Understanding and Improving the Sustainability of the Silk Cottage Industry in Thailand

Applying Sufficiency Economy Philosophy and Sustainable Approaches

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Abstract

As a consequence of the 1997 Asian financial crisis and the rural economic development policy of the previous Thai government, silk production in the informal economy has expanded from micro production to small and medium size enterprises. This is because SMEs in the formal sector mostly subcontracted their orders to new entrepreneurs in peri-urban areas. To achieve a large scale production, other process tasks, such as reeling, spinning and weaving have been distributed to home workers in villages or nearby areas. Therefore, silk production has become another important source of income for agricultural areas.

However, the growth of these silk businesses has had an unexpected effect on the local environment and natural resources in rural and peri-urban areas. Extensive quantities of chemical substances and dyes, fuel-wood and water are utilised in bleaching and dyeing batch process to attain massive scale production. Due to lack of appropriate waste management, effluent is typically not treated to public health standards. Additionally, excess effluent has often overflowed onto common land or into reservoirs. This contamination has led not only to environmental deterioration but also to conflicts between villagers in relation to health and local resources utilisation, particularly in Pak Thongchai, Nakhon Ratchasima province.

Therefore, the sustainability of silk production at the Micro-Small Enterprise scale or cottage industry should be investigated. The local sustainable development concept, the Sufficiency Economy philosophy, and other tools such as the Sustainable Livelihood and Cleaner Technology concepts were employed in this project to develop an appropriate win-win solution for the silk cottage industry. Currently the informal economy plays a significant role in the rural non-farm livelihoods of developing countries in general. An outcome of this project could be the improved application of sustainability tools and concepts in order to increasing an understanding of essential factors that affected the sustainability of this traditional craft economic activity and their community.

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List of Acronyms

11th REO	The 11th Region Environment Office
AFTA	ASEAN Free Trade Area
ASEAN	Association of Southeast Asian Nations
BOD	Biochemical Oxygen Demand
CLC	Community Learning Centre
COD	Chemical Oxygen Demand
CT	Cleaner Technology
CTAP	Cleaner Technology Advancement Program
DEQP	Thailand Department of Environmental Quality Promotion
DFID	The UK Department of International Development
FAO	Food and Agriculture Organization of the United Nations
FTA	Free Trade Area
GBP	Great Britain Pound
GDP	Gross Domestic Product
ILO	The International Labour Organisation
IMF	The International Monetary Fund
LETS	Local Exchange Trading Systems
LPG	Liquid Petroleum Gas
MSEs	Micro and Small sized Enterprises
NESDB	Thailand National Economic and Social Development Board
NGOs	Non Government Organisations
NICs	Newly-Industrialized Countries
NPLs	Non Performing Loans
NSO	Thailand National Statistic Office
OTOP	One Tambon One Product
OVOP	One Village One Product
PIP	Policies, Institutions and Processes
R&D	Research and Development

List of Acronyms (cont)

RNFA	Rural Non Farm Activities
SARS	Severe Acute Respiratory Syndrome
SEP	Sufficiency Economy Philosophy
SIF	The Social Investment Fund
SL	Sustainable Livelihood
SLE	Sustainable Local Enterprise
SMCEs	Small and Micro Community based Enterprises
SMEs	Small and Medium sized Enterprises
SUT	Suranaree University of Technology
TAO	Tambon Administrative Organisation
THB	Thai Bath
UNCED	United Nation Conference on Environment and Development
UNDP	The United Nations of Development Programme
UNEP	The United Nations Environment Programme

Chapter 1
Introduction

For nearly three decades, sustainable development has been a prevalent concept in policy making and national development strategies. The promotion of economic growth and poverty reduction in rural areas of developing countries, and more specifically enhancing economic activities of the informal sector via micro enterprises is a key development intervention. As they are frequently the primary sources of livelihood of the poor, micro-enterprises are strongly intertwined with the cultural and social makeup of local communities. These informal micro-enterprises are still vulnerable to the same shocks that create crises situations in the formal sector. However, given the strong 'embeddedness' of these enterprises into the fabric of community livelihoods, measures to minimize susceptibility to social and economic crises and to prevent environmental degradation and resources depletion are a paramount development pursuit.

Given the many cultural, religious and social backgrounds that characterise societies in the developing world, the challenge of applying sustainability concepts cannot be over-estimated. Indeed, the application of sustainability must be context and site specific in order for it to have a meaningful impact on local livelihoods. This means integrating the local concept of sustainability with established internationally recognised concepts of sustainability. This could offer the possibility of contextualising sustainability in local realities and transferring lessons from elsewhere. In line with this thinking, this research aims to apply the Sufficiency Economy Philosophy (SEP), a well known sustainability concept in Thailand, with other internationally recognised tools, such as the Sustainable Livelihood (SL) approach and the Cleaner Production (CP) concept. It is anticipated that the combination of these tools would lead to the development of an appropriate strategy for sustaining local micro enterprises in Thailand.

1.1 Thai silk livelihood on the brink of unsustainable development

1.1.1 The development of Thailand

Since the early 1960s, Thailand has implemented a programme of modernization, shifting from an agricultural to a manufacturing based economy, making it one of the fastest growing developing countries in the twentieth century (Delios and Keeley 2000). However, the consequences of this rapid development have had a dramatic impact in terms of natural resources depletion, environmental deterioration and social inequality. Since the 1990s the promotion of rural industrial development, which was once regarded as an important development programme was at the centre of these problems. This strategy accelerated environmental and social problems and drove many people from the agricultural to the manufacturing sector. The widespread implementation of the 'rural industrial development' programme further increased the diffusion of these problems on a national scale (DEPQ 1999).

Thailand was one of the countries hardest-hit by the Asian economic crisis in 1997 and consequently recovery was quite slow compared to South Korea and Indonesia. Up to 47.7% of Non Performing Loans (NPLs) in the financial sector and an economic contraction of 10.5% in 1998 resulted in the collapse of a large number of businesses and a sharp fall in employment (Punthasen *et al.* 2003). These macro-economic set-backs have had a dramatic effect on every aspect of Thai society, both urban and rural. In response to the crisis the Thai government has attempted to implement a number of strategies to boost and encourage the recovery of the economy at both the micro and macro levels.

With the heavy emphasis on the domestic economy, several government plans and policies have been formulated to encourage job creation and stimulate economic activities in rural areas. The 2001-2002 statistics from the Thailand National Statistic Office (NSO 2001) and the Office of Small and Medium Enterprises (SMEs) Promotion (OSMEP 2002) regarding enterprises operating in the manufacturing sector clearly show that Micro and Small Enterprises (MSEs) accounted for nearly all (99.54 per cent) of the total enterprises and 61 per cent of all jobs in the country. Therefore, MSEs have become the conduits for stimulating the recovery of the grass-roots economy since 2002.

One example of these rural economic recovery policies is the One Tambon One Product policy (OTOP). This policy aims to encourage every Tambon, or sub-district, in Thailand to develop and market its own local product or products based on traditional indigenous expertise. The Government is also providing more market channels and assistance in new management techniques to market such local products from village to domestic and international outlets. In the meantime, micro- financing support for investment in micro enterprises via the Village Revolving Fund and the SMEs bank was also provided for the MSEs (The Royal Thai Government 2001).

Although these policies appear to have helped increase income at the village level, the unforeseen consequences of social and environmental problems seem to have been exacerbated. Generally, most MSEs lack management and production control skills in commercial scale manufacturing (Wasuntiwongse 1999), and inefficient production and defective products may cause excessive waste and the wastage of local natural resources on a large scale. Furthermore, lack of knowledge about chemical substances and safe production practices have impacted on the health and safety of both producers and the general community. Together, all of these could have a harmful effect on livelihoods. These effects are strongly felt in the silk producing sector across Thailand, which is the sector investigated in this thesis.

1.1.2 Silk development in Thailand

Thai silk is an interesting and distinctive local product. Naenna (1984) stated that silk weaving is one of Thailand's most important traditional indigenous areas of expertise, in particular in the Tai Lao ethnic group. It has played a vital cultural and symbolic role, in addition to its everyday utility, in the north-eastern region of the country since pre-historic times. With its own unique pattern and style, Thai silk has become internationally recognised and is one of the most popular textile products in both domestic and international markets (Leesuwan 1987).

