberal period explains the emergence of the sustainable value chain approach: by cutting any social concerns out of economic systems and market activity, neoliberalism's association of economic freedom with social or political freedom created space for experimentation and innovation with the neoliberal paradigm. One result of the differentiated social effects of full neoliberal economic systems, as well as the innovation process in response to those negative impacts, is evident in contemporary articulations of market-oriented sustainable development and value chains that incorporate smallholder farmers (see for example Marsden et al., 2000). Vorley et al.'s (2006) assessment of value chains as potentially regoverning markets implies that value chains could theoretically be organized by principles other than economic efficiency. Colloquially and in

practice, however, value chains respond and reform in relation to specific social and natural contexts while still reflecting organizational principles of economic efficiency. In other words, social systems (and the values upon around which they are organized) can be embedded within the economic system, but only insofar as those values do not challenge efficiency.

Critical economic sociology in the classical vein of Marx, Harvey and everyone in between (including much of Polanyi's work) views the embedded/disembedded binary as a necessary tool for resisting the totalizing forces of economic efficiency that guide social values into economic structures; from this point of view, sustainable value chains are only the most recent in a long time of co-optation. Engagement with a market economy, the thinking goes, will require a shift to a market society (Polanyi, 1944). However, Polanyi (1957) offers an alternative conceptualization of the relationships between social and economic systems that allows for more variation in interaction and interconnection. Substantive economics "derives from man's dependence for his living upon nature and his fellows. It refers to the interchange with his natural and social environment, in so far as this results in supplying him with the means of material want satisfaction" (Polanyi, 1957: 243). Efficient, profit-maximizing economic systems, and the social systems that support them, are only one of several forms of economic activity (that is, activity undertaken to meet material need) categorized within the framework of substantive economics. Crucial to this definition of economic is the argument that the type of activities (and systems necessary to support them) taken to meet material needs will be structured by different social and societal orientations – toward communal care, for example, or equitable redistribution of scarce resources. Combining a theoretical understanding of substantive economics with the concept of embeddedness helps to move forward the conversation about how to use embeddedness as an analytical tool for understanding alternative economic systems.

In this paper, I argue that by combining Polanyi's notions of substantive economics and embeddedness, we can move beyond both the binary categories and the historicism of the pre-market/market economic systems, a move which is necessary in contemporary age of creative destruction within the global neoliberal system (Harvey, 2006; Busch, 2010). I use as an analytical example, the development of seed value chains in the Sahelian West African countries of Mali, Niger and Burkina Faso. Over the past five years, market-oriented approaches to seed system development have emphasized the establishment or expansion of formal seed markets and private seed enterprises to disseminate improved varieties of sorghum and pearl millet, local cereal grains not included in previous agro-input market development. In addition, seeds of local grains have not historically been considered economic goods – seeds are not something to be sold (Smale et al., 2008). Because of the social role played by seeds, the shift toward formal seed markets challenges the existing configurations of seed systems, and provides an important case study of how peasant agriculture adapts to and incorporates new economic and agronomic realities into existing seed systems. The data presented here are qualitative and visual, and present an analytical picture of the emergence of several distinct seeds systems that are interconnected and relational but not subservient to the market-oriented seed value chain that is the emphasis of major development efforts in the region.

Substantive economics and embeddedness

As has been well-documented, Polanyi's use of the term 'embeddedness,' as an analytical tool was brief and limited to a few key passages in *The Great Transformation* (1944), and later in *Trade and Market in the Early Empires* (1957) (Krippner, 2001; Hess, 2004; Randles, 2004). However, as a theoretical concept, the bookends of embeddedness and disembeddedness are often invoked in Polanyi's writing about the social construction and meaning of economic institutions. Block (1990; 2003) calls this the "market dialectic," a turn of phrase that helps explain the reification of the analytical categories (2003: 296). Polanyi himself, however, offers an alternative approach to analyzing embeddedness through his articulation of substantive economics. Substantive economies are systems of exchange to meet material needs that can be organized by a range of goals conditioned by social values, like reciprocity or redistribution. In other words, the value associated with the economic exchange is no longer necessarily defined by individual utility maximization or rational efficiency.

Substantive economies are instituted by patterns over time of individual actions that are organized around a consistent, context- specific social or economic goal. The reframing offered by a substantive definition of economics addresses the limitations of past economic sociology, described by Granovetter (2002) as methodological individualism in negative response to formal economic assumptions. By seeing the economy as an "instituted process of interaction between man and his environment" (Polanyi, 1957: 248), analysis of embeddedness can explicitly characterize relationships among social mores, political structures, natural environments and economic activity. Polanyi (1957) describes the instituting of economic process in terms that border on structural-functionalism, but his emphasis is not on the instrumental outcome of the economic structures that are instituted. Instead, his view of substantive economic analysis keeps primary attention on the ongoing interaction between individuals, the natural setting, and both economic and non-economic social institutions. At heart, substantive economics is an interpretive rather than instrumental approach to understanding how and why individuals and communities come to certain arrangements to meet their material needs. The notion of the economy as embedded in the social system derives from Polanyian notion of "instituted process;" because the economy is instituted by and among individuals, it reflects their entire experiential reality and will both influence and be influenced by the non-economic social world and the natural environment.

