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## SUMMARY

There is a growing concern that the technological regime of agricultural production and food consumption implicit in the modernizationist ideal of development is not socially or ecologically sustainable. This research focuses then on how developing countries with a predominantly pre-modern agricultural sector explore divergent food economies in light of domestic conditions and increasingly divided international debates about agricultural development. Connected to this is the concept of ecological modernization, which, for developed countries, has largely been viewed (and experienced) as a *post-industrial*<sup>1</sup> trajectory of development, predicated primarily on “superindustrialization” of pollution control through technological advancement (Huber, 1982, 1984, 1985; Murphy, 2000). In the food sector, however, post-industrial activities have commonly taken the form of de-technologization that imply a concomitant return to natural cultivation and local food networks (Clarke et al., 2008; Jarosz, 2008; Norberg-Hodge et al., 2002; Pollan, 2006; J.D. Van der Ploeg & Renting, 2004).<sup>2</sup> This feature suggests that a *pre-industrial* form of ecological modernization would be possible in the food sector of certain developing countries. Applying the concept of ecological modernization to food systems in a pre-industrial context, however, requires an investigation of socially-guided technological development and the cultural politics of food rather than a study on superindustrialization (Murphy, 2000).

In a poor country like Cambodia, the rapidly growing interest in and uptake of emerging agroecological cultivation techniques, green marketing, and ethical consumerism presents a particularly good opportunity to investigate the dynamics of ecological modernization embedded in pre-industrial sociotechnical evolution. The proposed research will address the emerging social acceptance and market embeddedness of sustainably grown and organic rice and palm sugar, as well as “traditional” agri-products, such as medicines and cosmetics. For this study, these products are referred to as *socionatural hybrids*, a term coined by Latour (1993) to denote physical manifestations imbued with the social, ethical and ecological processes that went into their making. The primary research question is, *whether the growing preeminence of socionatural hybrids and their concomitant production, marketing and consumer tendencies in Cambodia since the mid 1990s are indicative of a novel trajectory for agricultural development or whether they are unrelated and distinct shifts within a constraining (industrial) social and technological regime?*

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<sup>1</sup> For this research, post and pre-industrial refer on a sectoral basis to the extent to which a technological regime for agriculture has become dominant in production systems, public policy, and social expectations (R. F. White & Jacques, 1995). Because every country will experience agricultural development differently, an agricultural sector that is still primarily pre-modern and undecided about its industrial trajectory is considered to be pre-industrial.

<sup>2</sup> On the one hand, considering the advancements in crop biotechnology, post-industrial agriculture could also be seen in the traditional “superindustrialization” sense envisioned by Huber. On the other hand, biotechnology could also simply be seen as an extension of industrialization, which is how I view the situation.

*A proposal for:*

**Pre-industrial Ecological Modernization in Agriculture?  
The Role of Socionatural Hybrids in Cambodia**

**By Hart Nadav Feuer**

**TABLE OF CONTENTS**

1. Physical Background
  - 1.1. Agrarian Change in Cambodia
    - 1.1.1. Pre-1960s to 1992
    - 1.1.2. 1992 to Present Day
    - 1.1.3. Present Day and Looking Forward
  - 1.2. Socionatural Hybrids in Cambodia
    - 1.2.1. Rice
    - 1.2.2. Palm
    - 1.2.3. Traditional Agri-products
2. Theoretical Background
  - 2.1. Contemporary Views on Sustainable Agricultural
    - 2.1.1. Agroecology
  - 2.2. Ecological Modernization
  - 2.3. Social Sustainability
3. Theoretical Framework and Methodology
  - 3.1. Critical Realism with Conceptual Aid from Actor-Network Theory
    - 3.1.1. Recursive Innovation
    - 3.1.2. Transfiguration of Imagery
    - 3.1.3. Strategic Niche Formation
  - 3.2. Methodology
4. Research Questions and Sub-Questions
5. Bibliography

*Keywords:* post-industrialism, post-productivism, ethical consumerism, sustainable agriculture, alternative agriculture, green marketing, niche management, ecological modernization, organic