The Thai silk industry has shifted away from self-subsistence production[1] during the post World War II period. Many silk producers, particularly in some distinctive production sites in the Northeast such as the Pak Thongchai district in Nakhon Ratchasima province have shifted their activity from entrepreneur to SMEs level,

[1] Self-subsistence production means the production aiming for self-consumption and family use.

though the majority of producers in Thailand still work on a subsistence production basis (Sharples 1994). Nonetheless, the effects of the 1997 economic crisis have displaced the major producers in the silk industry from SMEs to MSEs level.

To minimise the burden of the increase of production costs and debt from the financial crisis, a number of SMEs in the cities were forced to subcontract purchasing orders to freelance home workers in villages. With high market demand and attractive returns, most of these home workers shifted their status from subcontractor to micro-producer. Other labourers in villages or nearby communities were hired to increase productivity, which implies that silk has become an important additional source of income for the majority of villagers in Pak Thongchai (interview with the Baan Doo silk handicraft weaving group leader, 2004).

The manufacturing of silk on the MSE scale, officially referred to as the *silk cottage industr*y, is generally done by hand and is labour intensive. To produce the same product quality as SMEs, however, some low technology devices and chemical dyes have been adopted from factories to increase productivity and save time. However, lack of skills and know-how in mass production and chemical dyeing has led to inefficient production, particularly in the bleaching and dyeing process. Difficulties in attaining correctly coloured silks make the re-dyeing process inevitable. The more re-dyeing is taking place, the more water and wood fuels are used as well as an increase in the amount of effluent from production which is discharged into public resources such as ponds, canals or nearby common land.

Repercussions resulting from degraded local natural resource have caused conflict in the local community. The strong chemical odour and intensely coloured wastewater has often affected the community's livelihoods and other farming activities. Scarce firewood in some production sites is claimed to have contributed to deforestation in local and adjacent areas (verbal communication with the chairman of Mueng Pak Tambon Authority Organisation, 2004). In recent years, many complaints have been expressed to local and provincial authorities especially in Nakhon Rachasima province, Thailand's largest silk producing area. Although the authorities have regulations to control this and can force micro-enterprises to comply, this method does not lend itself to long-term solutions without any knowledge and appropriate support regarding waste treatment management and technology for local enterprise.

1.2 Thai silk cottage industry sustainability under the Sufficiency Economy philosophy

As a result of the rural economic promotion policy, large numbers of MSEs at the village level have been enabled to carry out non-farming activities for additional income. It is found that there are two types of operating MSEs; Small and Micro Community based Enterprises (SMCEs) and rural entrepreneurship. The objective of SMCEs, supported by the government, is to produce and distribute goods or services in their slack period in order to generate supplementary income. Some allocated profit has contributed to community development and group members' welfare. In contrast, rural entrepreneurship, which is referred to as MSEs in this thesis, produces silk all year round as the main source of income and aims to maximise their own profit. As its business has originated from a subcontract system, production is on a mass scale and focuses on the wholesale market. These factors enable MSEs to operate freely from the government's regulation or in the so-called informal sector. However, without formal support from the government, these enterprises tend to rely on local resources as their main source of financial support to maintain their businesses in highly competitive markets (Vongkul 2003). These entrepreneurs will not be able to continue their non-farming businesses long term if they do not address the issue of degraded local resources.

As one of the main products in the north eastern region, the development of silk production at MSEs levels has become a strategy at both provincial and regional level in order to increase the income for the poor in the rural economy (Nakhon Ratchasima Province 2004; NESDB 2004a). Therefore, the question arising in the context of sustainable production is how to sustain silk production on a micro level in such a way that it is compatible with social and environmental systems. This would clearly require the deployment of principles and tools that support, in a practical way, the long term viability of Thai silk MSEs. The objective of this study is to understand and identify key factors related to the development of the Thai silk cottage industry as well as the impact of this livelihood on community sustainability. The research will use the Sufficiency Economy Philosophy with other widely used sustainability tools, namely the Sustainable Livelihoods and Cleaner Technology concepts, as a way to

provide the vision and implementation of a durable strategy for reinforcing sustainability of Thai silk MSEs.

To increase understanding of these three concepts and their potential role in the development of an appropriate strategy for Thai micro enterprises, each method is briefly discussed. Firstly, the Sufficiency Economy Philosophy (SEP), bestowed by His Majesty the King of Thailand in 1974, is well-known and widely accepted by Thai people as well as being fully supported by the government. Thailand National Economic and Social Development Board (NESDB 2003a) reported that the aim of the SEP, derived from Buddhist perspectives, is to support individuals or organizations to be able to address short and long term problems in the economy, society, environment and culture, for security and sustainability.

Additionally, the philosophy has been widely promoted as an alternative way for Thai people to deal with potential impacts from future economic crises, especially for the poor in the agricultural sector. Several case studies have shown that, by applying the SEP, peasant livelihoods can be sustained, though there is no explicit example of using the concept in non-farming micro-enterprise businesses as yet. The concept has become a main theme of the latest two consecutive Thailand economic and social development plans which are being implemented between 2002 and 2011 (NESDB 2006a). Moreover, since the military coup in September 2006 it has been used as the key concept for national development strategy in the long term by the new government to boost economic productivity, growth, social reconciliation and transparency, people's quality of life and ethics (Kanoksilp 2006; Saengpassa 2006; The Royal Thai Government 2006; Yoon 2006). It is clear that this tool has the potential to introduce and apply sustainable approaches for the development of Thai silk micro-enterprises[2].

Secondly, another sustainability tool introduced into the Thai industrial sector over the last decade is Cleaner Production (CP) or Cleaner Technology (CT). Developed from the Pollution Prevention concept, it is viewed as an effective strategy to solve environmental problems and benefit economic aspects simultaneously (UNEP 2001). Due to the fact that it promises a win-win strategy and enhanced industrial competitiveness, CP has been increasingly accepted by Thai SMEs. In 2002, the

[2] This research started in the late of 2002.

National Action Plan for Cleaner Technology was announced in order to support CP application to the other five sectors, e.g. finance, education, agriculture, tourism and local administration (DPC 2002). With waste reduction at the source as its ultimate goal, CP auditing is introduced to explore the input and output of materials in the production processes. The CP option is recommended to increase the efficiency of resource utilisation and to reduce waste from production. In this context, CP could potentially be applied by MSEs which lack waste treatment systems. However, this concept is yet to be widely applied by MSEs.

Thirdly, the Sustainable Livelihoods (SL) framework has been chosen as a potential framework to assess the implementation of Thai silk at the MSEs level. Inspired by Paulo Freire's work on participatory development and capacity building and Amartya Sen's work on entitlements and capabilities and developed by Robert Chambers in the mid-1980s, SL has become one of the approaches used by many international organizations in order to achieve sustainable development and poverty reduction (Allison and Horemans 2006; Jones and Laverack n/d; Scott-Goldman 2001). The concept is derived from people's capacity to cope with, and recover from, stresses and shocks, and aims to maintain or enhance their capabilities and assets both now and in the future, while not undermining the natural resource base (DFID 2001).

Using systematic frameworks, SL enhances understanding and analysis of the livelihoods of the poor. Like the SEP, the deployment of the SL concept has mostly been restricted to farming livelihoods. However, Hobley (2001) stated that this concept still misses some key factors important in its application to the enterprise sector, such as market and technology change which might have an effect on the livelihood of the firm. Integration of the SL framework with the SEP, which covers more variables e.g. ethics, market, employment, etc., would offer a more comprehensive analytical framework conducive to understanding and supporting the sustainability of Thai silk MSEs.

As SEP is at the core of Thailand's present national economic and social development plans, it is expected that the strategies developed in this project will be easy to understand and will be accepted by Thai MSEs and public administrations. These strategies should not only enhance silk producers' capability to sustain their businesses, but also strengthen their communities' livelihoods. The outcome of the

project may also help the provincial and national agencies to understand more about the related factors on the development of Thai silk MSEs. This could contribute to an improvement in implementation of the relevant plans and policies for the promotion of Thai MSEs in general.

