

## **Social Entrepreneurship as a Mechanism for Agro-Innovation: Evidence from Doi Tung Development Project, Thailand**

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### **Abstract**

*Numerous attempts have been made to conceptualize social entrepreneurship in terms of Schumpeterian entrepreneurship theory and Sen's capability approach. This paper aims to examine social entrepreneurship as a practical mechanism for facilitating technology adoption within the agro-innovation system. A study of technology adoption among participants in the Doi Tung Development Project (DTDP), a long-running social enterprise in northern Thailand, revealed significant adoption of new technologies and accompanying welfare benefits for project participants since the project's launch in 1988. The study also identified three modalities for institutional interventions by DTDP, categorized by their primary functions in risk reduction, knowledge-provision and welfare-enhancement. The empirical findings help to affirm the significance of institutional interventions financed under the social entrepreneurship model in delivering the positive long-term welfare outcomes seen at DTDP. The study concludes that social entrepreneurship can serve as a viable and sustainable practical mechanism for facilitating agro-innovation.*

**Keywords:** social entrepreneurship; rural development; technological innovation; agricultural innovation systems; Thailand; Doi Tung

### **Introduction**

Social entrepreneurship (SE) has recently emerged as a practical response to social exclusion, and to serve needs left unmet by traditional support structures (Thompson et al., 2000). The success of many such SEs invites examination of the institutional factors underpinning their accomplishments.

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How, for example, have SEs, often with minimal access to resources, been able to tap into a reservoir of socially useful innovations and facilitate adoption outside the context of mainstream research and development? Moreover, how does SE fit conceptually into the overall theoretical context of innovation for sustainable development?

The answers to such questions are of more than academic interest; they also carry potentially important implications for the world's rural poor. This paper aims to explore SE as a market-driven mechanism for facilitating adoption of agricultural technologies and enhancing small farmer welfare, using a case study of a long-running SE in agriculture: the Doi Tung Development Project (DTDP), located in northern Thailand. The paper is organized as follows. Starting with a brief review of literature covering technology transfer in agriculture, the role of institutions and the emergence of SE as a development approach, an overview of the DTDP is then provided before introducing the research questions, methodology and sampling framework for the current study. Empirical findings are then presented and used to derive a new conceptual framework for SE as a mechanism for facilitating technology adoption. The paper concludes with some implications for the broader utility of SE within agro-innovation systems.

### **Literature Review**

To provide context, the review begins with an outline of the evolution of approaches to technology transfer from linear 'technology-push' to systemic models such as the agro-innovation system (AIS). The central role of institutions in influencing technology adoption is then discussed, followed by an overview of social entrepreneurship as an emerging development paradigm.

#### **From 'technology push' to agro-innovation system**

Since the Green Revolution, transfer of agricultural technologies to farmers has followed the traditional 'technology-push' linear model of technological innovation. Technologies generated by universities and National Agricultural Research Systems (NARS) were transferred to farmers via extension agencies as a one-way process in which farmers were passive recipients of technology (Waibel, 2006). For the past 30 years, the NARS approach has remained as the dominant paradigm and driver of research and technological innovation in the agricultural sector. More recently, development practitioners (e.g. Hall et al., 2006) pointed to the inadequacy of the linear model in informing policy and practice in an increasingly complex environment that must balance social, environmental, ethical and economic interests. In particular, these authors note that the linear model does not take into account the 'institutional ecology' that surrounds the adoption decision, and neglects the presence of multiple sources of innovation as well as the role of tacit knowledge. The shift also reflects the need for new ways of technology deployment to align with prevailing socio-economic contexts (Hall et al., 2006; Hall, 2007). Spielman and Birner (2008) argue that these influences contributed to a shift towards a more inclusive and system-based theoretical context (the agro-innovation system, or AIS). Participatory, grass-roots and multi-stakeholder approaches such as 'sustainable', 'inclusive', and 'alternative' development (Rajalahti et al., 2008) all place farmers, rather than researchers, at centre-stage. Approaches vary: whilst Rajalahti's group views AIS in terms of key component institutions, Spielman and Birner offer the following definition:-

*"... a move away from a more linear interpretation of innovation as a sequence of research, development, and dissemination, to an interpretation that recognizes innovation as a complex web of related individuals and organizations... - all of whom contribute something to the application of new or existing information and knowledge".*

In summary, AIS attempts first to place farmers at centre-stage; and secondly, to accommodate the multi-dimensional nature of innovation generation, knowledge flows and linkages among system actors. In view of the increasing significance attached to this 'institutional ecology' in mediating technology adoption, the role of institutions is next considered.

#### **Role of institutions**

Institutions (such as policies, regulations, customs, standards and norms) profoundly affect innovation adoption in agriculture. Nelson (2008) stresses the importance of institutions for competitiveness and economic growth, while Gijssberg (2009) observes that outdated or inappropriate institutions may impede or distort the processes of generation and adoption of technological innovation. North (1995) coined the term 'institutional path dependence' to explain the persistence of outmoded policies, rules and incentives. Thus, failures by governments or private sector actors to ensure that key institutions keep pace with technological advancement result in inefficiencies that lead to declining adoption rates, with consequent impacts on competitiveness. Fostering an enabling and updated institutional framework is thus considered crucial to effective technology transfer within the AIS.

## SE as a development approach

The term 'social entrepreneurship' was coined by William Drayton and others to describe businesses with a mission to address social exclusion and empower specific disadvantaged communities or target groups (Drayton, 2006; Leadbeater, 1997). Around the world, SEs deliver services such as extension, credit, renewable energy, mobile technologies and affordable housing to the marginalized and underserved – often faster and more efficiently than governments can accomplish (Thompson et al., 2000). Proponents argue that the grass-roots participatory approach allows efficient targeting of resources and reinvestment of cash flows generated, contributing to long-term sustainability (Drayton and MacDonald, 1993). Nevertheless, despite growing interest among practitioners, researchers and policymakers, SE theory and understanding has lagged behind practice (Peattie and Morley, 2008; Short et al., 2009); scholars have yet to reach consensus even on definitions (Light, 2006; 2008; Nicholls, 2006; 2009). Moreover, despite the widely-publicized success of early SE initiatives such as Ashoka and Grameen Bank in legitimizing and mainstreaming the SE concept (Ashoka Foundation, 2007), attempts to conceptualize SE (e.g. by Swedberg, 2009, or Ziegler, 2009) have generally focused on its roots in Schumpeterian entrepreneurship theory (Schumpeter, 1934) and Sen's capability approach (Sen, 1999); the conceptual engagement between SE and sustainable development has been inadequately explored (Seelos and Mair, 2006; Mair, 2010).