## 1.0 PHYSICAL BACKGROUND

### 1.1 Agrarian Change in Cambodia

#### 1.1.1 *Pre-1960s to 1992*

Prior to the international military intervention and subsequent civil war in the 1960s and 1970s, Cambodia was renowned for rice and vegetable production and quality in mainland Southeast Asia. A combination of proportionately large areas suitable for cultivation and the hydrological productivity of the Tonle Sap Lake and Mekong catchment meant that Cambodia would have been ripe for green revolution agricultural development (Vickery, 1992). In 1975, however, the utopian regime of Democratic Kampuchea (i.e., the Khmer Rouge) gained control of the country and Cambodia effectively became isolated from much of the world. In a broadly structural sense, the effects on Cambodian agriculture have been immense. Urban citizens were forced into the countryside and an agrarian social-economy based on traditional (and essentially organic) agriculture predominated until the Khmer Rouge were deposed by the Vietnamese in 1979 (Chandler, 2000). As urban areas repopulated, sporadic elements of “modern” agriculture began filtering into Cambodia largely without any comprehensive vision in place for agricultural development. Casual (and usually uninformed) uptake of mineral fertilizers and pesticides by individuals became widespread (EJF, 2002; Koma et al., 2000) but these were not part of an overarching paradigm in Cambodia. And in the absence of institutions and path-dependent practices such as varietal narrowing, land consolidation, mechanized farming, large-scale infrastructure, and export-orientation, green revolution agriculture never took root in Cambodia. And due to poverty and isolation, many farmers continue to be “organic” by default (Makarady, 12-15 December 2007). Indeed, the view that Cambodia is in a unique position has permeated to international media:

“The ensuing poverty [from the civil war] and failure to adopt modern agricultural methods could actually give the country an edge, as it and other South East Asian countries gear up for an organic future.” (BBC News, de Launey, 6 March 2009 2005)

#### 1.1.2 *1992 to Present Day*

Although the foregoing narrative is rather essentialist, it is important to set out the structural characteristics leading up to the 1990s, whereafter Cambodia, as an independent entity, began laying new groundwork for agricultural development. Coinciding with and following from the United Nations-sponsored elections in the early 1990s, the international community began having direct access to Cambodia. This time period is critical, because already by this point in evolution of discourse in agricultural development, green revolution agriculture had changed its approach somewhat and it had also lost considerable ground to alternative development models focusing on ecological sustainability, empowerment, locality, and diversity. Notably, modernist institutions such as the Cambodian Agricultural Development and Research Institute (CARDI) and the alternative-oriented Cambodian Center for Study and Development in Agriculture (CEDAC) began operations around the same time. As a result, modernist agricultural development discourse has weaker than in the 1970s and its relationship with alternative development in agriculture has been less polarized than it would have been in prior decades. Functionally, this has resulted in agronomy programs in the University being more sympathetic to non-mainstream curricula and the government being supportive of a wider range of agricultural development models (Feuer, 2007). Paralleling these institutional

characteristics at the social scale, it is important to point out that wet-markets and direct farmer marketing still make up the majority of agricultural transactions.

### 1.1.3 Present Day and Looking Forward

Already, these historical conditions have meant that Cambodia has tended towards more post-industrial agricultural production than the surrounding countries. Official statistics provided by the International Federation of Organic Agriculture Movements (IFOAM) report that 0.21% of the agricultural production in Cambodia is organic, which is already higher than neighboring Thailand, Laos, and Vietnam (IFOAM & FiBL, 2008). More importantly for the future however are indicators from CEDAC and my previous research that suggest that roughly 35-75% of the production might be unofficially organic (Feuer, 2007).<sup>3</sup> On an institutional level, momentum for alternative agriculture has also risen considerably with the strong growth of CEDAC, which already reaches more than 5% of farmers and could be expected to reach 25% by 2015. Consumers in Cambodia are also playing a large role in this; despite low incomes, the demand for organic products considerably outstrips supply and Cambodia is showing signs that a culture of ‘domestic consumption’ founded on quality, patriotism and self-sufficiency has emerged (Vida & Reardon, 2008), which is reminiscent of local food movements in developed countries.