The possibility of applying the SEP, SL and CP concepts in silk MSEs is investigated to develop appropriate approaches of employing these methods in order to achieve the development of sustainability of silk production on a small scale. The project will provide some helpful approaches for other developing countries to develop their own silk cottage industry or other craft micro business in a sustainable way.

1.3 Research objectives

The objectives of this research were stated as follows:

1) To gain an insight into the factors and variables related to the growth of the Thai silk cottage industry in both traditional and modern production styles;
2) To understand the impacts of the silk cottage industry on community livelihoods and the sustainable development of communities;
3) To explore the viability of the silk cottage industry and develop an appropriate strategy to enhance the sustainability of Thai silk MSEs and SMCEs; and
4) To investigate the possibility of applying and integrating the SEP with the SL and CP concepts in order to promote the sustainability of the Thai silk cottage industry.

1.4 Thesis Organisation

As an overview of this thesis, Chapter 2 provides a review of the development of the Thai economy and society, the development of the Thai silk industry and the present situation of Thai MSEs and SMCEs, as well as sustainable development generally in Thailand. The information and the related research projects of the SEP, SL and CP concepts are also examined.

Chapter 3 addresses the details of the research methodology. Target selections, research scope, sampling details during the field work are presented. Six different methods, i.e. transect walks, semi-structured interviews, focus group discussions, in-

depth interviews, CP preliminary audit, and Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD) analysis, are reviewed. The remainder of the chapter shows data analysis methodology.

Chapter 4 presents the survey results of the silk MSEs in Pak Thongchai, the largest silk producing city in Thailand, as well as giving an overview of modern silk production. Data relating to silk MSEs and their communities is described in the context of the SL framework: vulnerability context, livelihood assets, Policies, Institutions and Processes (PIP), livelihood strategies and livelihood outcomes, respectively. The coping strategies developed from two out of three target communities have been summarised.

Chapter 5 covers the result of the empirical study into traditional silk production of the famous SMCE in Sida, which conducts its business in a manner which adheres closely to the principle of the SEP. The data details are presented in the same format as the MSEs indicated in Chapter 4.

Chapter 6 deals with the effect of the growth of silk MSEs and SMCE in villages on livelihood assets, policies and institutions in the SL framework. Other key factors affecting firms which are related to the SEP but which can not be clearly placed in the SL framework are discussed. The opportunities and constraints of these silk micro businesses as well as recommendations are analysed and suggested for developing Thai silk MSEs sustainability.

The possibility of integration of the SEP, the SL framework and the CP concept to investigate and identify a strategy to sustain the silk cottage industry along with the promotion of the sustainable development of the community is discussed in Chapter 7. Opportunities, constraints and recommendations for applying each method implemented in this study are discussed.

Finally, a summary of research findings and the contribution of the research are presented in Chapter 8. Further research topics relating to the development of silk MSEs and SMCEs in the future will be proposed.

Chapter 2
Literature review

In this chapter, the historical development of Thailand is briefly reviewed to provide a background of the Thai people and their way of life, particularly in rural areas. The chapter will also review how development and modernisation has affected the economic, social and environmental aspects of rural livelihoods. The role of micro-small enterprises (MSEs) and the related policies from the government in the promotion of grassroots economic activity are examined. Since silk production has been one of significant Rural Non Farm Activities (RNFA) in Thai rural society, the historical development of silk production and its contribution to people's livelihoods in the study sites are assessed in detail. Furthermore, three sustainable concepts and tools: the Sufficiency Economy Philosophy (SEP); Sustainable Livelihoods (SL); and Cleaner Production (CP) employed in this research project are discussed.

2.1 The Development of Thailand

2.1.1 Economic Context

Thailand, previously known as Siam, is located in South-East Asia. As it is situated in the centre of the peninsula, Thailand has become a land which is rich in different cultures (n/a, 2002). Thai state building started in the early 19th century, when many legal, economic, social and infrastructure reforms turned the ancient kingdom into a centrally-administered nation-state which laid the foundation for the modern Thai state (Uwanno and Burns 1998). However, while the national legal and administrative system, society and economy were reformed into the western model, there was little change at the rural village level.

Jansen (2001) and Nartsupa (1999) stated that the Thai economy had been forced to be part of the colonial economy. Rice, timber, tin and other forest goods were exported to nearby colonies. This was followed by more than a century of economic stagnation which made Thailand one of the world's poorest countries at the end of World War II. The change from subsistence economy to export-oriented economy started in the late 1950s through a modernization programme supported by the World

Bank and the U.S. government that shifted the country's development strategy towards an agricultural export and import substitution (Jansen 2001).

The fluctuation of the price of rice in the world market, which is the most important agricultural product for export, had encouraged the government to give priority to developing the industrial sector. LePoer (1987) indicated that several government policies in rice exporting, i.e. rice premiums, rice export duty and rice export quotas, helped to control export quantities and keep the price of rice in the domestic market at a low level. The impacts of these measures accounted for 30-60 per cent of the price of rice during 1950-1974 and prevented farmers from accumulating capital and investing in new technology in production (Choice 1995; Wiboonpongse and Chaovanapoonphol 2000). As a consequence, the low yield capacity of rice pushed farmers further into debt, which led to the migration of workers from agriculture to more secure industrial and service jobs in the cities. Dilokvidhyarat (1995) argued that the artificially low price of the main food product helped the government to hold down the cost of living in urban areas and prevent demands for higher wages. This meant that the readily available cheap labour in Thailand played a significant role in ensuring that Thai industry maintained a highly competitive posture in the world market.

Due to an economic recession during 1973-85, Thailand was forced to enter into the International Monetary Fund (IMF)/World Bank supported adjustment programme and began in earnest the transition in the early 1980s from an agricultural-led to a manufacturing export oriented economy (Chowdhury 1999). Phongpaichit and Baker (1998) and Delios and Kelley (2000) reported that the result of the appreciation of the Japanese yen in 1985 and the liberalization of trade and capital control in the 1990s led to an economic boom in Thailand. The country came to be classified as one of the Newly-Industrialized Countries (NICs) in Asia.

Warr (1999) reported that over the period 1950 to 1996 the average growth rate of real Gross Domestic Product (GDP) was about 7.3 per cent, resulting in a twenty-fold increase in total output and a seven-fold increase in per capita. During the decade ending in 1996, the Thai economy was the fastest growing in the world. However, this was short lived as the massive inflow of volatile foreign capital which poured into the non-trade sector, such as, real estate, stock market, telecommunication, and unrealistic

expectations of a continued boom were generating a *"bubble economy"* destined for a crash (Buch-Hansen 2001).

In 1996, the Asian financial crisis broke in Thailand and led to a severe and unprecedented contraction of the economy. The Thai government decided to implement the IMF bailout package of financial measures in late 1997 (Jansen 2001). The ensuing major reform of the financial sector, corporate governance, the secured lending regime and competition policy severely slowed economic recovery between 1998 and 2000.

The consequences of the financial crisis in terms of businesses and households were considerable. Many domestic entrepreneurs lost their businesses completely, while others lost operational strength and control. Other entrepreneurs were forced to downsize and restructure their management. All of these factors contributed to a great number of redundancies of employees (Phongpaichit 1998). More dramatically, a large number of Small and Medium Enterprises (SMEs), especially in trading and services, became bankrupt, as the economy experienced a further contraction by 1.4 per cent in 1997 and by 10.5 per cent in 1998 (Economist Intelligence Unit 2001).

To reverse this trend, the government requested for IMF assistance, and enacted a stringent set of reform measures to increase adequate net inflows of foreign reserve. The tight fiscal and monetary policy, the promotion of medium to long-tern foreign investment in business enterprises, privatisation of state enterprise and financial sector and tax restructuring were implemented to promote economic confidence at the macro level (Sussangkarn 1999). Following these interventions, the Thai economy began to show some signs of recovery in 1999, yet the high non-performing loans, excess capacity and consumer uncertainties constrained new domestic economic activities in the private sector (Bangkok Post 1999; Bangkok Post 2000).

The implementation of the *"Dual Track"* policy by the government, under Mr. Thaksin Shinawatra, in 2001 not only supported growth of the export sector and stabilization of the economy on the macro level but also promoted the domestic economy, particularly at the grassroots level. These policies included universal low-cost health care, farm debt suspension, a village fund scheme and a new support programme for SMEs (The Royal Thai Government 2001).