Contemporary critiques of Polanyi's articulations of the relationship between economic activity and non-economic social systems argue that the application of the theory of substantive economy can easily lead to oversocialized hypotheses about the influences of human activity, much like classical economic theory posits an undersocialized version of individual action (Granovetter, 1985). However, the analytical frame enumerated in original descriptions of substantive economics suggests that economic systems must be analyzed on multiple scales and not take for granted the relationships between economic and non-economic social institutions. Hopkins (1957) overviews the three aspects of economic systems that can be characterized in substantive economic analysis: the movement of means to meet material wants (process), the patterns through which actions are integrated

(institutionalization), and the degree of embeddedness. Measuring or characterizing economic embeddedness creates a methodological challenge that is too often met with overly simplistic heuristics about how fully free markets are or the incorporation of social and ecological externalities into market prices. Hopkins (1957) reminds us that centrally planned economies are just as disembedded as fully rational market economic models, which shifts the dichotomous, idealistic view of rational market economics as fully disembedded and all other economic arrangements as fundamentally embedded. However, definitions and explanations of embeddedness remain elusive when operating within the framework of formal economics. Embeddedness comes to be synonymous with non-formal or substantive, which is clearly contrary to Polanyi's notion of substantive economics providing a unifying analytical approach rather than an either/or articulation for understanding economic activities.

Embeddedness as an analytical tool, then, can be conceptualized as the degree to which non-efficiency values put limits on efficient economic activities. There are degrees of embeddedness, or, as Block (1990) as described, degrees of marketization. In overviewing economies through history, Polanyi builds on Marx's (1978) observations of a metabolic and social rift that occurred when relationships among people, and between people and nature, were disrupted by economic activity predicated on individual gain rather than social support. Embeddedness is here defined as manifest when land and labor are not economic assets through which to maximize efficiency or profit, and instead where social and natural settings set the limits on how land and labor are used. Taken apart from Polanyi's extensive analysis of a range of societies and their economic institutions, this implicit definition of embeddedness could be read as overly reductionist in its description of society and economy. However, when incorporated into analyses that include all three dimensions of substantive economic analysis described by Hopkins (1957) and elaborated below, embeddedness becomes both a relational category and a theoretical abstraction made concrete by assessing the instituted process of economic activity in a specific setting.

Through his own analysis of economies ranging from ancient Greece to West African empires, as well as by drawing from anthropological descriptions of non-Western economies in the 20th century, Polanyi (1957) identifies specific types of economic process and patterns of instituting economic activities. Economic processes involve movement of some kind, either locational (through production and transport) or appropriative (the circulation and administration of goods). Appropriative processes are further differentiated as either transactions, between actors, or dispositions, one-sided actions based on custom or law that force indirect transactions (taxation and public spending is an example of a disposition). These processes, or actions to meet material wants, are instituted through patterns based on reciprocity, redistribution and/or exchange. Reciprocity and redistribution are defined and situated within social relationships, so that individual economic decisions occur within social institutions that provide the symmetry necessary for reciprocal relationships, on the one hand, or the social mores necessary to guide redistributive decisions on the other. The specific social institutions that create the possibility for substantive economies instituted through reciprocity or redistribution are varied in terms of their presence and influence in a given society. The generalized point Polanyi (1957) makes, however, is that economic processes like transactions

can be instituted not only through patterns of efficient or profit-maximizing exchange, which require price-setting markets as the primary institution, but also through relationships defined by social institutions like kinship groups.

The analytical intent of the substantive economic framework is to create space to uncover economic institutions at a variety of scales within social settings, in order to broaden the understanding of individual economic decision. Hopkins (1957) suggests that the three patterns of institution defined by Polanyi are not necessarily the only three abstract categories of social interactions that condition economies, creating a methodological opening for research and analysis at the individual, institutional and social scales. One contemporary example of such an interpretive dialectic analysis is Hart's (2010) articulation of informal economy, a subset of activities that generated its own institutions (often referred to as the "black market") within the broader framework of an economy based on formal market-exchange institutions. In exploring and applying Polanyian ideas of substantive economics to my own analysis of seed systems in Sahelian West Africa, I build on Polanyi's interpretive analytical approach by exploring the dialectical relationship between patterns of individual action and social institutions.

Research setting and methodology

Setting

Mali, Burkina Faso and Niger are located in the Sahelian region of West Africa, just south of the Sahara desert, where rainfall ranges from 300 mm to 1,000 mm annually (Jalloh et al., 2013). The rainy season lasts from late May to early October, though the season length and total rainfall can differ considerably from year to year. The legacy of French colonialism has had an impact on government and institutional structures, as well as on inequalities at the national and sub-national. Huillery (2009) analyzes the difference in colonial investments and contemporary economic well-being of several Francophone West African nations. She finds that Mali, Burkina Faso and Niger all had lower rates of financial and human resource investment than coastal Francophone countries, and that within countries, rural areas received less investment than urban areas. The nation-level inequalities are still apparent today, with the United Nations Human Development Index currently ranking these countries at the bottom of the global scale, with Mali at 182, Burkina Faso at 183 and Niger at 186 (out of 186) (UNDP, 2013).