## 1.2 Socionatural Hybrids

This paper focuses on the respective sociotechnical systems for production, marketing, and consumption of organics, palm sugar and “traditional agri-products”, which include medicines and cosmetics originating from unrefined natural sources in Cambodia or Southeast Asia. These and other such products are referred to in this study as agricultural *socionatural hybrids* (following Latour, 1993), which I define more specifically as the physical manifestations of the remaking of food production-consumption relationships in accordance with novel ways of imagining better food networks.<sup>4</sup> The inclusion of these three categories in this study is strategic, insofar as these agricultural products either play disproportionate roles in the overall agricultural system in Cambodia or are of significant concern for studying the social values of pre-modern artifacts. Perhaps more importantly, however, these three categories have already been the targets of significant engagement by civil society in cultivation, promotion, conservation, and marketing. The main characteristics of these socionatural hybrids are summarized below, with detail in subsequent sections:

- Organics, and particularly rice, are usually mainstream agricultural products whose production is industrialized in many other countries but are now targets of agroecological reinvention and new marketing systems.
- Palm sugar is a treasured traditional product with importance for local cuisine and cottage industry. Palm processing has increasingly become industrialized with its broader penetration into urban markets, which threatens its nutritional utility and worsens its ecological impact.
- Traditional medicinal and cosmetic agri-products, still mainstays of the Cambodian health system, influence consumer acceptance of chemically derived products and unsustainably procured ingredients.

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<sup>3</sup> It is important to point out that for IFOAM, “organic” generally refers to a conscious attempt made by farmers to follow organic principles and is not a default category for farmers not employing chemical inputs.

<sup>4</sup> Notable examples of socionatural hybrids include organic, “traditional”, Fairtrade, and local products. The appellations, such as “organic”, are themselves not socionatural hybrids—only a product itself.

### 1.2.1 Rice

The emergence of various agroecological techniques, such as the System of Rice Intensification (SRI), multi-purpose farming and ecological livestock raising, have simultaneously provided a potential avenue for farmers to (a) increase productivity, (b) gain access to niche markets for organic and local produce, and (c) decrease environmental degradation. In Cambodia, in particular, the success of the Cambodian Center for Study and Research in Agriculture (CEDAC) and Srer Khmer in the extension of SRI and promotion of green marketing initiatives (i.e. my previous research, and CEDAC, 2007) has increasingly demonstrated the potential for sustainable production and consumption to be merged. The Natural Agri-Product (NAP) brand, developed by CEDAC, has extended into the organic certification of plant and livestock products, non-chemical preservation, and natural food restaurants. The German Technical Cooperation (GTZ) and German Development Service (DED) have invested expertise in testing and internationalizing these standards as well as measuring market characteristics. At the present time, the *domestic demand* for organic certified products and ‘natural’ foods outstrips supply by a significant degree, despite the relative poverty of Cambodia (compared to Thailand and Vietnam).

### 1.2.2 Palm Sugar

The successful spillover effect from promoting organics (particularly rice, a mainstream mega crop) onto other moderately important agricultural products, such as palm, has hinted at the possibility for larger-scale inclusion of other agricultural products propelled by producer and consumer support. Palm products, particularly palm sugar, have transcended the countryside and received much attention from industrial producers, the primary result of which, in addition to widespread market diffusion, has been miniaturized packaging and introduction of chemical additives for color preservation. Palm, however, is still commonly seen as a “traditional” product and demand is growing for authentic and natural forms. Initiatives for sustainability of palm products, which have largely been advanced by the same parties promoting organic certified rice and livestock, have included non-chemical preservation and packaging in traditional earthenware pots.

### 1.2.3 Traditional Agri-products

Many other “traditional” products, particularly medicines and cosmetics, are also beginning to be appreciated locally on two levels experienced in post-industrial environmental and health discourses. On one level, medicines and cosmetics derived from largely unrefined and natural origins are increasingly being viewed as healthier alternatives to their chemical-based counterparts. On another level, awareness and consumer action concerning the trade in rare and endangered species used in traditional medicine and cosmetics has increased the demand for sustainably-procured ingredients and increased the pressure to stop illegal or irresponsible harvesting.

## 2.0 THEORETICAL BACKGROUND

### 2.1 Contemporary Views on Sustainable Agriculture and Rural Development

In development discourse, the concept of sustainability has grown to encompass a wide range of ideas and practices, ranging from specific methods for improving eco-efficiency to broad theories concerning how to (re)structure consumer society (Jacobs, 1999; Lélé, 1991; O’Riordan, 1981; 1989; O’Riordan & Voisey, 1997; Tripp, 2006; UNCED, 1992a: Section II,

1992b). The earliest paradigm of *agricultural sustainability* was largely normative in nature, emerging from atavistic notions about returning to nature, simpler lives and honoring rural farm heritage (cf. Leopold, 1981; L. White, 1967; Wilson, 1996). The collective struggles of animal rights activists, family and artisan farmers, discriminating consumers and concerned agriculturalists have laid the preliminary foundation for markets for sustainable products and articulated a post-industrial<sup>5</sup> vision of agricultural production that deliberately resembles pre-modern agriculture (Clarke et al., 2008; Singer, 1974). Unsurprisingly, post-industrial conceptions of agriculture have often come to be seen as uniquely commensurate with rural development programs in impoverished areas and have thus become quite common in development practice.