Consequently, the domestic economy appeared strengthened with several indicators showing significant changes for the better. The growth of GDP per year between 2002 and 2005 rose by an average of 5.8 per cent per year. Figure 2.1 shows the overview percentage of Thailand GDP growth per year since 1955 till present. Private and government consumption expenditure and investment, shown in Figure 2.2, increased significantly since 2001 (NESDB 2006a), and Figure 2.3 shows a drop in unemployment rate between 2002 and 2005 to 2.1 per cent, compared to 4.4 per cent in 1998 (NSO 2006a).

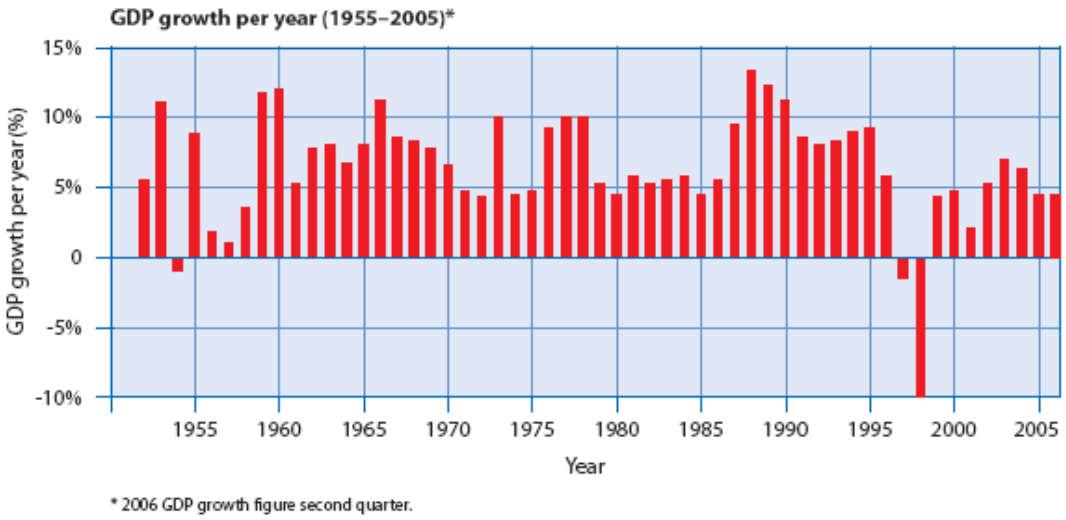


Figure 2.1: Overview of GDP percentage growth from 1955-2005

(Source: NESDB, 2006)

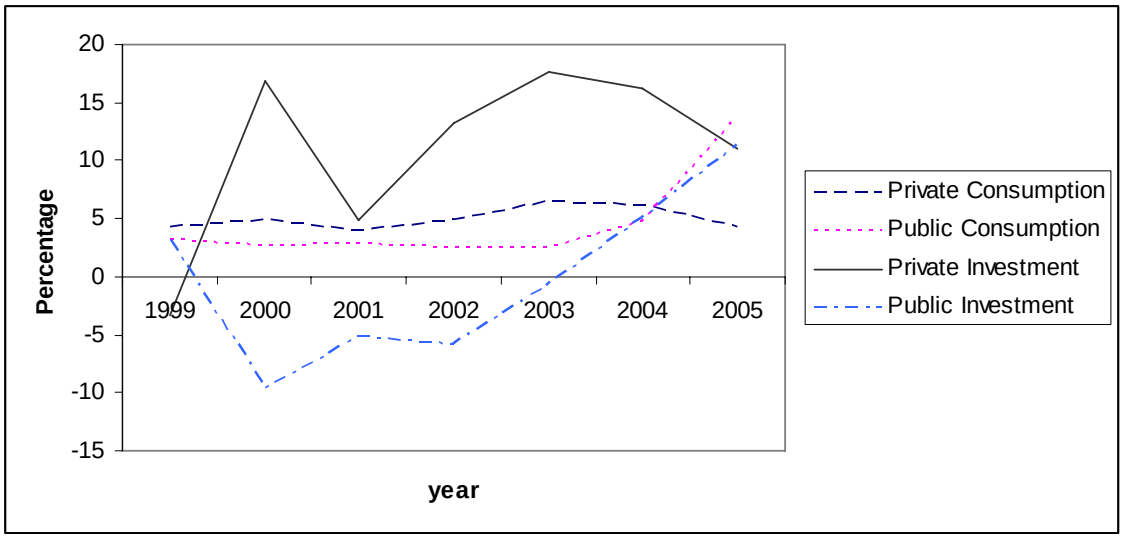
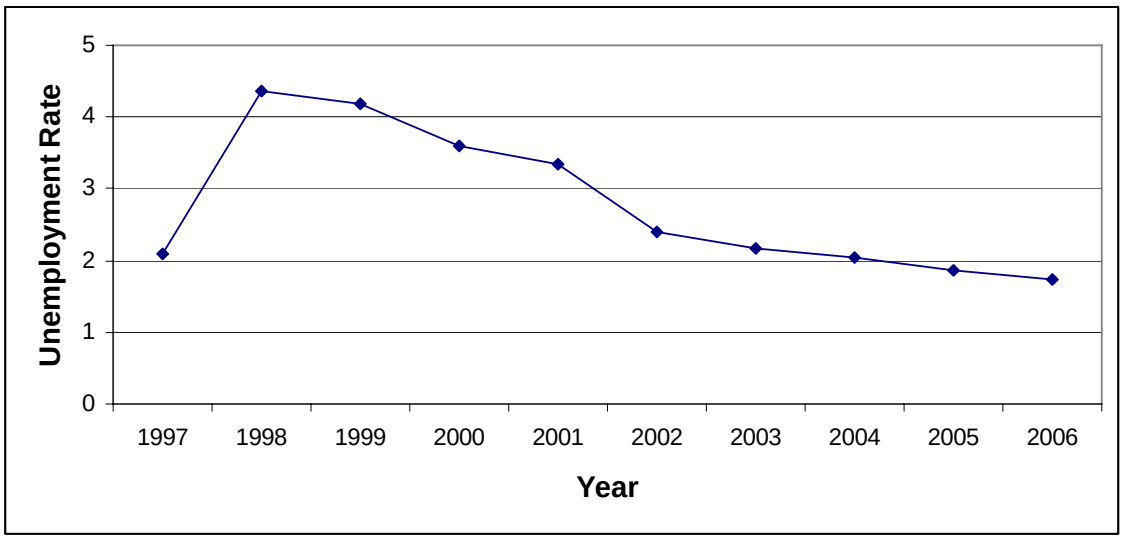


Figure 2.2: Consumption and investment percentage of private and public sector from 1999-2005

(Source: NESDB, 2006)



*2006 Unemployment figure second quarter.

Figure 2.3: Unemployment rate from 1997-2006

(Source: Thailand National Statistic Office (NSO)
and Thailand Development Research Institute (TDRI) Foundation, 2006)

The effects of the Asian financial crisis were also felt in rural areas. According to a Thai village economy research project (cited in Tubplien 2003), the Thai village economy is the largest economic system in Thailand covering the majority of the country's population. This key economic system is high subsistence with a little or almost no surplus. Strong kinship links encourage people to cooperate in social activities and help one another in a spirit of common humanity. Phongpaichit and Baker (1998) stated that the *"shock absorber"* capability of rural economy played a significant role in cushioning the impact from the urban economy. This buffer capability was based on employment in the agricultural sector and the bond in family and community. Nevertheless, the resilience of the rural economy also has its limitations because of the lack of serious support in agricultural development by the government and the migration of young labour force to the urban centres.

The Thai village economy research project (cited in Chang Noi 2002) found that the income of rural families was mainly generated from non-agricultural activities and remittance (60 per cent) and agriculture (40 per cent). The impacts of unemployment in urban areas severely affected the income of rural households, especially for landless workers. However, the depreciation of the baht currency had increased the price of agricultural products which directly alleviated the economic effect for rural families (McGuire and Conroy 1998; Siamwalla and Sobchokchai 1998).