Agricultural systems in Sahelian West Africa are shaped by characteristics of the natural and social settings, which create both constraints and opportunities. Because of the semi-arid climate and lack of irrigation for the vast majority of farmers in the region, agricultural production is limited in scope and diversity by rainfall. Local, native grains are sorghum, pearl millet, and fonio, which can produce even in the driest years. Pearl millet and sorghum are planted much more extensively than any other cereal crops, which is in part a testament to their adaptation throughout the region. Landraces make-up the vast majority of the area planted with pearl millet and sorghum; Alene et al. (2011) estimated that in 2011, less than 20%

of the area for either crop was planted with improved varieties. The improved varieties that are planted are almost entirely conventionally bred, open-pollinated varieties. This research project focuses on the downstream efforts of a participatory plant breeding (PPB) project that developed and is now disseminating these improved varieties through the sale of small quantities (mini-packets) of certified, packaged seeds (Weltzien et al., 2008). The mini-packet approach to seed dissemination included goals of increasing capacity in the formal, market-based seed system (see Sperling and McGuire, 2010, for distinctions in seed systems). However, implicit in the mini-packet strategy was the awareness that selling small quantities of seeds was a way to diffuse new improved varieties, which would then be incorporated into agricultural systems at the individual and community level in a variety of ways, including through informal seed systems that utilize saving and sharing.

Methodology

The analysis and findings presented in this paper are part of a broad, mixed methods research project that looks at the differentiated effects of market-based seed system development, as well as characteristics of the natural and social context that influence the organization of seed systems in Sahelian West Africa. The research question being asked and analyzed in this paper focuses on how and why farmers are choosing to incorporate improved variety seeds and seed sales (in other words, a market-based seed system) into their existing seed systems. Using as the unit of analysis individual farmers who used improved variety seeds at some time over the three-year period of 201-2013, I gathered qualitative data through semi-structured interviews as well as quantitative data through the interviews and the use of GPS technology. These farmers were further stratified into three categories – those that initial purchased seeds, those that initially received seeds through non-cash based exchanges, and those who accessed seeds while participating in PPB field trials. In semi-structured interviews, I asked questions of how farmers perceive their seed networks and markets – where they receive information and materials, how and why they access them, and what this access means to them in terms of their agricultural and social context. In addition, I asked specific questions of changes they have seen in information and seed sources, why those changes have come about, and how they have experienced them.

Analysis of the qualitative data used through thematic coding and 'horizontalization' of the data (Coffey and Atkinson, 1996; Creswell, 2007). Taking a phenomenological approach to qualitative data analysis, I use the approach of horizontal data analysis to identify and present as complete a range as possible of non-overlapping specific sentiments expressed by those I interviewed about both the context of and decisions about seed systems (Creswell, 2007). Therefore, the data are representative of a specific code or theme within the categories that I identified throughout the process of initial data analysis; the data are often not attributed to particular individuals because they are representative of a common experience expressed by several of those interviewed. Quantitative spatial data points (geographic coordinates of seed use) were analyzed using GIS software, and I created visualizations of these data that can then be connected to the qualitative analysis to provide both triangulation and further analytical power (see Figure 1 below). I start with the ideas of substantive economic systems to organize

codes related to experiences of different seed systems, motivations for seed access decisions, and the value associated with the output of improved variety seeds. I then continue within the interpretive phenomenological analytical approach, and lay out the breadth of experience and perceptions associated with improved variety seeds, in order to have as complete an understanding of the field of experience as possible (Creswell, 2007).

Substantive seed economies in the Sahel and relationships among them

When evaluated within the frame of formal, rational economics, the heterogeneity of seed systems in Sahelian West Africa can be characterized as more or less economically efficient, and points of inefficiency identified. Conversely, an overly simplified economic sociology can characterize these systems as embedded or disembedded These characterizations are not necessarily judgmental, but rather uses a heuristic derived from formal economic theory to improve social and economic systems seen to be less than optimal in terms of potential for meeting material needs. International agricultural development efforts have consistently sought out points of weakness in agricultural systems in order to improve efficiency and ultimately, to enhance food security. In many ways, the market-oriented sustainable development approach is more nuanced than previous approaches to agricultural development, as it seeks to incorporate social and natural context into the standardized formula of price-setting markets generating economic efficiency and therefore material well-being. There is recognition that social characteristics will affect individuals' ability to participate in markets, and an awareness of the differences across types of goods in terms of the appropriate speed and scale of market creation and integration. However, returning to Polanyi's (1957) distinction between formal and substantive economies, the formal economic heuristic described above assumes that economic efficiency is the basic goal of all systems that function to meet material needs.

In analyzing current points of contact and integration across distinct seed systems in Sahelian West Africa, I apply an interpretive substantive economic analysis to analyze how still-embedded systems interact with market forces. Contemporary discussions of peasant agriculture as an organizational form continue to ask the original agrarian question of if and how peasant systems persist in the current market-oriented global economy (McMichael, 1997; Birner and Resnick, 2010; van der Ploeg, 2010). The data analyzed and synthesized below suggest that peasant seed systems are changing to incorporate the formal market-oriented seed economy being instituted through many agricultural development projects, and that peasant seed systems maintain distinct patterns of decision-making on the basis of separate organizing principles. The analysis shows that embdedded seed systems persist and adapt even in the contemporary macro-economic climate that definitively emphasizes market-oriented development. Identifying these patterns of adaptation, and using spatial representation to identify how distinct systems relate to one another, contributes to critical understandings of the differentiated effects of the current dominant approaches to international agricultural development.