Acknowledging the definitional dilemma, in 1996, the European Commission's 'EMergence des Entreprises Sociales en Europe (EMES) set out to identify economic/entrepreneurial and social criteria by which SEs could be defined (EMES, 1998), reflecting the economic and social dimensions of SEs. The EMES construct (Table 1: *EMES criteria for the 'Ideal-type' of SE*) was influenced by several disciplines (economics, sociology, political science and management) and is recognized as a robust framework for describing SEs (Defourny&Nyssens, 2010). The Doi Tung Development Project in Chiang Rai, northern Thailand was selected as an example of a long-running SE in the field of agricultural development and was assessed for its 'fit' with the EMES criteria for social enterprises. The following section provides an overview of the project.

## Overview of Doi Tung Development Project (DTDP)

Located in Chiang Rai Province, northern Thailand, DTDP occupies a mountainous 150km<sup>2</sup> of national forest reserve bordering Myanmar (Figure 1: *Location of survey area*). Founded in 1988 under the patronage of the late Princess Mother, H.R.H. Princess Srinagarindra to provide sustainable livelihoods for the area's mostly stateless and landless shifting cultivators, DTDP aimed to reforest and rehabilitate the severely degraded environment, eradicate opium cultivation and stabilize an ethnically diverse population. According to project staff (DTDP, 2012) the project focuses on three fundamental pillars: health, livelihood development and education; the project offered alternative livelihoods in agriculture, forestry, handicrafts, tourism and food processing. Today, DTDP operates in part through its corporate subsidiary, Navuti Co. Ltd., whose profits are reinvested by DTDP into the community's social development initiatives (primarily health and education). Farming under the project is mainly based on agroforestry, and the project has introduced high-value crops such as coffee, tea, macadamia, fruit trees, cut flowers and ornamentals. DTDP claims that by upgrading farmer skills and promoting adoption of appropriate technological and market innovations, the project can 'build human capital and catalyze full economic and social integration' (DTDP, 2011). DTDP's people-centric approach has evolved iteratively through lessons learned, resulting in a set of development principles incorporating market mechanisms to drive innovation and create opportunities for sustainable livelihoods, both on- and off-farm. Moreover, these development principles are applied in DTDP's outreach programmes in Aceh, Afghanistan and Myanmar, under very different technological and socio-economic contexts, suggesting wider potential utility for the model. Nevertheless, despite the global recognition of DTDP's accomplishments in reforestation and opium eradication, there remains a lack of empirical studies to elucidate institutional drivers of success for the DTDP, or to propose a conceptual model for SE with wider utility as a mechanism to link small farmers to global value chains. The current study attempts to address this gap.

## Research Questions

The literature review highlights the dependence of innovation performance on institutional as well as technological factors; the AIS concept embraces the influence of institutions (such as policies, regulations, customs, standards and norms, as distinct from organizations) on adoption processes. In essence, the AIS may be viewed as a roadmap describing patterns of information flow among system actors, identifying constraints and suggesting potential entry points for development intervention. However, beyond its utility in mapping the 'institutional terrain', AIS provides no explicit guidance in identifying practical implementation mechanisms to enhance long-term system efficiency. This limitation offers an entry point for the current research, which aims to elucidate the potential of SE as a practical mechanism for delivering agro-innovation outcomes. Based upon this rationale, two research questions may be posed:

**RQ1:** What factors influence technology adoption among smallholder farmers?

**RQ2:** How do DTDP's institutional mechanisms support technology adoption to enhance long-term farmer welfare?

The current study addresses these questions using the methodology described below, focusing on the function of the DTDP entity as a social enterprise, rather than on individual farmer entrepreneurship.

### **Research Methods**

Mixed methods were used to explore the subject from various perspectives, using methodological triangulation (Denzin, 2006) to interpret and validate empirical findings. Secondary data from an annual household census of Doi Tung's 11,000 inhabitants enabled evaluation over time of household welfare across a broad range of economic, social and environmental parameters. The census data also allowed corroboration of cross-sectional primary data from two sources: (a) semi-structured in-depth interviews with 32 expert stakeholder representatives in the fields of SE and agriculture; and (b) a questionnaire survey of 288 DTDP farm households. The semi-structured expert interviews were conducted using an interview guide to explore views on Thailand's agricultural competitiveness, public and private sector roles in agro-innovation, SEs and the DTDP's goals and principles, challenges, management processes and outcomes. Respondents included representatives from DTDP, agricultural development specialists, social enterprises, government agencies, private sector agribusiness and academia. A category system was used to analyze the coded data, following Patton (2002). Guided by the in-depth expert interviews, a Thai-language questionnaire was designed to assess technology adoption among DTDP farm households. The questionnaires were completed with the assistance of trained enumerators from the DTDP's Social Development Department during face-to-face interviews with project participants, conducted in the appropriate local language/dialects. The survey was conducted during November-December 2011. Responses were coded and analyzed using IBM SPSS v. 19.0 to generate descriptive statistics.

### **Population and Sampling Framework**

A total of 288 households from a total population of 1,783 farm households within DTDP were selected for interview using multi-stage sampling. The locations of survey samples are shown in Figure 1: *Location of survey area*). Using the household as the unit of analysis, four main sample strata were identified during a preliminary survey to maximize intra-group homogeneity and inter-group heterogeneity. Sample stratification was based on cropping systems and the distinct institutional contexts of each of these groups vis-à-vis land tenure, knowledge acquisition and preliminary assessment of technology adoption. The four dominant cropping systems were: integrated farming (multiple cropping), coffee, ornamentals and macadamia nuts. Coffee-growing households were further divided into three sub-strata, reflecting differences in land tenure and production arrangements. Stratum and substratum characteristics are summarized in the population and sampling framework shown in Table 2 (*Household survey: population and sampling framework*).