2.1.2 Social context

Petchprasert (2001a) and Raekpinij (2002) believe that the expansion of commercial production, industrialisation and capitalism have weakened communities and caused collapse of family institutions. In particular, community relationships were weakened by intensive agriculture production as people with different skills who would have cooperated with each other in the past were suddenly disunited by market demands (Kaewthep 2001). Furthermore, community indigenous institutions, such as those for marriage, kinship, and religion, were severely weakened both by the actions of the central bureaucracy and economic change. Narintarangkul-Na-Ayuthaya (2002) and Nartsupa (1999) indicated that the abuse of power by the officers of the state, such as; the sale of property, or sub-contracting by urban businessmen, forced villagers to become increasingly less dependent on these community institutions.

In the early 1980s, 70 per cent of labourers were in agriculture. Pongpaichit and Baker (1998: p.192) asserted that during the decade of economic boom, industry was growing at 15 per cent a year while agriculture stagnated. The government failed to address this disparity. Failure of the government's rural development policy coupled with the unprecedented growth in industrial activity pushed a large pool of rural labour from the north and north-eastern regions to work for manufacturing and services sectors. During the 1980s and 1990s, over 7 million agriculture workers, mostly with four years of education or less, left their villages to work in urban areas (Phongpaichit and Baker 1998). The increase in urban wages and structural problems in the rural economy drove these people to become the backbone of the ever-expanding labour-intensive industries.

From the Thai village economy research project (cited in Chang Noi 2002), it is found that due to the lack of labour in rural areas, most rice planting at rural household level became limited to self-consumption. This meant a rise in poverty levels in rural areas. Phongpaichit and Baker (1998) noted that due to the vulnerability of the poor to the market, ecological decline and diminishing human resource (pp.286-289), the gap between rich and poor income between 1981 and 1994 grew rapidly expanding from 17 times to 37 times (p.281).

Since there was no unemployment insurance scheme in Thailand before the 1997 economic crisis, the loss of income during the unemployment period had severely affected the living standard of both labourers in cities and their families in rural areas who were dependent on remittances as their main source of livelihood. It is estimated that at least 1.2 million temporary workers returned to rural areas in Thailand after the crisis. A number of workers tried to start their life in agriculture, whilst many turned to alternative non-farm work in the informal sector or in small-scale enterprises (Bangkok Business Newspaper 2002). Kaewthep (2001), Petchprasert (2001b), Vejayachai (2001) and Kannasutra (2001) indicated that several rural communities have begun to evaluate themselves and invent new institutions and enterprises to bargain better with the outside world and to provide their own social welfare, e.g., saving groups, weavers' and potters' enterprises or community businesses.

In order to strengthen social safety net and lessen the impact from the economic crisis, many social protection approaches have been implemented by the government since

1998. These included an income support for the elderly people, a medical care programme for poor adults, school lunch programme for poor primary school students (Nabi and Shivakumar 2001). In regard to the formal employment, severance pay, low interest loans, placement and training courses were promoted to tackle the unemployment (Siamwalla and Sobchokchai 1998). Furthermore, the establishment of social security fund, workmen's compensation fund and recently unemployment insurance has enhanced employees' capabilities to manage risk from their living and working condition. However, these approaches have not supported the informal employment, which accounts for 73 per cent of total employed labour in 2002 (NESDB 2006a).

Meanwhile, nationwide local organisations were enabled to provide the services required by target groups via the Social Investment Fund (SIF). This fund had granted community based organisation to initiate their own community development activities in 1998. The four-year SIF programme, obtained loans from the Asian Development Bank and the World Bank, covers five major categories: community enterprises, community welfare and safety, natural resource management and cultural preservation, community capacity-building and networking, and emergency community welfare for the vulnerable groups (Pongsapich *et al.* 2001). This programme seems to enhance the promotion of participation in community and improve social cohesion via supporting new initiative community development activities. It also strengthens several community organisations, such as saving groups, to strengthen their activities through the establishment of community enterprises and to expand social welfare for social exclusion groups (Bunyarattanasunthon 2001; Kannasutra 2001; Petchprasert 2001a).

2.1.3 Environmental Context

Since the early period of modernization, the environment and natural resources have been at the service of national development. The increase in gross national product falsely reflected the well-being of the population, because it did not take into account the social costs and the depletion of human and natural resources (Dilokvidhyarat 1995). The post-1960 capitalist industrialisation allowed free and unlimited exploitation of human and natural resources. Without proper safeguards, therefore, resources were being exploited beyond replenishment capacity. The Department of

Environmental Quality Promotion (DEQP) reported that during 1967-1991 the government had promoted the adoption of Green Revolution and the expansion of agriculture for export. As a result, the accumulation of chemical residues and the deterioration of soil and water as well as deforestation, greatly affected the rural farmers and the community livelihoods (DEPQ 1999).

Sathirathai (2003) indicated that industrial pollution has caused environmental problems since 1964. After 1967, the provision of natural resources for industry use had become more severe because of unplanned and unregulated use. Moreover, DEQP (1999: p.70) stated that the national policy of expanding industry to rural areas, as the tools for alleviation of impoverishment at the community level, not only accelerated pollutant distribution into public resources, but also deteriorated both the ecology system and people's health in the surrounding areas.

It is inevitable that there have been numerous conflicts in natural resources exploitation both in quantity and extent, especially between the state and the public (DEQP, 1999, pp.78-81). Several groups that were affected by these conflicts have been campaigning and fighting for their rights since 1973. Non-government organizations (NGOs) concerned with rural and environmental development became major supporting sources for social and environmental movements. During the economic boom period, the degradation of the environment and conflicts over resource exploitation had accelerated due to resource scarcity. Nonetheless, the 1997 People's Constitution, which endorsed public participation in government policy, has significantly consolidated the civil society movement (DEQP, 1999, pp.128-129).

Another key player in environmental issues is the Tambon[1] Administrative Organisation (TAO). The 1997 Constitution requires devolution and decentralisation to provincial, district and sub-district (Tambon), respectively (Buch-Hansen 2001). Therefore, TAO has become more responsible for implementing the government's development activities and running the day to day public service functions at the Tambon level. This includes education, health, waste management, infrastructure and also managing natural resources at the local level (DLA n.d.). Nonetheless, the

[1] Tambon is Thai sub-district which comprises of 3 to 5 villages in very close proximity. There are approximately 7,405 Tambons in Thailand (Thai Tambon.com, 2006)

delayed and complicated transfer process and categorisation of TAO have put constraints on the budget, manpower and management methods. This resulted in doubts about the role and effectiveness of TAO in local natural resources management.

In summary, as Thailand has attempted to industrialise over five decades, it is unlikely that this development can be viewed as sustainable in so far as rural communities are concerned. In terms of the economy, market production has resulted in large debts and increasing vulnerability to poverty. As Thailand aimed to be New Industrialised Countries since 1980s, the promotion of agriculture, the largest employment sector of the country, has been neglected by the state. The continual migration of young labour to the cities has led to rural family separations. Inevitably, the community, which has traditionally functioned as a social safety net, was weakened. The natural resources, the key asset of the village economy, were over-exploited and polluted by waste from both agricultural and industrial sectors. The net result of all this is villagers having to struggle to simply survive.

Since the 1997 economic crisis, the previous economic promotion approach has eroded families and communities capacity to cope with the crisis (Siamwalla and Sobchokchai 1998). In rural areas, the impacts of the crisis were cushioned due to self reliance in terms of food production and higher social capital than urban areas. The rural development in economic, social and environmental perspectives is vital to enhance the majority of Thai people to strengthen their capabilities to sustain livelihoods and deal with any future shocks. However, the recession in small scale farming has become more serious due to limited land, lack of labour force and the deterioration of soil and water resources. Rural non farm activities (RNFA), particularly in Micro and Small scaled Enterprises (MSEs), have been used by the state as major tools to revive the local economy and create employment since the crisis.

2.2 Micro and Small Enterprises (MSEs) and informal economy

Since nearly all economic activities in rural areas of Thailand, with the exception of farming, take place within the informal economic setting, it is essential to understand the characteristics and behaviour of the informal economy in Thailand. The informal economy is defined as enterprises, employers and entrepreneurs who produce goods

and services without being regulated by the taxation system, business standard practices, requirements and laws (Edgcomb and Thetford 2004). The informal sector is recognised as a major economic arena in providing income and employment for the poor, particularly in developing countries (Lund and Nicholson 2003).