The structural dynamic assumedly underlying such visions for agricultural development is that the developing countries, having begun agricultural industrialization later, have a cadre of farmers who are in a structural position to embark directly on a novel trajectory of agricultural development. Implied in such conceptions of rural and agricultural development is the hope that, in the name of food security, ecological diversity, environmental protection, and health, farmers in developing countries might leapfrog the unsustainable path taken by industrialized countries. The opportunities for farmers involved in this movement include gaining access to privileged market structures such as Fairtrade and organic, improving eco-efficiency, reversing deleterious health effects of agricultural chemicals and pollutants, facilitating local coordination and governance, and retaining indigenous culture. For consumers, this is a chance to move directly to post-industrial consumption ideals, epitomized in particular by wholesome, healthy, diverse, locally-supportive, indigenous, and chemical-free food (Bawden, 1991: 2363-2364; Chambers et al., 1989: xvii-xx).

The heterodox or “alternative” food and agricultural systems emerging since the 1960s in post-industrial contexts have evolved in form and shape to compromise quite a large spectrum of what Holloway et al. (2007) calls “new food economies”. They range from revolutionary and oppositional food systems aspiring to make fundamental changes in production methods, supply chains, consumer interaction, and identity to more modest revisions of cultivation techniques. Holloway et al. argue that it is important to see this spectrum not as a bipolar opposition between conventional and radical, but rather multi-polar, with different heuristic analytical fields constituting forums for differentiation and/or opposition. In J.D. van der Ploeg’s (1996) account of the heterogeneity of European farming, the individual and subtle level of differentiation between various “styles” of farming production demonstrates that diversity in agricultural systems exists even in the assumedly fully commoditized western European agricultural zone.

In light of the seemingly neutral diversity found among food production-consumption systems, I argue that the discourses from which most transformative visions for new food economies emerge are oppositional in nature. Although I am disinclined to use the terminology of “alternative agriculture” as Holloway et al. (2007), I recognize that the larger “political project” behind organics, ‘slow food’ movements, and community-supported agriculture continues to be focused on *supplanting* an entrenched sociotechnical regime for agriculture. In other words, although neutral differentiation between food economies is possible, this is not ground for de-politicizing movements that have emerged from primarily reactionary and oppositional discourse. In any case, while these mostly post-industrialist movements have inserted small wedges in the global agricultural system and initiated fruitful discussion, they have lacked the teeth to uproot the dominant technological regime sustaining modernist and ‘green revolution’ agriculture in developed countries. Since the mid 1990s, however,

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<sup>5</sup> Post-industrial, as it is used here, refers to the values and systems (for agricultural production and consumption) that are commonly associated with the orientation on environment and health found in many industrialized countries in the North. Post-industrial ideals are not exclusive to those living in post-industrial societies, especially considering that many of these ideals are a harkening back to pre-modern values and systems which are often shared by members of developing countries.

sustainable development discourse has made developing countries an arena in which more radical visions for restructuring food economies might be realized.

### *2.1.1 Agroecology*

At the intersection of sustainable agriculture and rural development lies agroecology, which is primarily the application of ecological principles to agricultural science. First introduced by Miguel Altieri (1987), agroecology has increasingly come to symbolize resistance (against the strict scientific rationality of agronomy) and cooptation (of scientific methods for ecological purposes). Although extant long before in the works of K.H.W. Klages (1928), the contemporary support for agroecology grew out of dissatisfaction with green revolution (high external-input) systems of cultivation and social organization (Fernandes et al., 2002). As such, it is a science that is fairly reactionary in nature and often bundled with new methodological considerations, such as participation and empowerment. In part, agroecologists seek not only to undo the damage wrought by industrialized and green revolution cultivation practices and land management techniques, but also to foment a paradigm shift in rural development as a whole (Francis et al., 2003). Many agroecologists, as a result, are not natural scientists or agriculturalists, but social scientists.<sup>6</sup> And while adhering to the normative agenda of environmental sustainability, agroecology is keenly aware of the extent to which the time frame, structural (and market) constraints, and extension/learning techniques must be accommodated in order to see paradigm-wide changes.