Categorizing and contextualizing organizing principles of Sahelian seed systems

Seeds are foundational both to agricultural production, as a primary input and basic material need, and to food security for rural families and communities. Because of the complex role that seeds play in agrarian society, seed systems share the common purpose of providing access to seeds, and are then organized by a specific principle relevant to social values and systems. Table 1 offers a categorization of the seed systems currently present in Sahelian West Africa, including the recently established formal seed markets that are part of a broader push for the development of sustainable seed value chains. Seed systems can be categorized as either provisioning or economic, based upon whether seeds are accessed through uni-directional activities (saving and sharing) or through exchanges of some type (see van der Ploeg, 2010, for discussion of provisioning). Provisioning seed systems provide seed access through non-exchange based interactions between individuals and the natural world, in the case of seed saving, or through social interactions between individuals; for example, seed gifts can reflect religious or familial responsibilities. Economic seed systems provide seed access through some type of exchange between individuals; these exchanges reflect the economic value associated with the output or production that comes from the seeds as inputs. Within both types of seed systems are separate configurations of access actions and values that reflect distinct organizing principles and combinations of influence from the social and natural setting.

Table1. Categorization of organizing principles and dimensions of Sahelian seed systems

Organizing principle	Type of system	Access actions	Seed types	Value of output
Stability	Provisioning	Saving	Local Creolized	Social value
Sufficiency	Provisioning	Gifting	Local Creolized	Social value
Parity (reciprocity)	Economic	Non-formal exchange Informal exchange Formal exchange	Local Creolized Improved	Use-value
Reasonable return (redistribution)	Economic	Non-formal exchange Informal exchange Formal exchange	Local Creolized Improved	Exchange-value
Utility maximization (efficient exchange)	Economic	Formal exchange	Improved	Commodity-value

Provisioning seed systems

Provisioning, as described by van der Ploeg (2010), was considered an autarkic action in an idealized past of agricultural independence and self-sufficiency, but for contemporary peasants provisioning systems reflect intentional decisions about how best to organize systems to meet their material needs. Polanyi (1977) makes a similar argument in describing the decision to orient toward self-support or householding as the privilege of farmers and households with enough accumulated knowledge and experience to reliably meet their material needs through provisioning activities. I identify two separate provisioning seed systems, based on principles of stability and sufficiency. Provisioning seed systems based on

stability are instituted by farmer seed saving activities – in other words, through individuals' interchanges with their natural environment. The social value associated with seeds in the stability-oriented provisioning seed system is influenced primarily by the natural environment, and reflects a habitus that reflects experiences of drought and environmental uncertainty. Provisioning seed systems based on sufficiency are instituted by seed gifts. Seed gifting is a non-exchange based social transaction because only one person receives something material (seeds) from the interaction, and because the value of the seed gift comes from a social setting that prioritizes community-level food security as a means of buffering against uncertainty in the natural and social (including economic) environment. Farmers' comments about the solidarity associated with seed gifts, as well as the adamant stance taken by some that seeds are not something to be either sold or exchanged, suggest a distinct habitus skilled by social history that connects individual well-being to communal well-being.

The analysis of provisioning seed systems as being constructive and intentional reflects related research findings that argue for peasant agriculture having context-appropriate time preferences (see for example, Moseley, 2001). In drought-prone areas, an organizing principle oriented toward stability could take a flat view of time by effectively only assuming the worst and making decisions based on the immediate future. Provisioning, however, is a dynamic process that requires the time necessary for farmers to incorporate experience and knowledge of new types of seeds or new access points into their systems. Table 1 identifies both local and creolized (second-generation improved) variety seeds as theoretically accessible through provisioning systems, with the implication that farmers will make calculations about reusing creolized seeds rather than repurchasing improved variety seeds. Skilling with new technology (Stone, 2004) occurs over several years, as farmers save and replant, and then make calculations about the following year based on experience with the new seeds.

Substantive economic seed systems

The economic seed systems categorized in Table 1 reflect Polanyi's (1957) description of substantive economies, within which a formal economic system based on profit-maximization and market exchanges for commodity-value of goods is only one possibility. Substantive seed economies involve some type of exchange between individuals, wherein both gain a material good, and where value and cost are determined by the organizing principle of the specific seed economy. The value of the output of seeds in substantive seed economies reflects the Marxian (1978) categories of use-value, exchange-value and commodity-value. I begin with the value orientation of substantive seed economies rather than the organizing principles to highlight the heterogeneity in motivations for engaging in economic exchanges to access any type of seed.