### **Results**

Empirical findings are presented below in the context of the study's two main research questions, drawing upon both secondary and primary sources to examine adoption levels, factors influencing the adoption decision, DTDP's institutional interventions and fit as a social enterprise, and the project's welfare outcomes.

#### **Adoption of technological innovation among DTDP households**

Respondents reported adoption of a range of agricultural technologies as follows:

- Soil conservation measures (terracing, check dams, soil mulching, cover crops such as Vetiver grass (*Chrysopogon zizanioides* L. Roberty), and soil fertility testing)
- New crops (coffee, macadamia, fruit trees, ornamentals)
- New farming systems (agroforestry, multi-cropping systems)
- Organic fertilizers (manures, organic composts)
- Water management (check dams, piped irrigation and sprinkler systems)
- Mechanization (grass cutters, tea pruners, post-harvest processing of tea and coffee)
- Use of chemical fertilizers, insecticides and herbicides.

Although routinely adopted elsewhere, prior to project start these technologies were virtually unknown to the shifting

cultivators occupying the area; DTDP farmers have adopted and adapted technologies and learned new skills through an iterative 'learning-by-doing' innovation process mediated by DTDP. Adoption levels for all sample groups combined are shown in Figure 2 (*Technology adoption in DTDP, all sample groups*). The most widely adopted category was soil conservation (58.3% of survey respondents), followed by chemical fertilizers (47.9%) and local production and use of organic fertilizers (38.9%). These priorities indicate awareness of the need to sustain long-term soil fertility and protect against the high risk of landslides. Moreover, three of the four most frequently adopted innovations (soil conservation, organic fertilizers, water management) entail collective decision-making as well as individual endeavour, suggesting a strong degree of cooperation and social cohesion in DTDP communities. The significant uptake of long-term land management measures, along with the collective action required to implement them, suggest a shared, long-term commitment or sense of ownership among beneficiaries.

Moreover, in-depth interviews with DTDP executives and staff revealed a selective policy towards screening technologies to recommend to farmers. In general, new technologies are favoured if they (a) have zero or low capital requirement; (b) can be readily adopted by unskilled farmers with a low level of risk; and (c) can create social/environmental, as well as individual benefit. For example, mechanization is generally limited to the use of small machinery such as grass-cutters, since to promote further intensification would risk displacing farm labour. Technologies or practices that carry known inherent environmental risks (e.g. use of chemical pesticides) are recommended only where there are no feasible alternatives. Innovations held to contribute to long-term sustainability are most favoured. Technology screening is thus used as a key tool for shaping the trajectory of sustainable development at DTDP.

### **Reasons for technology adoption**

The farm survey examined seven potential reasons for adoption among farmers, categorized as monetary or non-monetary drivers. Table 3 (*Drivers of adoption of technological innovation*) summarizes the responses. Considering all sample groups combined, the most frequently-reported reasons given for technology adoption were peer pressure (other farmers / recommendation from DTDP staff, 30.5%) followed by cost reduction (26.8%) and environmental conservation (16.1%). Table 3 also reveals differences in prioritization across sample groups, with respondents within the integrated farming group reporting strongest concern for the environment (25.6%). The ratios of monetary : non-monetary drivers indicate that growers of coffee (NSR2 group) and ornamentals are the most commercially oriented of the six sample groups. These respondents are the most intensive users of external chemical inputs and place highest priority on monetary factors in the adoption decision. In aggregate, 38.1% of survey respondents reported DTDP as the primary source of technical knowledge and advice.

Though the prominence of short-term financial drivers among respondents from all groups is itself unsurprising, the relatively high mean frequency of environmental conservation (16.1%) as the primary reason for adoption also points to a longer-term perspective among beneficiaries. Overall, the data indicate (a) a stronger than expected influence of non-monetary drivers in the adoption decision; and (b) DTDP's role as the primary communication channel for delivery of technical advice and knowledge.

### **Typology of DTDP institutional interventions**

Project documentation and interviews with DTDP staff identified a range of institutional interventions targeting project beneficiaries. These interventions were categorized according to one of three primary functions- risk reduction, knowledge provision, or welfare enhancement. The typology shown in Table 4: *Typology of institutional interventions at DTDP* categorizes DTDP's key interventions by these primary functions. Following this typology and acknowledging its limitations—these categories are neither exhaustive nor mutually exclusive—the distribution of institutional measures may also be compared. Overall, an even balance among the three categories was apparent among the types of services delivered, lending support to DTDP's claim to apply a 'balanced, holistic approach to sustainable alternative agricultural development' (DTDP, pers. comm., January 2012).

### **Organizational form, governance and implementation mechanisms**

Table 5: *DTDP- defining criteria* draws from the findings of in-depth expert interviews, field observations and project documentation to compare the extent to which DTDP's organizational form, governance and implementation mechanisms fit with the theoretical framework for SEs proposed by EMES (Table 1: *EMES criteria for the 'Ideal-type' of SE*).

With the exception of the indicator requiring 'Minimum amount of paid work', the analysis indicates close congruence between DTDP's institutional framework/business model and the EMES economic/entrepreneurial and social criteria. In

regard to the ‘paid work’ criterion, for DTDP creating alternative farm and non-farm employment is a key social goal; today the project directly employs 1,700 local staff. Given this overall congruence, and subject to some caveats, DTDP may reasonably be accepted as a proxy for SEs within the sphere of sustainable agricultural development.

### **Welfare outcomes**

Evaluation of welfare outcomes of DTDP was based on empirical findings and corroborated by secondary data. As part of the farm survey, twelve welfare criteria were selected to evaluate economic, social and environmental perspectives. The findings are shown in Figure 3 (*Perceptions of welfare, by group*). Survey responses reveal satisfaction with DTDP’s institutional interventions, with coffee growers (NSR2 group) reporting the most positive responses. Overall, 84.6 percent of the combined sample reported their lives were ‘much better’ or ‘very much better’ under DTDP. Corroborating this finding, longitudinal data from the Doi Tung annual socio-economic census from 1988 to 2010 (DTDP, 2011) reveal continuously increasing economic welfare among Doi Tung residents (Figure 4: *Net disposable incomes for DTDP participants, 1988-2010*). Annual per capita incomes increased 12-fold from Baht 3,772 in 1988 to 43,633 Baht (US\$ 1,468) p.a. in 2010. With the exception of the years 2005-2006 (attributed by DTDP to data collection errors) net disposable incomes per capita increased over tenfold from Baht 1,576 p.a. in 1988 to Baht 24,268 p.a. in 2010 (1,440 percent). At Baht 278,077 p.a., 2009 DTDP average annual household incomes in Doi Tung exceeded the national average of Baht 250,836 p.a. (National Statistical Office, 2011).