## **2.2 Ecological Modernization**

In the early 1980s, Joseph Huber introduced the concept of ecological modernization to illuminate trends environmental protection based on the experience of Western Europe (Huber, 1982, 1984, 1985). He expounded a view that environmental problems could be addressed through “superindustrialisation”—using more sophisticated industrial technology to reduce pollution. In addition, he posited that ecological modernization was a phase that followed the construction of industrial society (1848-1980) (Murphy, 2000). He viewed the economy and technology as the driving forces during industrialization, while the subsequent stage was driven by the need to reconcile the impacts of human economic activity with the environment. Huber argued that, in this process, new social movements, such as the environmental movement, and even government, had a limited role to play in bringing about this transformation. Instead, he saw economic actors and entrepreneurs as the most important influences.

The original formulation of ecological modernization has since been critiqued, revised, and expanded with additional theorizing and empirical evidence from countries not considered by Huber. Notably, there is now a broad agreement that there is indeed a role for government to play. Additionally, dimensions of ecological modernization have also been introduced, particularly those involving cultural politics and discourse (Murphy, 2000). Ecological modernization has come to be seen as more path dependent (i.e., historically contingent) and socially constructed, reflecting a society’s relationship with scientific advancement and its tolerance for risk (Giddens, 1990, 1991). Largely, these re-formulations continue to be focused on macro-level processes observed in post-industrial contexts. By viewing it sectorally, however, ecological modern can be distilled down to more concrete processes and ideas, from which a more nuanced and empirically robust outline of this transformation can be viewed. In this research, then, I aim to look at the sector of agriculture in a pre-industrial context, in order to explore how or if ecological modernization can be utilized as a strategy for sustainable

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<sup>6</sup> See, for example, the edited volume by Norman Uphoff (2002), the director of the Cornell International Institute for Food and Agricultural Development (himself a social scientist). Contributors to the volume were spread fairly equally between agricultural scientists, NGO leaders, and social scientists of various disciplines.

development. There is reason to believe that the agricultural sector, particularly in a country like Cambodia, could experience a sectoral form ecological modernization prior to or instead of industrialization. As Henderson (1998) has argued, the agricultural sector is less readily subsumed into capitalist relations, because it is based in nature and nature (i.e., land and growth dynamics) does not inhere the circulative properties of capital common to other industries.<sup>7</sup> Indeed, even Marx (1909: 241) has acknowledged that agricultural production is largely expected to combine with subsidiary rural industries in order to form capitalist production cycles, as it is not absorbed into capitalist relations on its own.

### 2.3 Social Sustainability

The development of niche-scale new food economies in developed countries has demonstrated that values and social institutions rather than the advancement of agricultural technology are the main drivers of new sustainability initiatives in agriculture. Indeed, the investments into research in organic agriculture are very small relative to the interest [citation, Bonn Univ Organic Studies Group]. It is been largely at the confluence of the post-industrial farmer's and consumer's environmental ideology and health concerns that the demand and production systems for novel food networks have emerged. Crop scientists have contributed to this as well, mainly by expounding various management systems (such as Integrated Pest Management), outlining causes of and mitigation techniques for soil nutrient loss, and producing "natural" fertilizers and pest control compounds. In general, however, the production, consumption, and interface system of new food economies *are based on modifying the social experience and everyday practices of farming and buying*, rather than advancing the technical system. In contrast to the Huberian model of ecological modernization, human and social capital, and not technological advancement, are the primary agents of change. These characteristics of new food economies, combined with the structural similarities between post-industrial and pre-modern agriculture, makes them particularly viable in many developing countries.