Parity-oriented substantive seed economies see use-value in the output of seeds. Food, fodder and building materials are valued for many people first because of their integral role in what were historically self-contained systems. In other words, the same orientation that, when influenced primarily by risk and uncertainty, leads to provisioning can also push farmers to engage in some type of economic exchange with the goal of equal exchange so as to ensure communal well-being (because no one is gaining or losing). Parity-oriented substantive seed

economies can be seen as the first step in the shift from provisioning toward utility-maximizing economic decision making. However, the Marxian (1978) view of use-value economies facilitating simple circulation suggests that use-value can institute economies that persist rather than define a moment of transition. The parity-oriented substantive seed economy is embedded within a social system that discourages exploitation or accumulation, in part because of the social mandate to care for the community and the foundational role that seeds play in these communities. This orientation institutes a system that incorporates any type of exchange and any type of seed, as long as the exchange produces equal gain. Non-formal exchanges like equal quantities or measures of grain for seed are indicative of use-value, as are informal and formal exchanges wherein farmers see the cost as equal to the value they will receive at the end. This value is not a price, since use-value is an empirical but interpretive measure that is contextualized and so inherently not able to be standardized by money. Instead, use-value is defined by social context and individual experience, and so always evolving.

In Table 1, I identify a substantive seed economy organized on the principle of reasonable return that recognizes potential exchange-value in seeds and remains conditioned by social expectations of non-exploitation and communal care. Farmers descriptions of exchanging two measures of local grain for one measure of improved variety seeds reflects Bourdieu's (2005) description of economic orientation making 'reasonable' calculations based on the social and natural context within which exchange occurs. Reasonable return-oriented substantive seed economies are instituted by economic calculations embedded within a social orientation that recognizes benefit both in rewarding value-added economic activity and in tempering the degree to which value can be accumulated by individuals. For example, certified improved varieties sold to family members at a lower-than-market price, and landraces sold at a higher price in local markets for specific uses, like sorghum beer in Burkina Faso, are both examples of calculations of exchange-value made by individuals in actions that institute an economic system based on reasonable return. Because this substantive seed economy is embedded within a social system that prioritizes communal well-being, the price or terms of exchange must be reasonable not only with regard to the financial or material assets of the two parties, but also reasonable in terms of the potential for accumulation. Exchanges in economic systems based on reasonable return are largely conducted through social institutions like kinship and embedded economic institutions like local marketplace relationships. Both the parity-oriented and reasonable return-oriented substantive seed economies described by farmers reflect Hopkins' (1957) description of economic embeddedness as "economies whose constituent actions are patterned through their occurrence in non-economic roles" (299).

The language of substantive economics, economic disposition conditioned by social orientation, and reasonable calculations of value remains relevant for the profit-maximizing economic system articulated in classical economic theory. Polanyi (1944) describes the formal economy as a particular substantive economy, wherein organizing principles for social systems have shifted to prioritize individual accumulation as the best means to meeting material need, making the rational economic calculation of efficiency reasonable and instituting a system organized on the principle of utility or profit-maximization. The utility maximization-oriented

substantive seed economy in Sahelian West Africa is largely being instituted, at least initially, by seed value chain development projects and organizations that operate at a broader social scale than the household or village level. As shown in Table 1, this system is instituted by formal exchanges of improved variety seeds – other types of exchanges and other types of seeds do not allow for the full expression of commodity-value because they are not standardized enough to allow value, as reflected in price, to be determined within price-setting markets. In the profit-maximizing seed systems envisioned by the development of seed value chains, farmers would be motivated by individual gain through efficient decision making, in part based on experiences of price-setting markets both for seeds as inputs (where they are consumers) and for grain and seeds as outputs (where they sell their production). For the most part, analysis of farmers' initial experience with the profit-maximizing seed economy suggest that commodity-value, reflected in prices set by markets for either grain or seeds produced, is not recognized by most economic actors in the region. Farmers report difficulty in selling the grain of improved varieties in local or regional markets, with buyers and wholesalers unfamiliar with the varieties and so making reasonable calculations about their value within Sahelian markets and food systems.

Embeddedness in Sahelian seed systems

Based on Polanyi's (1944; 1957) extensive writing about substantive economies, Hopkins (1957) identifies three dimensions of substantive economic analysis: degree of embeddedness, type of movement and form of integration. I focus here on the first and third of these, and explore type of movement below using maps to visualize distinct seed systems. Degree of embeddedness cannot be discretely identified, but rather exists on a spectrum that is expressed through negotiation between social and economic organizing principles and value orientations. In the Sahel, provisioning seed systems are not economic in that there is no exchange activity, and the economic evaluation that distinguishes seeds as a social good reinforces rather than challenges the social orientation toward stability or sufficiency. In other words, economic orientation is completely embedded to the point of being non-distinguishable from more general social principles. In substantive seed economies, economic goals emerge as having an orientation at times at odds with that of the social context. The resulting organizing principles of parity and reasonable return reflect the relative strength of economic orientations in the calculation process that institutes seed economies based on use-value or exchange-value. In profit-maximizing formal seed economies, the idealized assessment of embeddedness suggests a complete subsuming of social goals by economic efficiency (Polanyi, 1944). As Granovetter (1985) and others (Block, 1990; Krippner, 2001) argue, however, market economies rarely if ever attain the purity theorized by classical economic, and instead both economists and sociologists agree that formal market economies retain a degree of negotiation between social and economic values. The sustainable value chain approach to seed system is an example of how market dialectics at the local and extra-local levels throughout the neoliberal period have combined with natural context and social history to generate new iterations of market-oriented development (Block, 2003; Birner and Resnick, 2010).