The census data also record long-term improvements in technological, social and environmental indicators. For example, the data indicate that the population of Doi Tung now enjoys universal access to primary and secondary schooling and health services, and that forest cover in the Doi Tung area increased by 70 percent between 1988 and 2003, significantly enhancing biodiversity and contributing further to tourism-related employment and income.

### **Discussion**

#### **Factors influencing technology adoption**

The empirical results offer evidence to address the study’s two main research questions. Considering RQ1 (factors influencing technology adoption), the farm household survey reports adoption of a range of agricultural technologies, many of which have led to profound social, economic and environmental change. The survey also shows that adoption has been mediated primarily by DTDP, which is considered the most trusted and authoritative source of advice, and in some cases, the only source cited. Although monetary drivers (buyer needs, cost reduction, higher market price, and reduced production risk) were most frequently reported as the primary reason for adoption, non-monetary reasons (peer pressure, protection of the environment) were also important. Moreover, collective implementation of some technologies suggests a long-term perspective among farmers, in keeping with the project’s sustainable development philosophy.

The second research question RQ2 concerns DTDP’s institutional interventions and their modality; the study has identified a range of specific institutions that influence technology adoption via three primary modalities: risk reduction, knowledge provision and welfare enhancement (see Table 4: *Typology of institutional interventions at DTDP*).

DTDP’s risk-reducing interventions serve to shift the burden of risk borne by individual farmers to the project itself until innovations (both technological and market) are deemed to be viable and sustainable for farmers to bear individually. Such risks include production risks, technology risks and market risks. The project’s collective approach also reduces perception of risk among farmers, increasing confidence and encouraging individual adoption. Secondly, in regard to land tenure, although land occupants cannot hold legal land title due to the area’s status as a forest reserve, the project guarantees and protects usufruct rights for occupants by issuing its own land registration certificates based on cadastral survey, along with project identity cards. Such security would be expected to incentivize long-term maintenance of soil fertility and environmental conservation by farmers. Thirdly, by offering a guaranteed market for produce, market risk is eliminated, though a number of growers choose to exercise their right to sell to external buyers.

Knowledge-providing interventions enhance farmers’ capacity to access technologies, increase productivity and make informed choices between farm and off-farm employment. DTDP’s extensive external linkages both in Thailand and within the international development community provide access to a rich pool of expertise and technology, facilitating delivery of advice and technical support to beneficiaries. Most fundamentally, public welfare services (health, education and infrastructure) form an essential prerequisite for development, justifying the early introduction of basic ‘welfare-enhancing’ measures in DTDP’s first phase.



Thus, the proposed typology of institutions offers a framework for analyzing DTDP's specific institutional interventions and for identifying those that may have been 'over-delivered'. For example, having shielded participants for years through risk-reducing institutions, it may be timely for DTDP to review exit strategies to accommodate a more realistic perspective on present needs and vulnerability to risk.

The strong positive welfare outcomes revealed by the farm survey and census data are consistent with DTDP's goals, approach and specific institutional interventions. The congruence of DTDP's organizational form and practical approach with the EMES criteria for SEs validate DTDP's utility as a proxy for SEs in agricultural development. Taken together, the cross-sectional data from the farm survey and in-depth interviews, corroborated by the longitudinal census data, support the contention that social entrepreneurship, as represented by DTDP, can be considered as a viable practical mechanism to facilitate agro-innovation and enhance farmer livelihoods within a sustainable development paradigm.

### **Towards a new conceptual framework**

The evolution of development practice from a remote, top-down modality to a grass-roots participatory approach has followed a theoretical progression that reflects increasing appreciation of the systemic nature of technological innovation, institutional learning and knowledge flows among system actors. Thus, with SE as a grass-roots, farmer-centric development mechanism, a locus for SE within the broader AIS framework may be proposed as shown in Figure 5 (*Social entrepreneurship as a mechanism for agro-innovation*), building upon Hall's construct of this theoretical evolution. The proposed locus for SE as a putative mechanism for delivering AIS outcomes fits both the theoretical perspective and the empirical evidence from Doi Tung in regard to the application of institutional interventions by SEs to mediate monetary and non-monetary drivers of technology adoption by smallholder farmers.

Thus a new conceptual framework may be derived (Figure 6: *Proposed conceptual framework for SEs*) that describes the adoption process in terms of linkages between available technologies, monetary and non-monetary drivers, institutional interventions and ensuing development outcomes. The framework incorporates the typology of institutional interventions that mediate adoption through monetary and non-monetary incentives. Thus, available technologies are screened using sustainability criteria developed by the project and continually refined as an iterative process that reflects the institutional learning—held as a core characteristic of DTDP. Such a framework is especially relevant to the needs of small farmers, who are typically marginalized with limited access to land, water, credit and markets, as well as basic needs such as health and education services. The project's institutional interventions are tailored specifically to enhance small farmer welfare, as measured in its monetary, social and environmental dimensions. Most importantly, for the past 24 years, revenues generated by DTDP's SE business model have driven organizational growth and long-term financial sustainability; over the same period, its institutional strategies for technology adoption and adaptation have focused on the project's long-term social goals which principally address health, education, opium eradication and sustainable livelihoods.

### **Conclusions**

Drawing on the DTDP experience, this paper presents preliminary evidence of on-farm technology adoption and accompanying welfare benefits for DTDP project beneficiaries. The empirical findings help to affirm the significance of institutional interventions financed under the SE model in delivering these welfare outcomes. Three modalities for these interventions are identified and categorized according to their respective functions in risk mitigation, provision of access to knowledge and technical skills, and delivery of basic services such as education, health and infrastructure. In offering a framework for assessing the continuing relevance of institutional interventions over time, the typology highlights the risk of creating a culture of dependency, and underscores the importance of formulating exit strategies at an early stage in the project's development.