The primarily social basis of new food economies, however, means that a sense of sustainability emerges without necessarily creating a strict, scientifically verifiable ecological reality. Nevertheless, exploring novel food economies can push society towards the social readiness to accept scientifically approved ecological sustainability when it comes down the pipeline. Illusions can be instrumental in this sense. "Organic/Bio" is a lifestyle symbol (Evers & Gerke, 1997), as much as it is a technical standard/certification (Campbell & Liepins, 2002). The Fairtrade system, likewise, has been a large experiment that has generated a dialogue about its brand of 'production system' and thereby pushed research to evaluate its in a much more effective fashion. Furthermore, agroecological production systems such as the System of Rice Intensification, which are not yet scientifically verified,<sup>8</sup> have been shown (in Cambodia) to be very useful nevertheless in building participatory rural development projects around them (Feuer, 2007).<sup>9</sup>

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<sup>7</sup> Henderson is primarily summarizing here the so-called 'Mann-Dickinson thesis' (1978), which posits that nature, in her various manifestations (land, weather, crop growth dynamics, etc.), is an obstacle to the full absorption into capitalist relations. Henderson goes further to argue that the impediment is furthered by the artificial creation of so-called "fictitious capital", or productive value unjustifiably predicted from the highly variable, natural conditions inherent to cultivation.

<sup>8</sup> There is an ongoing collaboration between the University of Wageningen (the Netherlands) the Cornell International Institute for Food, Agricultural Development (CIIFAD, USA), and the International Rice Research Institute (IRRI, the Philippines) to "settle" once and for all whether or not SRI improves yields in a sustainable fashion.

<sup>9</sup> Due to the limitations of scope and the researcher's capacity, this work is not poised to verify or discredit the scientific (ecological) sustainability of any particular production system.

### 3.0 THEORETICAL FRAMEWORK AND METHODOLOGY

#### 3.1 Critical Realism with Conceptual Aid from Actor-Network Theory

This research is concerned with the creation and evolution of sectoral networks for the promotion of socionatural hybrids, or agri-products that are driving the development of a new food economy in Cambodia. By treating these socionatural hybrids and their networks as concrete objects and exploring the socially constructed nature of the concepts behind these socionatural hybrids (Sayer, 1993), this research adopts a critical realist stance in its view of ecological modernization. Ecological rice, traditional palm sugar, and natural-traditional health and bodycare are already manifest in Cambodia and their form is similar to socionatural hybrids emerging out of post-industrial contexts and alternative agricultural movements. The questions to raise at this point regard the significance of the extent of these socionatural hybrids in Cambodia and the ideas being transmitted through the production, marketing and consumption of these products. In order to explore the people, products, and places relevant to these products, I use a specific set of methodological tools from Actor-Network Theory to understand the evolution of the networks of production, marketing and consumption. Although ANT was initially employed as a theoretical and methodological frame for untangling the messy relationship between the hard sciences and their social embeddedness (Callon, 1980, 1986; Callon & Latour, 1981; Latour, 1987, 1988), it has increasingly been used to analyze institutional behavior, the sociotechnical nature of (development) ‘projects’ parented by organizations, and the non-human objects and technologies which mediate network functioning (Callon, 1991; Latour, 2004, 2005).

Central to the understanding of ANT is the concept of ‘translation’, which is a manner of imposed collaboration by which actors enroll others into, or maintain their presence in, an ‘actor-world’. Actor-worlds, which are often conflated with ‘social networks’, are operational spaces within which actors continually renegotiate their roles and redefine the scenario of their functionality. ANT studies often conclude that, indeed, the result of aggregate translation exercises is the maintenance the coherence of various actor-worlds. This study, however, is focused on the meaning of the strategies and methods used to recruit into the network and the strength of the translation relative to competing agricultural paradigms. In other words, the ideas being employed to enroll actors into an actor-world, be they environmentalism or health, are not viewed only instrumentally for their ability to enroll, but for their significance within a framework of ecological modernization.

The specific methodological-theoretical tools from actor-network theory that I use are:

- *Recursive innovation*. Defined as the co-evolution of markets and preferences with new technologies, recursive innovation is an attempt to serve the means/practices of other social worlds (mostly users and appliers) *from the onset of development* (Geels, 2002; Rammert, 2001).
- *Transfiguration of Imagery*. Coined by Allaire and Wolf (2004), this refers to the processes by which socionatural hybrids “hitchhike” on intermediary symbols or pre-existing products that have familiarity and meaning to end-users.
- *Niche Formation*. The process by which niches, or protective spaces for experimentation and articulation, form around new technologies in order to determine their viability in a less constraining sociotechnical regime (Hoogma et al., 2002; Hoogma et al., 2005). In this study, Cambodia is viewed as a niche within the worldwide technological regime for food, and development projects are viewed as a niche within the Cambodian agricultural regime (Murdoch et al., 2000).