Lund and Nicholson (2003) noted that it is believed that 80 per cent of the world's population work in the informal economy, which lacks sufficient social security coverage. According to the International Labour Organisation (ILO) statistics (ILO 2002) the number of off-farm informal workers varied from one half to three quarters of the total workforce in developing countries. The informal economy has caused several problems for formal enterprises and the state, including being a source of unfair competition, undermining tax collection and social protection, etc. (Williams 2005). On the other hand, the informal economy has provided employment, goods and services for lower-income people as well as for the formal economy. It is clear that the informal economy significantly supports political stability and economic growth in both developing and developed countries (Chen 2004; Portes and Haller 2005).

In Thailand, NESDB (2003b) estimated that the informal economy, excluding the illegal economic activities, accounted for 45 per cent of the GDP and employed nearly three-quarter of total employed labour force in 2002. It is also stated that the MSEs or informal workers accounted for almost 70 per cent of total employed labour and almost 58 per cent worked in agricultural sector. These informal workforces, who are not registered with any public authority and mostly work in non-municipal or rural areas are not able to access any social protection provided by the government (NSO 2005a).

As defined by NSO, micro enterprise, or cottage industry in Thai official terms, is categorised by the number of employees per enterprise which is less than 10, while the ILO's definition of the number of employees is less than 5 persons. Nevertheless, the number of workers in small enterprises of both NSO and ILO is the same, less than 50 persons. Likewise, ILO (1993) and Maurice (Maurice 1999) defined MSEs as:

> *"A very small-scale unit, producing and distributing goods and services in the informal sector. It may comprise sole proprietor, partnerships, private companies, and co-operative as well as community-owned enterprises, in both urban and rural areas of developing countries"*

In 2002, it was estimated that approximately 99.54 per cent of the total number of formal enterprises operating under the manufacturing sector in Thailand were MSEs. This corresponds to 3.5 million people or 61 per cent of the total number of employees in this sector (NSO 2003; OSMEP 2002). Even though the main enterprises promoted in the national policy are SMEs, the significant impact of MSEs, particularly in promoting job creation and alleviation of poverty in local areas, has pushed the government to establish a new development scheme for MSEs.

Most enterprises are usually constrained by factors such as finance, technology, market, skilled worker, business management skills, etc. These impede MSEs' capability to develop and to expand their businesses (Wasuntiwongse 1999). Due to operating in the informal sector, it is hard to benefit from government policies and measures and to access the formal system with respect to credit availability and distribution networks (APEC-Micro-Enterprise Working Group 2003).

At present, the aim of MSEs promotion is to increase the income for grassroots people and enhance local self-reliance by using or adding value of local assets for economic activities. Since the local economy has been developed, local authorities and people may be able to contribute their resources to solve other problems and set up social welfare to strengthen and develop the communities without any support from the state (Poldej 2003). Tubplien (2003) and Vejayachai (2001) indicated that the rural and agricultural economy may serve as the social safety net in the community, and as a consequence, several grassroots economic promotion plans and policies have targeted rural MSEs. One of the policies which directly enable the villager and community to run their own businesses is OTOP which will be discussed in the next section.

In this research, two common types of MSEs, in both the formal and informal economy, at the rural community level are studied. The informal MSEs or entrepreneurs, which aim at maximizing profit, are selected as representatives of

production within the market economy. At the same time, the Small and Micro Community based Enterprises (SMCEs), which have registered as formal enterprises to increase additional income and group cooperation in communities, are investigated as examples of production on the basis of the Sufficiency Economy philosophy.

2.3 The OTOP Policy

To promote the community's capability for self-reliance, income generation and job creation in rural areas by using rural folk knowledge and local resources, OTOP policy, adapted from One Village One Product (OVOP) scheme in Oita prefecture, Japan, has been implemented in every Tambon throughout the country. Distinctive products selected from local goods in each Tambon will be developed to meet quality standards and market requirements. The Government will provide support in terms of arrangement of financial sources, business advisories, market promotion via domestic and international outlets and an e-commerce channel (The Royal Thai Government 2001). In 2004, there were 24,767 SMCEs and 10,412 SMEs registered to participate in this scheme (DCD 2007). According to NESDB report the turnover of local products has dramatically increased from 215.5 million baht in 2001 to 52,027 million baht in 2002-2005 (NESDB 2004b).

Vongkul (2003) cites that there are at least two general problems concerning the promotion of local commodities production that the government has not yet solved. Firstly, the market for local products is a key constraint. Large amounts of products failed to sell and the distribution channel in the supermarkets or superstores was very limited. Secondly, because of the lack of value added product and the fact that they are produced from basic local skills and knowledge, most products are hard to sell to other rural communities. Therefore, MSEs need to distribute the commodity in the main market, which must compete with standard manufacturing products.

According to the NSO survey reports on micro enterprises (NSO 2004), it is found that nearly 33 per cent of enterprises throughout the country produced weaving, garment and leather products. More than 48 per cent of these weaving producers and 41 per cent of the total number of micro enterprises operated in the north eastern region. Since silk is the most outstanding weaving product in the region, it has become a popular product in the OTOP programme. In 2005, nearly 1,800 silk items

were advertised on the OTOP shopping website[2]. Therefore, silk fabric production at community level in the north eastern region of Thailand was selected as a study target in this research.

The political uncertainty and rising inflation and interest rates since the beginning of 2006 have negatively impacted on domestic consumption. The slowdown in farm income and continuously soaring oil prices as well as floods during the monsoon season have reduced consumer consumption (NESDB 2007). The success of the military coup and the resulting void created in government in September and October 2006 have also hindered the previous government's support schemes.

In response to strengthening the grassroots economy and reviving ethics and social consolidation, the SEP has been a core principle for the new interim government to implement its national development policies (The Royal Thai Government 2006). The dramatic political change has overturned the national core strategy shifting the priority from economic growth to the advancement of society's happiness. As a result, the change directly impacts producers participating in the OTOP scheme and initiative programmes related to silk development at local level (Chantanusornsiri 2006). Nevertheless, this current disruption will not be discussed in this thesis except in Section 8.3 Future Research.

2.4 Silk

Silk, which is produced by the caterpillar of silkworms, has been known as an important natural textile fibre in the world for at least 4,000 years. Although there are several types of silkworms, the most important specie of silkworm is known as *Bombyx mori* or mulberry silk due to the main food of worm. Silk filament consists of two protein substances: sericin and fibroin. Sericin or silk gum is material that covers fibroin and is removed before dyeing and finishing. Fibroin, therefore, becomes a core material of finished silk fabric (Sinha 1990).

The production of cocoon or sericulture consists of two key activities: a cultivation of mulberries for feeding silkworm and a rearing of silkworm. Silk is extracted by boiling the cocoon in boiling water in order to dissolve the gum cover on the cocoon.

[2] The result of searching for silk OTOP product on April 2005 at http://www.thaitambon.com/

Then, eight to ten silk filament are collected together to start reeling. Reeled silk is processed to increase the strength by throwing it with other strands of raw silk. These twisted threads form different types of yarn: warp and weft yarns. Silk yarns are further processed to prepare them for weaving into fabric (Federico 1997).

2.4.1 World Silk development

Silk is believed to have originated in China around 2640 BC. The Chinese Empire had severely restricted silk knowledge transfer in order to keep it secret for hundreds of years. Due to the growth of fascination in silk fabric in other countries, there were attempts to spy and acquire silk knowledge by Japan and Korea. This knowledge was later transferred to India and Europe (Sinha 1990).

Bush (2000) stated that silk was introduced to Europe via the ancient silk road which started from Peking to Central Asia, Persian Empire, Byzantine Empire, Greece, Egypt and Spain. However, the invasion of Roger I of Sicily brought Greek silk rearers and weavers to Palermo and other Italian cities in the twelfth century, which made Italy the most powerful silk producer in Europe in the thirteenth century. The flourishing of Italian silk industry had greatly contributed to the economy during the Renaissance (Mola 2000).