Based on the empirical findings, a conceptual clarification is proposed, providing new evidence for the significance of SE as a practical mechanism for delivering agro-innovation outcomes; the new conceptual framework carries implications for technology adoption and agricultural development policy. The study is limited by its single case approach; further quantitative research is needed covering multiple case studies across countries in emerging economies in order to quantify the interactions among specific institutional interventions and output variables. It would also be pertinent to investigate specific challenges to scale-up or replication of SEs, including limits to organizational growth, and the inherent incompatibility of grass-roots approaches with a distant and impersonal management associated with increasing organizational scale. These issues represent important avenues for future research.

Finally, it must also be acknowledged that DTDP has evolved within a unique institutional and leadership context; thus it

is to be expected that effectiveness of replication may be constrained without comparable levels of leadership, political support and financial resources. The focus of this study on institutional rather than organizational influences means that the significance of organizational leadership has not been considered. Nevertheless, DTDP's unique organizational context, and the personal adulation among Thai people for H.R.H. Srinagarindra, the Princess Mother, have certainly been instrumental in securing the goodwill and cooperation of government agencies and the private sector; future studies may attempt to quantify such benefits and evaluate the role of organizational leadership among SEs.

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Figures and Tables

Figures

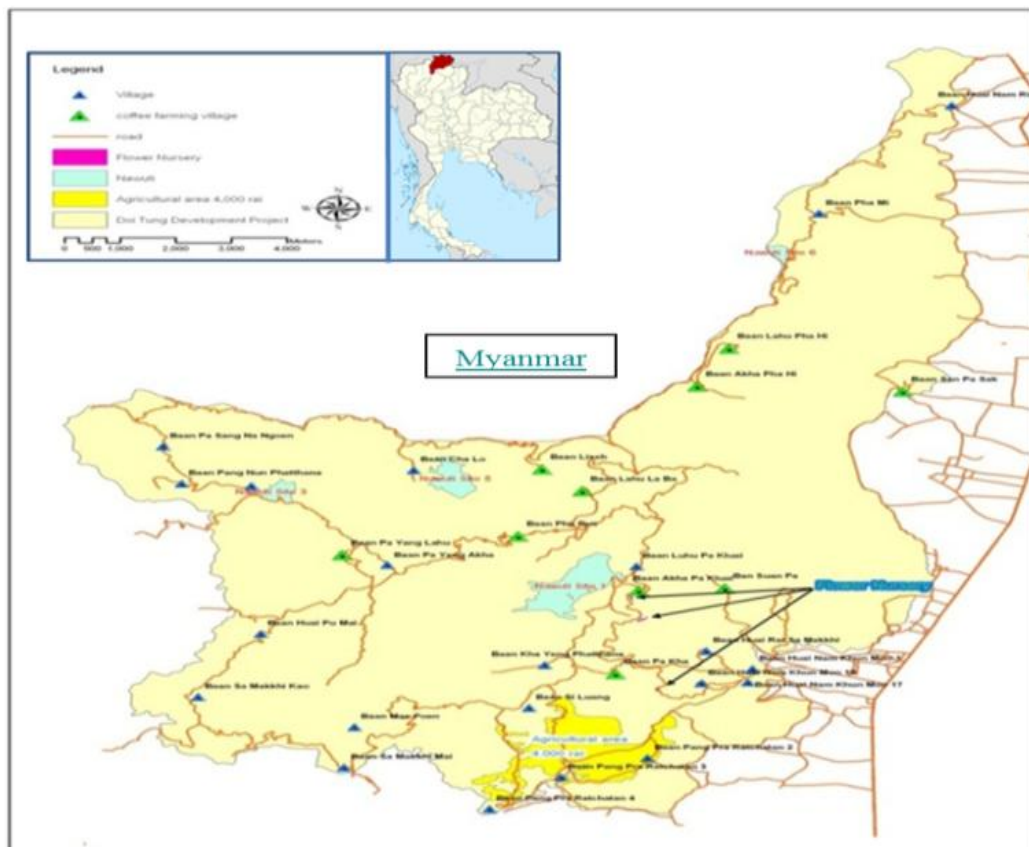


Figure 1: Location of survey area

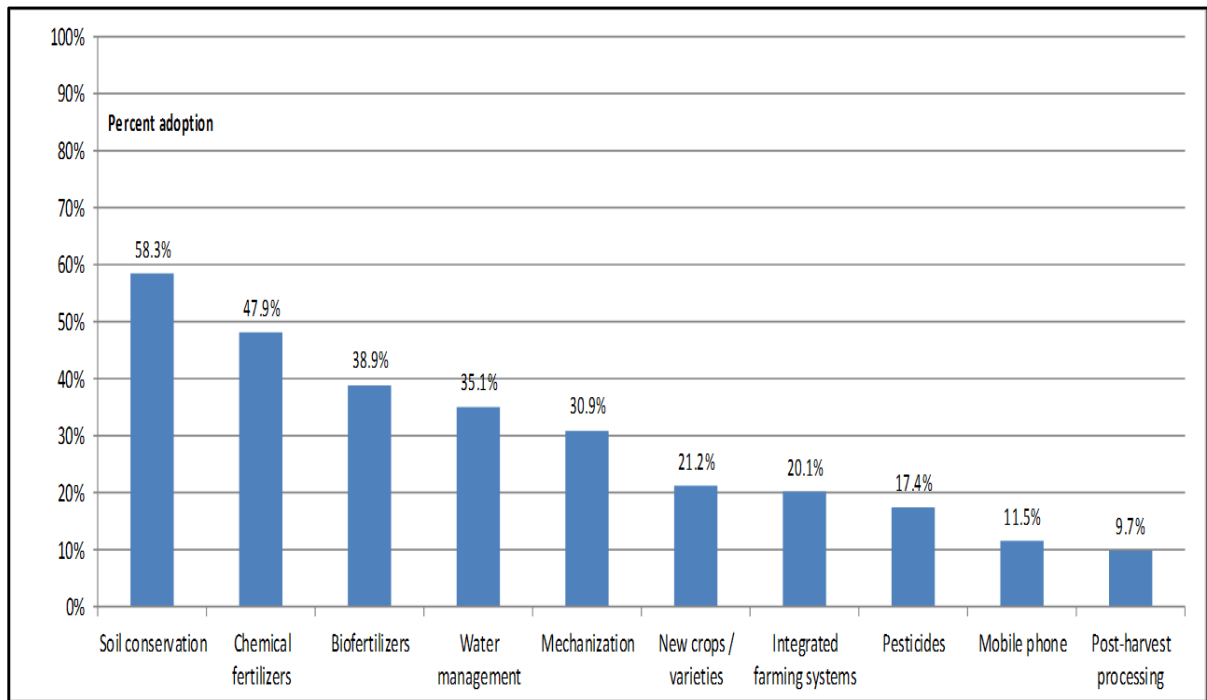


Figure 2: Technology adoption in DTDP (all sample groups)