### 3.2 Methodology

The heterogeneity of research objectives inherent to this study necessitates a highly multi-disciplinary approach. Below, I describe which data types I intend to gather and expound upon the methodology for each gathering and the theoretical relevance.

1. *Market Information System (Recursive Innovation, Niche Formation)*. In order to understand the market trends accompanying the changes in agricultural production, I will collaborate with the German Development Service (DED) to create a market information system for certified organic products. The baseline data would comprise volume of sales based on different certifications, source regions, pricing, timing of purchases/sales, and resale characteristics such as marketing efforts. The data would be refreshed at intervals based on seasonality (up to 3 times/year for rice). Indirectly, these data would also provide information on production costs and the growth of organic markets by region and by certification system. In addition to simple trend analysis, these data would be collected to facilitate an analysis of the market segmentation of the consumers (elite, middle-income, poor) and of the elasticities of demand for the target agri-products compared to conventional products. The larger econometric question to be answered with these data is how the increase in sales/demand for socionatural hybrids (dependent variable) is associated with independent variables (such as relative cost, price elasticity, proportionate market segmentation, green marketing measures) that explain comprehensive society-wide change rather than those of specific economic or social classes.

Sampling will be conducted as follows:

- a. (Domestic) Assembling a list of all known organic product distributors (based on certification agencies' data and retail outlets' sourcing) and visiting/contacting each marketer.
  - b. (Export) Data on the export and government policies of certified organic products and their conventional counterparts would be collected from the Ministry of Commerce. Destination countries and export handlers would be identified correspondingly.
2. *Survey of Values and Preferences (Recursive Innovation, Transfiguration of Imagery)*. In order to understand how the identity of socionatural hybrids is evolving alongside consumer attitudes (Kemp & Rotmans, 2005), it will be necessary to survey individuals at each stage in the commodity chain (or *filiere*) of the agri-products (Smith et al., 2002). More specifically, farmers, middlemen, resellers, and consumers will be surveyed about their changing perceptions and outlook regarding socionatural hybrids. Particular focus will be given to members of society on the frontiers of change (e.g., poster-child organic farmers, NGO members, ministerial officials, rich consumers, etc.) in order to gauge the leading edge of ecological literacy and ethical consumerism. These surveys will be of a hybrid qualitative and quantitative nature, primarily sociological in form, exploring the motivations and behavior of actors directly influencing the demand for and awareness of socionatural hybrids.

*Many such surveys/interviews can be made alongside data collection for the market information system. The approach is loosely based on the commodity chain approaches (Hartwick, 1998), such as Global Commodity Chains, Filières, Systems of Provision, hybrid approaches (Holloway et al., 2007) and Netchains, as well as the 'food networks'*

*approach (Arce & Marsden, 1993), adapted for use in domestic settings (see Raikes et al., 2000).*

The larger question to be answered is to what degree identities (as constructed by NGO programs, marketers, and consumers) such as organic, traditional, and authentic are appealing to health concerns, ecological concerns or simply romantic atavism. Although this is primarily a qualitative investigation involving in-depth ethnographic interviews and group discussions, some significance testing can be used to determine whether awareness-makers' intent and consumer views are aligned (Pearson's chi-square test) and whether these factors are related to sales (ANOVA, using market information system data).

In order to select respondents, I will use (a) the Market Information System's informant pool with further snowball sampling, and (b) my own knowledge of the food sector based on previous research. Consumers will be the most difficult to sample from – and I am still considering how to sample respectfully and randomly from within shop and marketplace resale groups in order to ensure (some) representation from organic buyers. Generally, I will carry out interviews and ethnographic work with the following categories:

- *NGO personnel*
- *Farmers (often as group discussions, perhaps in Farmer Associations)*
- *Middlemen (overlaps with NGO personnel sometimes, includes rice millers)*
- *Resale (marketplace)*
- *Resale (shop)*
- *Consumers (domestic)*
- *Government officials*
- *Organics Certification Officers (primarily GTZ, DED, CEDAC, Oxfam America)*