In the sixteenth century, France established silk industry at Lyon. Despite its decline at the time of the French Revolution, the silk industry was revived by the invention of punch card mechanism by Joseph-Marie Jacquad in 1804. This invention enabled weavers to make complex pattern with accuracy in the short time. As it became normal dress among French elites who were regarded as leaders in elegance, silk fashion had spread throughout Europe. In England, the silk industry was developed in the sixteenth century, though sericulture had been introduced much earlier in the thirteenth century. The effect from cheaper imported silk from France and the introduction of artificial silk had dwindled British silk industry. Meanwhile there were attempts to establish silk industry in America by the English silk master weaving migrants, but the substantial investment in sericulture, a speculation in silk and an epidemic of blight in mulberry orchards prompted the collapse of the industry in 1840s (Mansfield Historical Society 2004; Sinha 1990).

Due to its high value and demand in the West, the silk industry in Asia has become well developed. In China, Japan, India and South Korea, silk was an important product for commercial export until the Second World War. Due to the rapid industrial development in Japan and South Korea, these two countries have dropped in rank among silk export leaders. However, as silk production is labour intensive and requires low capital investment, it has recently grown in countries such as China, India, Vietnam, Thailand, etc., where labour costs are low. In China, it is estimated that 20 million farmers and 500,000 workers are engaged in sericulture and silk processing industry. During the 1990s, sericulture, which is a cottage industry in India, was practised in 59,000 villages and provided full and part time jobs for some 6 million people (International Trade Centre 1999b; Mansfield Historical Society 2004; Sinha 1990).

More recently however, production has diminished in high labour cost countries, such as Japan and Korea. The statistic of world raw silk production in 2004 by the Indian Ministry of Textile showed that the world largest raw silk producers are China, India, Brazil and Thailand. More than 80 per cent of total raw silk production came from China (Ministry of Textiles 2004). Nevertheless, since 2004 the amount of imported raw silk yarn in Thailand has increased 10 times the amount exported due to inadequate silk productivity and high market demand for domestic silk within Thailand (International Trade Centre, 2008). The leading silk producers in Europe, e.g. France and Italy, have focussed on processing high quality silk fabric and garment by using imported raw silk from Asia (International Trade Centre 1999a). However, silk production at household level is still found generally in developing countries, particularly in areas where sericulture can be practised.

2.4.2 Silk development in Thailand

Silk has played an important role at local level since the prehistoric period according to the archaeological evidence discovery (Leesuwan 1987). Silk making skills and expertise have become a key part of the heritage of the ethnic people, particularly the Tai. The Tai people are the ethnic group comprising several sub-groups who dwell in Thailand, Burma, Laos, Vietnam, eastern India and southern China. Tai weaving has been traditionally passed on by women and is seen as a manifestation of womanhood (Marks 1998; Na-Ubon and Nil-a-thi 1992).

Conway (1992) stated that silk has been continuously woven in rural areas, especially in the north and north-eastern regions of Thailand. Until the middle of the 20th century, local people in these regions still followed their traditional way of life and development path, with a strong ethnic tradition and culture as well as the belief in Buddhism, compared with other regions in Thailand. This is because of the isolation of the location, problems with transportation in the rainy season, and lack of support from the central administration policies and plans. Due to its geography and climate, the north east is particularly suitable for sericulture. Furthermore, native silk moths are polyvoltine species which can produce eggs more than twice per year. Plenty of good quality silk yarn has always been available for the weavers in the region.

Silk can have an effect on two aspects of the village life; economy and, religion and social life. In terms of economy, the main economic activity in Thai agricultural society is rice planting. The rice cycle starts when the monsoon rains begin in June. Throughout the rainy season, all the family members work together to grow the rice. After the rice is harvested in the dry season (around November and December), women can turn to the reared silkworms (which are fed in the rainy season) and prepare for spinning and weaving. In a village where the rice crop has failed or is not sufficient, the woven silk fabric and surplus by-products from silk cultivation can make a critical contribution to the family income (Nartsupa 1999).

Silk has also played an important role in religious and social life. Because women cannot be ordained as monks, the only way to gain great merit for women is to weave and offer silk robes for her son or male relatives who are to be ordained as Buddhist monks. Decorative silk banners displayed in important religious ceremonies are also offered to the monk. The skilled weavers not only acquire merit to accomplish a happy and moral mind for this life and life after death, but will also be recognised by the abbot and villager as a master artisan (Samutakupta 2000).

Chantawich (1993) reported that silk has been used in rural life from birth to death, such as the protective symbols for a new born child and old soldier, the customary gifts for marriage ceremonies, and burial clothes in funeral rites. Silk fabric can also represent the varying social and economic status of the wearer (Wuttakul and Panyura 1994). Furthermore, silk weaving skills represent the reaching of maturity for girls in traditional village society (Vongchavalitkul University 1994). Samutakupta and

Kitiasa (1994) indicated that the skilled weaver, who knows how to cultivate silkworms, dye and spin silk yarn and weave a variety of textiles for household use and for ceremonial occasions, is recognized as a successful wife.

Recently, Thai silk has been revived by Her Majesty the Queen of Thailand and the U.S. entrepreneur Mr. Jim Thompson since the 1950s (Art and Cultural Magazine 2001) following failed attempts in 1903 and 1941 to revitalise the industry.

Traditional silk weaving production has been supported by a charity under the patronage of the Queen of Thailand and the Government. To promote and develop the skills of producers, annual weaving contests and silk weaving courses have been initiated in each region (Kaewrueng 2004). Moreover, the royal family's formal silk dress on various occasions has contributed to marketing Thai silk in the cities and among government officials.

Jim Thompson has played a key role in the promotion of modern style production of Thai silk. With his knowledge and expertise in colouration, Thompson modernised traditional Thai silk introducing industrial production methods: using new lengths of fabric; new patterns; and chemical dyes. He also introduced new styles of Thai silk to the international market. Art and Cultural Magazine (Art and Cultural Magazine 2001) stated that the change in silk fabric led to the worldwide recognition of Thai silk, which provided an impetus to the beginning of a boom era for the Thai silk industry. At present, the Thai silk industry exports silk for clothing and upholstery to all the major industrial countries.

Therefore, the manufacture of Thai silk currently can be divided into two types: traditional production and modern or industrial production. In 2006, it is estimated that nearly 4,800 workers were employed in 88 factories involved with silk production while there were around 150,000 farmers involved in producing mulberry and silk yarn in 2003 (Agrifood Consulting International 2005; DIW 2007). In 2004 and 2005, the value of Thai silk fabric and silk-related products export per annual was more than 800 million Thai Bath (TB) or 11 million Great Britain Pound (GBP) or 24.2 million US Dollar (USD)[3] (The Customs Department 2007).

[3] The exchange rate at May 2007 1 GBP= 72 THB and 1 USD= 33 THB

This research project focuses on both styles of silk production at silk cottage industry level for which Nakhon Ratchasima province in the north east of Thailand was chosen as the study area. The Pak Thongchai district was selected to investigate the modern production, whilst the study of the traditional production was conducted in the Sida district. The details of each style of production are discussed in the following section.

a. Silk Production development in Pak Thongchai district

Pak Thongchai is a district in Nakhon Ratchasima, the largest province in Isan or the north-eastern region of Thailand. As shown in Figure 2.2, the district has many advantages in terms of location and accessibility to the transportation system, e.g. a railway and road, from Bangkok, it has become one of Isan's foremost mercantile portal cities for merchants from other regions (Pak Thongchai District n.d.). Silk weaving has been passed down from one generation to the next by Tai Lao ethnic groups, who were taken as prisoners of war from the Siam - Lan Xang war in the late 18^{th} century. Although the main objective of weaving is for household and gifts for ceremonial and religious purposes, weaving for sales purposes and new techniques have been introduced since the post second world war period with the arrival of Chinese and Vietnamese merchants (Vongchavalitkul University 1994).

The introduction of the flying shuttle handloom instead of the traditional loom, intensive chemical dyeing, and metal loom accessories has dramatically boosted silk productivity over the past 60 years. Furthermore, skilled women weavers and men are employed to weave silk and work in the processing and dyeing of yarn in merchants' small factories. Therefore, silk weaving in Pak Thongchai is no longer the exclusive domain of women. It has also changed in terms of production size from household supply to cottage and small industry.