Relationships among Sahelian seed systems

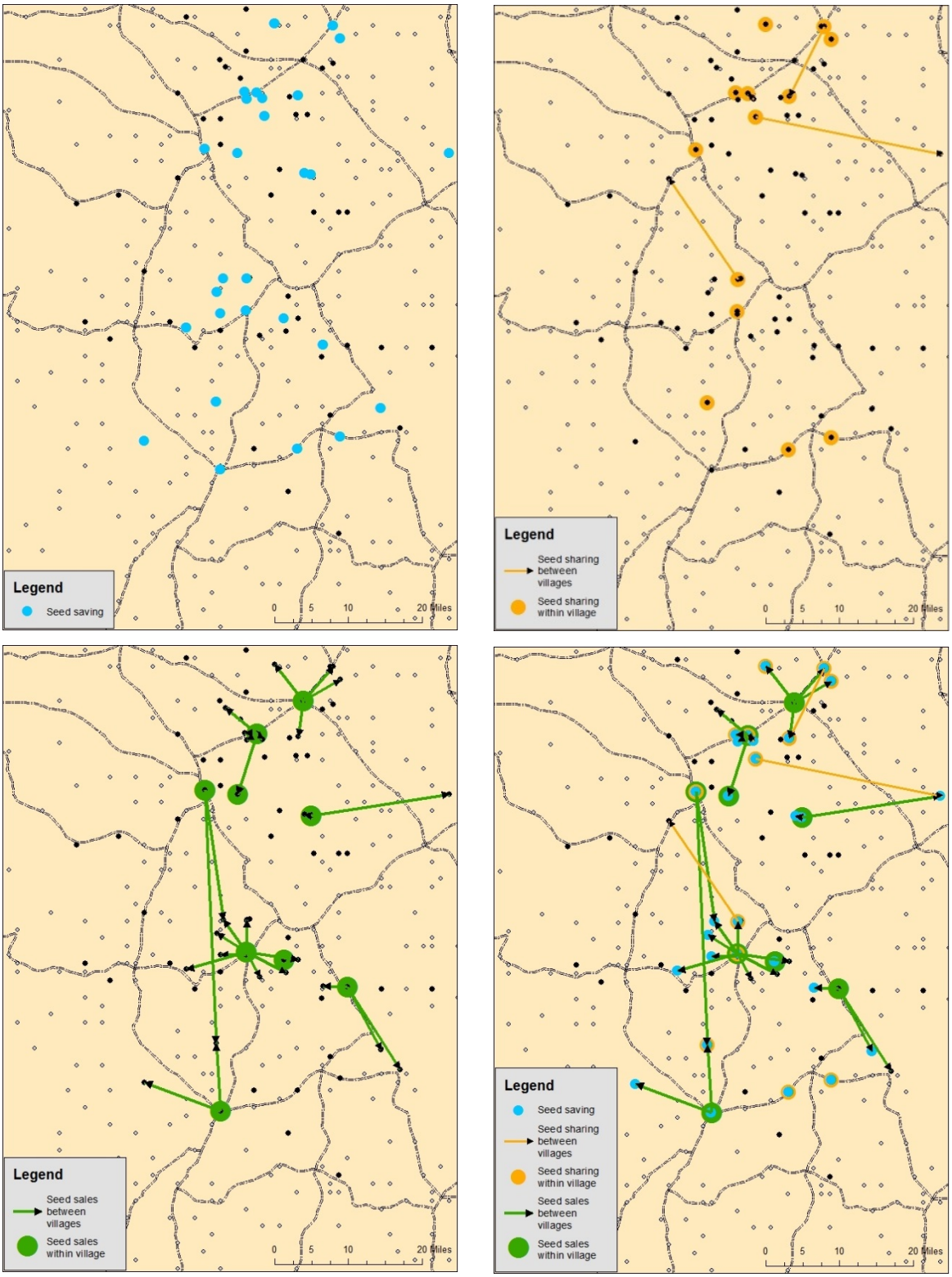
Much has been written about the integration of formal and informal seed systems in Sub-Saharan Africa within the context of the development of value chains, but the types of envisioned relationships among these distinct systems is not clear (Sperling and McGuire, 2010; Louwaars and de Boef, 2012). Similar to Polanyi's distinction between formal and substantive economies, I make a distinction here between integration-by-incorporation, and integration-by-interconnection. At the global and macro-economic levels, economic integration generally means the incorporation of non-market-oriented economic and social systems into the dominant capitalist economy; in other words, a move toward disembeddedness. In Africa, integration-by-incorporation at the global scale has led to differentiated and inequitable impacts for individuals and communities whose own systems are organized by principles that are reasonable in their context and do not necessarily include utility maximization (Daviron and Gibbon, 2002; Nissanke and Thorbecke, 2008). Recognizing that contemporary agrarian economic and social systems are organized by distinct and consistent internal logic, another form of integration among systems is emerging that builds upon interconnection and continued distantiation rather than incorporation and capitulation of separate systems (van der Ploeg, 2008).