3. *Geographical Idea Map (Niche Formation)*. In order to study the spatial dimension of the spread of awareness of socionatural hybrids, it is imperative to travel extensively between production sites and to determine how and why production systems have migrated to other areas (Hoogma et al., 2005; Kemp & Rotmans, 2005; Kemp et al., 1998). Have they migrated through market information, rumor, demand, development activities and/or the spread of ecological motivations? I will interview producers and investigate cropping patterns to determine how production constraints and environmental awareness, agricultural extension and rural institutions have mediated for the spread of niche production techniques all over Cambodia. On the consumer side, I will try to make when and why certain market stalls and resale shops took on organic and traditional products. Were there thresholds like the sales success of an NGO organic shop or restaurant, or the success of certain agroecological techniques in a flagship village? Was the spread cumulative, fragmented, or sudden? Which actors were involved in the transitions and how many resources did they pour into getting what they wanted? What threads and ideas are interwoven into this – such as ideas of modernity, and exposure to modernized agricultural systems, like HYV see and the availability of agrochemicals. The theoretical background for studying the transition of socio-technical systems and niche formation is discussed by a number of key authors within the field of science and technology studies (STS) (Geels, 2005; Geels & Schot, 2007; Hoogma et al., 2002; Kemp et al., 1998).

4. *Discourse Analysis (Transfiguration of Imagery)*. Paralleling the changing systems of agricultural production and evolving views of nature, purity, and authenticity is the

language and frame of reference in which these activities are carried out. High-level discourse concerning sustainability and rural development certainly have a role in defining how NGOs and development agencies specify their activities (Adams, 1995), but this must also meld with two other influential categories of thought in Cambodia: local conceptual space (derived from language, lore and spirituality) and utopian thought (Hedré, 2008). Mentioned above in regard to interviewing farmers was the concept of the “rice goddess”, which is a spiritual and mythical construct with some influence on the way people conceive of purity and rice cultivation. In my previous research, the cow is often seen as a “member of the family”, which inevitably impinges on livestock raising practices and other animal labor activities. Newspapers, radio and television are also media institutions that have quite a reach into the countryside—they form and are formed by discursive practices. Politicians and political campaigns are additional players in the construction of imagery. To the extent that such influences change and are being changed by the discourses of sustainable development, organic agriculture, tradition and modernity, they become important explanatory factors for and of paradigmatic changes in society. As a “methodology”, discourse analysis will merely be used as an overarching interest used and examined in all of the other methodologies explained above.

#### 4.0 RESEARCH QUESTIONS AND SUB-QUESTIONS

1. (Recursive Innovation) How are food production-consumption systems in Cambodia evolving to meet the technical and social needs of farmers and consumers in the context of the diffusion of alternative agricultural systems?
  - a. What is the nature of the heterogeneity of farming practices—flexibility, resource constraints, and/or style?
  - b. What is the market segmentation by social/economic class and what are the cross elasticities (i.e., demand is more resistant to price changes) for socionatural hybrids compared to conventional produce?
  - c. What is the scale of new investment and consumption in the sectors for socionatural hybrids and is thisprecedented?
2. (Transfiguration of Imagery) What types of production and consumption ideals are attached to socionatural hybrids and how much social currency do they represent?
  - a. What is the scale of marketing efforts for socionatural hybrids and what are the dominant messages contained therein?
  - b. What are the motivations of producers of socionatural hybrids and what identity elements are becoming associated with socionatural hybrids?
  - c. What roles do ecological literacy and understandings of rural life have to play in building the social identities behind socionatural hybrids?
3. (Strategic Niche Branching) What is the dynamic behind the diffusion of production and consumption practices for socionatural hybrids? Viral, decentralized, bottom-up, etc.
  - a. To what degree have alternative cultivation techniques been spread by people and social expectations as compared to development interventions?
  - b. Through what channels have messages attached to socionatural hybrids migrated? Market information, rumor, demand, development initiatives, etc.
  - c. To what degree is maintaining the growth in socionatural hybrid cultivation and promotion dependent upon donor funding and how has independence been achieved by some actors?
  - d. What is the dynamic of the spreading—is it gradual, cumulative, sudden?—and are there thresholds at which different dynamics begin or end?
4. What is the nature of the communication and discourse between actors attached to production systems for socionatural hybrids and those of modernist agronomic orientation?
  - a. How do figures within these various institutions (esp. CARDI and CEDAC) see their political relationship with the other, and what influence does this have on cooperation, academic exchange and dialogue?
  - b. What is the nature of ideological and practical disagreements? Critical, open, antagonistic, etc.
  - c. Have relations between modernizationist and agroecological institutions improved, worsened, or remained unchanged, and upon which controversial issues have the conflicts focused? Where is the common ground?

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