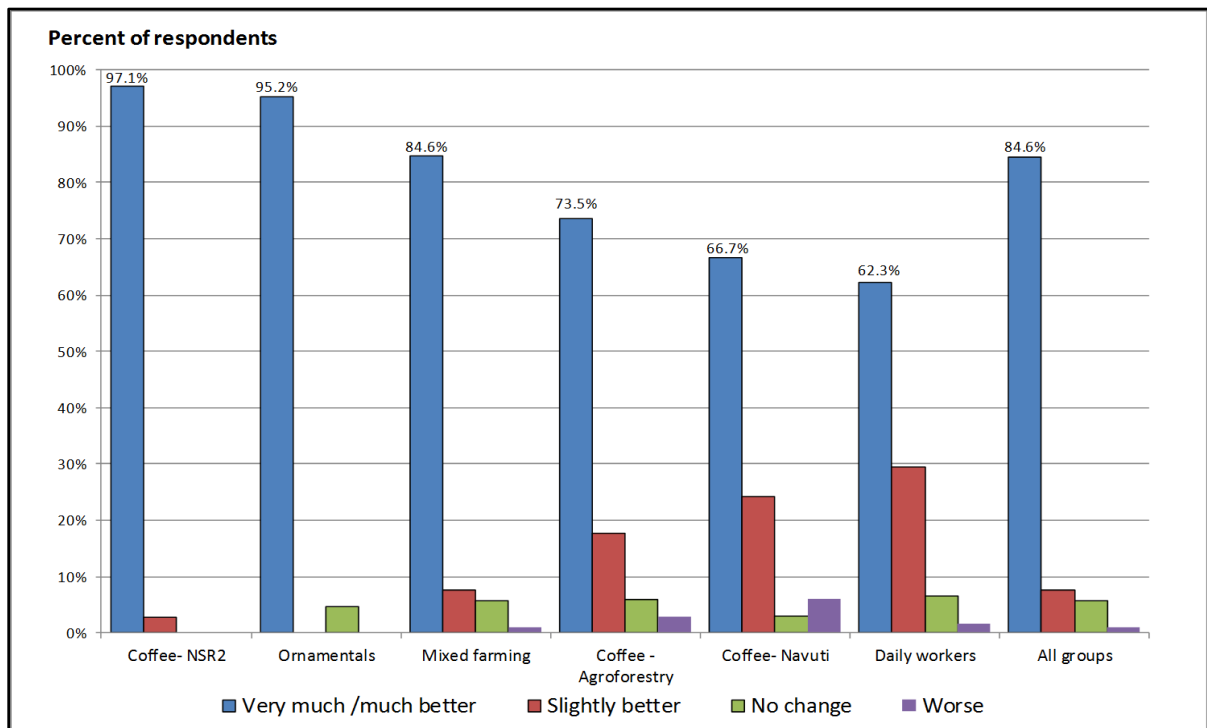


Figure 3: Perceptions of welfare, by group

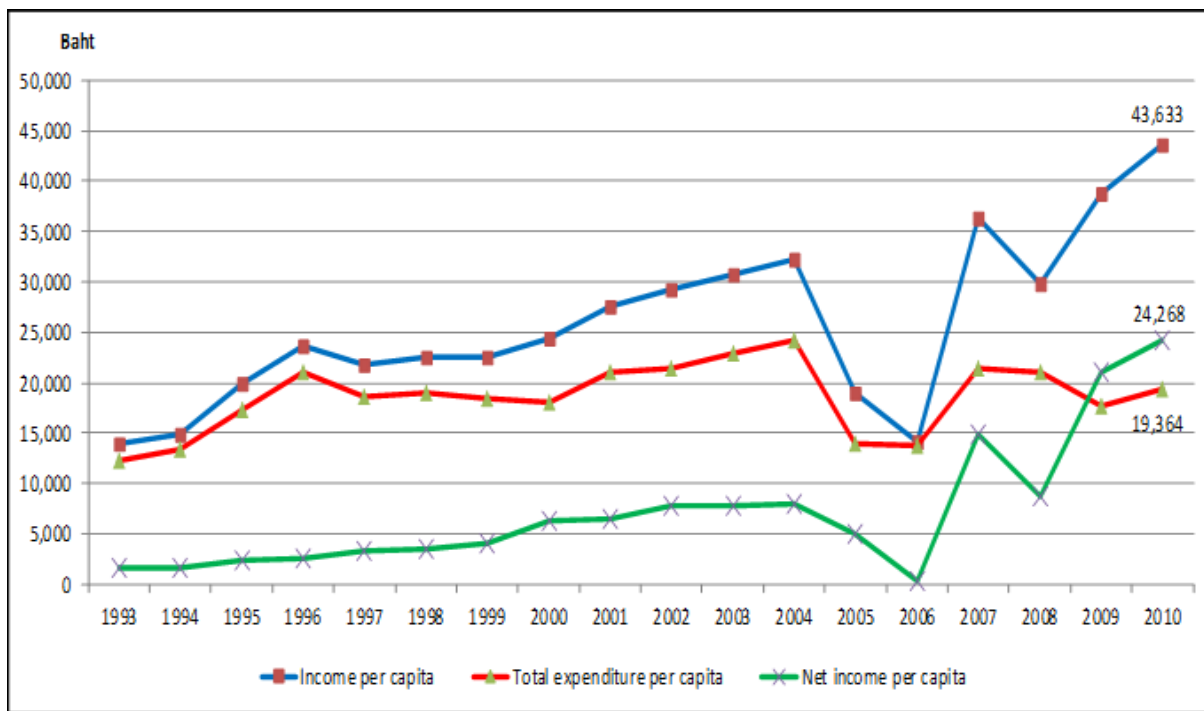


Figure 4: Net disposable incomes for DTDP participants, 1988-2010