To visualize the integration described by farmers and analyzed in this dissertation, I created a series of maps for one site in each country. Maps for Dioila, Mali are presented in Figures 1 and 2 below. The maps in Figure 1 depict seed saving, seed sharing, and seed sales as three distinct seed access actions that can institute a single seed system or set of seed systems. The final map in Figure 1 shows all three types of actions, to visualize the relative extent and points of overlap for each seed access action. Analysis presented here confirms the point made by Djurfeldt (2013), that market or economic system integration in Africa happens at the village scale, and so maps depict seed access actions with village as the unit of analysis. The maps in Figure 1 combine data from 2010, 2011 and 2012 to depict the full extent of seed spread within the sample for all three years. Figure 2 then presents two maps that depict the points of overlap among seed systems and related seed spread in 2010 and 2011, and again in 2012 and 2013.

The first 3 maps presented in Figure 1, show the extent of each type of seed access action. Seed saving, seed sharing (which includes gifting and non-formal exchanges) and seed sales are measurable and representable actions taken by farmers to access seeds, and seed saving actions institute the stability-oriented provisioning seed system. Seed sharing and seed sales, as described in Table 1, can institute a range of seed systems depending on the organizing principle of the system and the value associated with the output. The final map in Figure 1, which shows the points of overlap of distinct seed access actions, helps to clarify the type of seed systems being instituted in relation to improved variety seeds. In almost every village to which seeds are sold, there is saving; farmers who buy improved variety seeds in formal markets and then save them are instituting a parity-oriented seed economy and at the same time, incorporating creolized seeds into the stability-oriented provisioning seed system already used for landraces. Seed sharing is also largely connected to seed saving, reinforcing the point

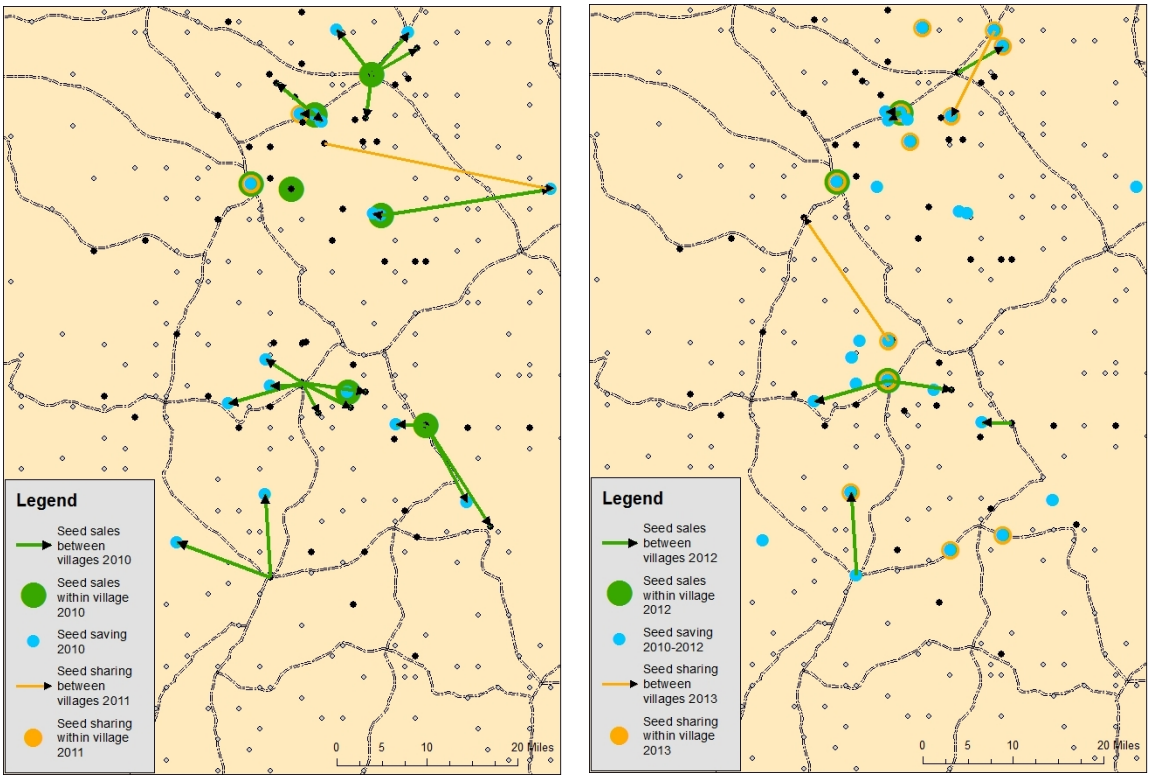
made above: provisioning seed systems and parity-oriented seed economies are connected by a common social habitus that prioritizes communal well-being over personal gain.

Figure 1. Seed spread through seed access actions, Dioila, Mali, 2010-2012



The maps in Figure 9-3 visualize seed spread at the village level in Dioila, Mali, and the connection points among seed systems that facilitate that spread. The first year of sales of mini-packets of improved varieties was 2010, and the map on the left in Figure 9-3 shows the extent to which seeds were spread through sales in 2010 and further through other seed systems in 2011. In almost every village to which seeds were sold, seeds were then saved at the end of 2010, meaning that creolized seeds were incorporated into stability-oriented provisioning seed systems. That saving also generated some seed sharing in 2011, mostly within the same village as seed saving, but there was some additional seed spread through inter-village sharing. Two years later, in 2012, the map on the right in Figure 9-3 shows a decline in seed sales and many villages in which saving of creolized seeds continued from year to year. In 2013, the dominant (in terms of extent) seed system is a stability-oriented provisioning system instituted by seed saving and facilitating the use of creolized (for two or three years) seeds.

Figure 2. Connection points of seed systems, Dioila, Mali, 2010-2012



Interconnected seed systems: Governance through persisting and adaptive embeddedness

Seed systems provide a particularly interesting case with which to study the process and impacts of current sustainable market-oriented development approaches in international

agricultural development. In many ways, the seed value chains envisioned as a key feature of the second Green Revolution for Africa reflect the general approach to sustainable value chain development and current approaches to 'green capitalism' (Scoones and Thompson, 2011; Toenniessen et al., 2008; Friedmann, 2005). To incorporate small scale producers in seed value chains, it is necessary to define separate roles for producers and consumers, so that rent can accrue as economic value is added by producers, and prices can be used to signal economic value to consumers (Kaplinsky, 2000). De Janvry et al. (1991) show that peasant agriculture is often, in economic terms, non-separable; a farmer or farming household makes production and consumptions decisions in tandem, acting in a closed system where the option of separate economic actions is not practically possible. Non-separability is seen in development and peasant economics (Ellis, 1988) as a feature to be recognized but not necessarily incorporated into future economic development. As Lockie and Kitto (2009) argue, however, the producer/consumer dichotomy does not capture the reality of many agricultural households of various sizes, and in both developed and developing country settings. And within agricultural households and systems, seeds are a material representation of non-separability, since barring extreme genetic manipulation, all seeds can be saved and reused indefinitely.

The value chain approach to agricultural development in general and to seed system change in particular, assumes that farmers are motivated by utility-maximization and rational, rather than other types of socially situated calculations about costs and benefits of buying and using improved variety seeds. Get the links in the chain right, reflective of the contextual costs and benefits, and farmers will integrate themselves into seed value chains, thereby fully instituting a profit-maximizing substantive seed economy (Kaplinsky, 2000). Seed system integration via value chains does not admit the possibility that farmers might see the output of seeds as having use-value or exchange-value, and might therefore orient toward economic systems organized by the principles that prioritize other goals than efficiency. In the case of Sahelian seed systems, as an example of economic systems, individual decision making about how to access, use and re-use seeds is conditions by social history and natural context. Patterns of decision making over time have begun to define distinct contemporary seed systems that then allow further choice in economic activity.

Applying the theoretical concepts of substantive economics to examples in the real world makes more explicit the underlying spatial element running through discussions of substantive economies, provisioning systems, and the institutions that comprise them. In this paper, I identify alternative values and organizing principles associated with seed systems other than the formal seed value chain in order to evaluate the development-oriented goal of integrated seed systems (Louwaars and de Boef, 2012). Kaplinsky (2000) argues that for the value chain approach to truly work for small scale producers, strong governance will be necessary to buffer against the inherently spatially unequal forces of capitalism. In settings like Sahelian West Africa, where national-level government institutions are relatively weak, value chain governance would likely occur at the village or local (organized around an administrative town) scale.

Given that seed systems other than the formal seed value chain are also instituted and organized at the local levels, and are shown to be integrating through interconnection with the formal seed system, one way to think about the persistence of non-market based seed systems is as a governance mechanism. This form of governance is not necessarily intentional or coordinated, but instead is a contemporary version of the same social orientation that historically has buffered against environmental risk and institutional uncertainty. The governance of extra-local value chains through local alternative systems draws on analysis from Lawrence (2005), Harvey (2006) and many others of the scalar mismatch between capitalistic value chains and localized economic and social systems, a phenomenon that has also been documented in Sahelian West Africa (Diakité et al., 2008). Spatial relationships, both material and theoretical, are key components of interpretive economic analysis, and have to-date been under conceptualized in economic sociology (Peck, 2005). Bair and Werner (2011) elaborate upon the need for spatial understandings of contemporary economic change, focusing in particularly on the commodity chain approach and arguing for the reinsertion of scale into critiques of the differentiated impacts caused by global commodity chains.

The data and analysis presented in this paper are a first step toward combining a contextualized exploration of the organizing principles of distinct economic systems with visual representation of the relationships among those systems. Using the case of seed system development in Sahelian West Africa, I identify the value and actions associated with distinct seed systems through thematic coding of qualitative data, and then depict changes over a three-year period in how those systems relate to one another. The results suggest that the persistence and adaptation of a range of seed systems allows for integration-through-interconnection of distinct systems. Each system maintains its internal integrity, even while interacting with certain aspects of the new, market-oriented seed system. The persistence over time of embedded seed systems suggests that they have the potential to govern the disembedding influence of the market-oriented seed systems, in part because the latter are being instituted at the same scale as the social system working to re-embed them.

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