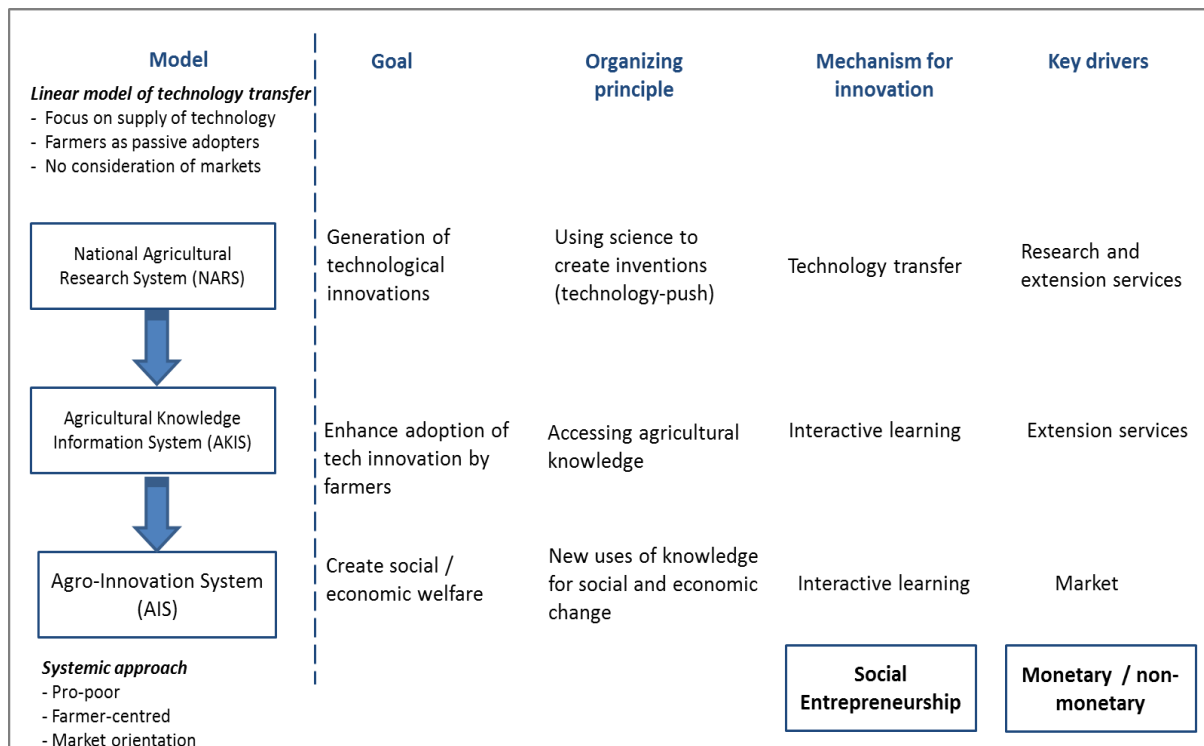
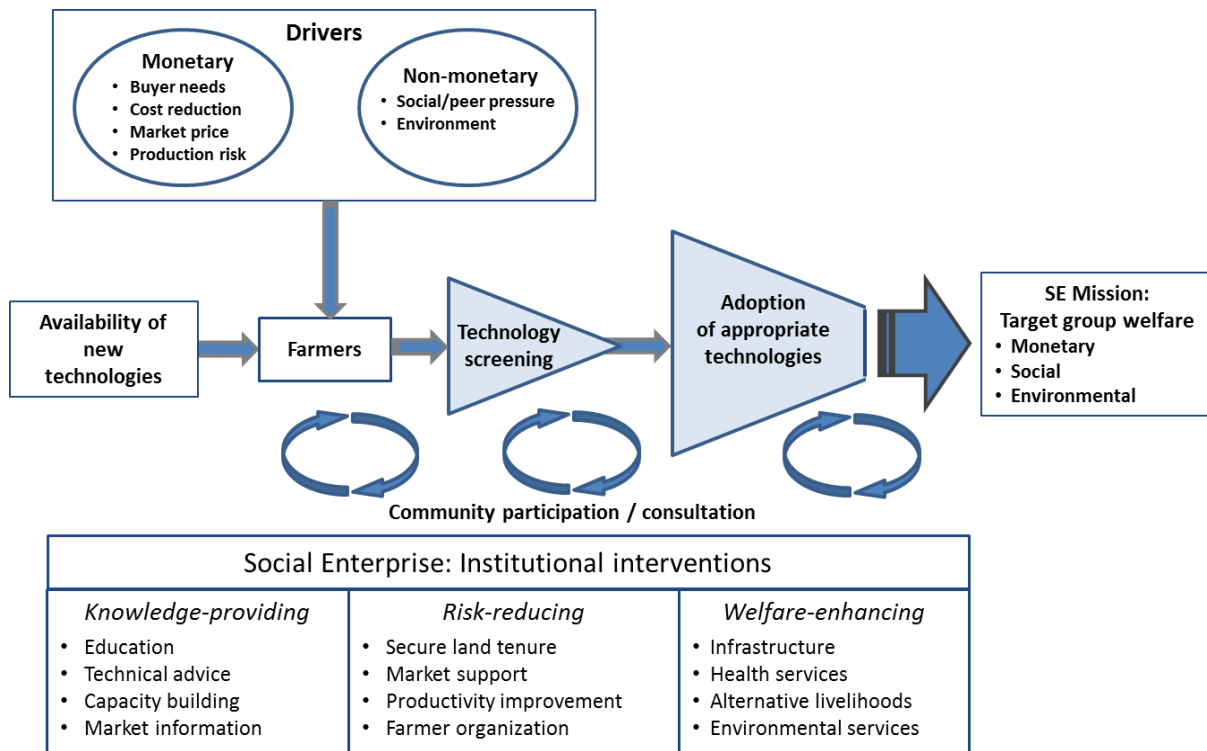


Figure 5: Social entrepreneurship as a mechanism for agro-innovation

Source: Adapted by the author from Hall et al. (2006)



**Figure 6: Proposed conceptual framework for SEs**

**Tables**

**Table 1: EMES criteria for the 'Ideal-type' of SE**

<i>Economic / entrepreneurial criteria</i>
Continuous activity producing goods and/or selling services; High degree of autonomy; Significant level of economic risk; Minimum amount of paid work
<i>Social criteria</i>
An explicit aim to benefit the community; An initiative launched by a group of citizens; Decision-making power not based on capital ownership; Participatory nature, which involves various parties affected by the activity; Limited profit distribution

Source: EMES (1998)

**Table 2: Household survey: population and sampling framework**

Sample level / description	Population		
Chiang Rai Province, Thailand	1,157,302 (2010)		
DTDP	11,000 (2010)		
Sample Groups	Population	Location (Village)	Sample size
<b>1. Integrated farming</b>	267 households	Ban Huay Nam Khun Moo 1	26
Usufruct rights for mixed farming of fruit trees, tea and rice under integrated farming system. Land certificate retained by DTDP.		Ban Huay Nam Khun Moo 17	26
		Ban Huay Nam Khun Moo 18	26
		Ban Bang Prarachatan	26
			104
<b>2. Coffee growers</b>	1,420 households		102
<b>2a. NSR2:</b>	354 households	Ban AkhaPahi	9
NSR2 land certificate issued by DTDP. Intensive commercial production		Ban San Pa Sak	9
		Ban AkhaBakKluay	9
		Ban MuserLaba	8
			35
<b>2b. Navuti Co. Ltd.</b>	77 households	Ban MuserPahi	12
No land certificates issued. Farmers rent individual coffee trees under contract farming arrangement.		Ban BayangMuser	17
		Ban Pabue	4
			33
<b>2c. Coffee under agroforestry</b>	989 households	Ban Liser	12
No land certificate. Usufruct rights to grow coffee under agroforestry system.		Ban Paka	11
		Ban Suwan Pa	11
			34
<b>3. Ornaments</b>	22 households		
Intensive production of pot plants and ornaments for sale to DTDP. No land certificates.			21
<b>4. Daily workers</b>	74 households		
Daily labourers in macadamia tree plantations; no land certificates			61
<b>TOTALS</b>	1,783 households		<b>288</b>

\*Note: Land certificates are issued by the DTDP, not by the government.

**Table 3: Drivers of adoption of technological innovation**

Drivers of adoption	Integrated farming		Coffee-NSR2		Coffee-Navuti Co		Coffee agro forestry		Ornaments		Macadamia workers		Total		
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	
<b>Monetary drivers</b>															
Buyer needs	12	3.0	4	2.9	2	2.2	28	14.9	18	14.8	1	1.1	65	6.3	
Reduce costs	147	36.8	38	27.3	36	39.1	26	13.8	19	15.1	11	12.0	277	26.8	
Higher market price	16	4.0	36	25.9	4	4.3	29	15.4	8	6.3	3	3.3	96	9.3	
Reduce production risk	29	7.3	19	13.7	6	6.5	11	5.9	44	34.9	4	4.3	113	10.9	
<b>TOTAL</b>	204	51.1	97	69.8	48	52.2	94	50.0	89	73.0	19	20.7	551	53.4	
<b>Non-monetary drivers</b>															
Peer pressure	93	23.3	23	16.5	32	34.8	76	40.4	24	19.0	67	72.8	315	30.5	
Protect environment	102	25.6	19	13.7	12	13.0	18	9.6	9	7.1	6	6.5	166	16.1	
<b>TOTAL</b>	195	48.9	42	30.2	44	47.8	94	50.0	33	26.2	73	79.3	481	46.6	
<b>RATIO</b>															
<b>MONETARY:</b>															
<b>NON-MONETARY</b>	1.05			2.31			1.09			1.00			2.70		

**Table 4: Typology of institutional interventions at DTDP**

<b>Primary Function</b>	<b>Institution (service)</b>	<b>Objective</b>
<b>Risk-reducing</b>	Usufruct rights administered by DTDP; selected farmers are granted a form of ownership when deemed capable of managing risks independently	Secure access to land
	Provision of piped irrigation	Reduce production risk
	Farmers can sell to DTDP or externally Indirect subsidies (e.g. nominal land rents)	Guaranteed markets Access to credit or subsidies
<b>Knowledge-providing</b>	Free primary and secondary schooling under the Montessori system	Education
	Regular extension and technical advice Liaison with government experts and researchers	Access to technical knowledge New farming skills
	Raise awareness and implement soil conservation measures at community level	Conserve soil fertility; landslide prevention
<b>Welfare-enhancing</b>	Infrastructure (roads, piped water, electricity)	Access to markets and other services
	Project ID cards give access to basic public welfare services (health / education)	Access to health and medical care
	Health and rehabilitation clinics	Health and medical care
	Set up non-farm business units ( <i>Saa</i> mulberry paper, textiles, tourism, confectionery) Tree replanting scheme	Employment opportunities Reforestation / environmental rehabilitation

**Table 5: DTDP- defining criteria**

<b>EMES criteria</b>	<b>DTDP institutional interventions</b>
<b><i>Economic / entrepreneurial criteria</i></b>	
Continuous activity producing goods and/or selling services	Production of food and other high-value agricultural produce and cottage industry goods / eco-tourism Build DTDP brand, and establish links to high-value domestic and international markets to ensure financial sustainability for promoted activities and extend project's options in pursuing long-term development goals.
High degree of autonomy	DTDP operates autonomously from government
Significant level of economic risk	DTDP shields farmers by assuming production and market risks (e.g. new crops/technologies, fluctuating market prices)
Minimum amount of paid work	Employs 1,700 local people directly
<b><i>Social criteria</i></b>	
Explicit aim to benefit the community	3 pillars ('Survival, Sufficiency, Sustainability')
Initiated by a group of citizens	Initiative launched by H.R.H. Princess Mother
Decision-making power not based on capital ownership	Extensive local participation in problem-solving, developing solutions, and in decision-making
Participatory nature, which involves various parties affected by the activity	Relationship between project and beneficiaries founded on trust / mutual respect. DTDP staff live and work in the communities. The project learned from lessons during implementation in an iterative people-centric process to analyze problems and identify solutions.
Limited profit distribution	No profit distribution, but indirect subsidies and non-cash benefits are provided