From 1967-1977 many villagers in the district market started their own silk factories which focused on producing silk fabric on a large scale according to orders provided by middlemen. Nevertheless, the golden age of the silk industry in Pak Thongchai began with the establishment of the Jim Thompson factory in 1978, which has now become the world's largest silk handloom factory (Manager Magazine 2000a). This provides opportunities for training in weaving skills, factory woven technologies and quality control techniques. As a consequence, several workers, who have more

financial support, have started to run their own silk micro enterprise, whilst others have become freelance in yarn processing and weaving.

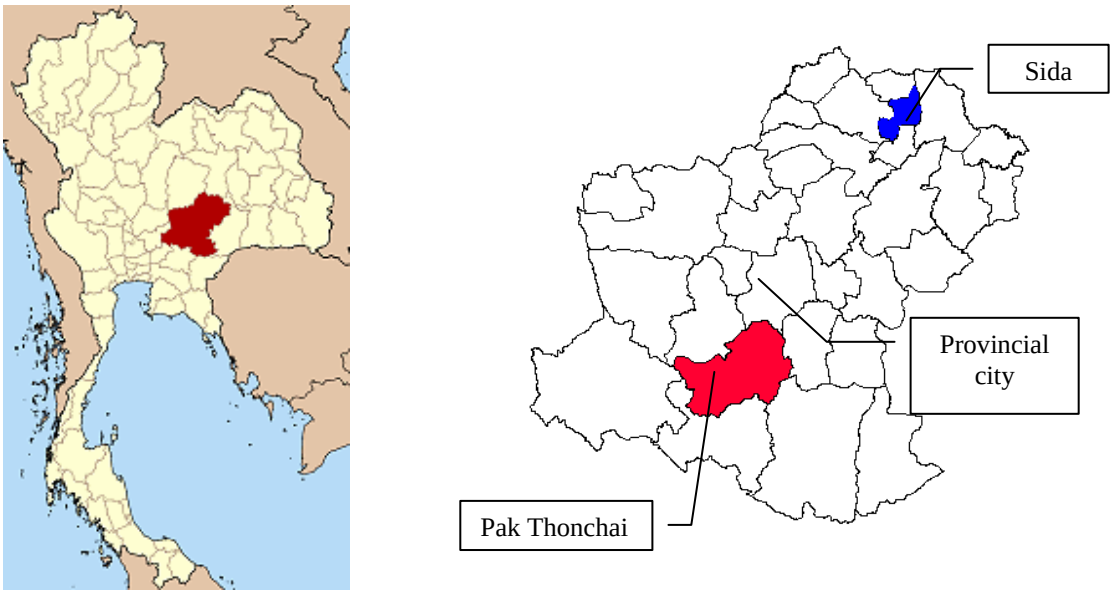


Figure 2.4: Map of Nakhon Ratchasima province and map of Pak Thongchai and Sida district
(Source: Nakhon Ratchasima provincial administration office, 2005)

Manager Magazine (Manager Magazine 2000b) reported that there were more than 40 large and medium factories operating in Pak Thongchai municipality during the Thai economic boom period (1991-1995). The total capacity of those factories was approximately 300,000 yards of silk per month. As a result, Pak Thongchai became the largest silk production site in the country, where more than 80 per cent of silk fabric sold domestically was produced. Moreover, it is estimated that there were more than 700 freelance weavers and entrepreneurs that lived in the villages outside the municipality, who had been subcontracted to produce silk for those factories (verbal communication with Pak Thongchai Community Development Officer, 2004).

After the 1997 economic crisis, only 5 large and 15 small factories survived in the silk weaving business. The crisis had a severely adverse impact on most local factories which managed their firms as suppliers only. On the other hand, the Jim Thompson factory, which has an international management system and market network, recovered easier by gaining more profit from its export trading. The local factories

had to decrease their production costs by laying off employees and subcontracting their orders to the micro producer (Manager Magazine 2000b)

As a consequence of the outsourcing, the cottage industry spectacularly increased in 1999-2000. This coincided with large numbers of migratory labourers returning to their villages after being laid off in the big cities due to the 1997 economic crisis. Some of this surplus labour was accommodated into the growing number of cottage industries including silk weaving which became a popular occupation, even for those who were newly trained.

Following the introduction of the OTOP policy and Village Funding policy in 2002, numerous silk producers emerged from various parts of the country. This has adversely affected the market share of Pak Thongchai silk industry. Nevertheless, silk production was selected as one of the provincial development strategies at the end of 2003. The strategy aims to serve as a centre for marketing management of silk products from other provinces in the Isan region. The increase by 20 per cent of new silk entrepreneurs and 30 per cent of silk sale value were set as an indicator of this 2004 budget year's planning (Nakhon Ratchasima Province 2004).

Although several government policies have been formulated to promote the silk cottage industry, many problems in both marketing and environment are still overlooked and not seriously addressed. Without experience in silk production for sales and marketing, many poor quality products are rejected by customers. It is inevitable that price-cutting has been implemented to compete with the established entrepreneurs and to earn sufficient profit to pay back the debt. The collapse of the fabric price was magnified by a serious silk fraud in Pak Thongchai in 2002 which will be discussed in detail in Section 4.2.3 and 4.3.4 of Chapter 4.

In terms of environmental problems, there have been several complaints about pollution from untreated wastewater discharge and its effect on local natural resources exploitation in recent times. The petitions were presented to both local and provincial administration organisations in 2003. Detail will be discussed in Section F of Chapter 3. However, as yet there has been no in-depth research conducted into the environmental aspects of silk production and therefore solutions have not yet been identified. (verbal communication with The 11th Regional Environmental Officer, 2004).

b. Silk development in Sida district

In rural areas, most weavers prefer to produce silk using the traditional production methods although silk production has been developed into a cottage industry. Because of small scale production for own use or for small scale trading, traditional looms and wooden accessories are used instead of machinery. However, there have been some changes in raw materials in response to market demands. In order to make their fabric more colourful, producers have started to replace natural dyes with chemical substances. At the same time, the fear of uncertain markets and limited budgets forced producers to use low price chemical dyes and bleaching substances. These chemical substances, which do not contain identified ingredients and lack proper health and safety information for the user, are sold in small quantities at a much cheaper price than the high quality products. These cheap chemical substances have become popular for traditional silk production in every part of the country.

Although there is no research into the effect of cheap chemical silk dyes, there were some studies into this type of chemical used in traditional production of cotton fabric in the north of Thailand. Volker (1996) reported that several low price cotton dyes sold in the local market consisted of dyes based on carcinogenic amine that are banned from use in clothes in Europe. The pollutants from the discharge of untreated waste water from local textile production had caused both environmental and health problems in the community. Furthermore, it was found that the cotton weaving production affected producers' health problems in several systems, i.e., respiration, dermatology and muscle (Phusawang 2001).

Like most of the promoted silk weaving groups, the *"Ban Fhake and Ban Non Samran silk weaving group"* in the Sida district has been supported by government promotion offices. Due to its remote location (as illustrated in Figure 2.2), farming still remains the main livelihood of the district and silk is promoted as a supplementary income provider during the dry season. Although the group was set up a decade ago, the scale of silk weaving has not changed significantly because all workers in the family need to help to cultivate rice, which is the main occupation of the villages.

Due to its similar production technique to other groups, low quality chemical substances and firewood are used in the production of silk. Waste from production is

discharged without treatment. Furthermore, group's members still mostly do their own sericulture as in the past. Thus, the group was chosen as representative of traditional subsistence silk production.

2.4.3 Silk development and sustainability

Although silk production has played a crucial role in income generation and job creation in the village economy, silk producers and other stakeholders remain vulnerable to business failure and poverty. The lack of business management skills may lead to inefficient production which in turn may contribute to overuse and accelerated depletion of local resources. For example, the increase in the volume of chemical dyes used and lack of waste treatment know-how of the local producers and authorities could accelerate the pollution to the detriment of both human and ecological systems.

The promotion of silk development may raise some ethical issues in terms of a perceived animal cruelty in extraction of silk thread and the increasing indulgence of luxury commodity for the global consumer. In Thailand, however, this issue may be less controversial. Although boiling silkworm is the only technology to separate silk thread from the cocoon, throughout their short life cycle by the rearers the silkworm is carefully and attentively treated. Furthermore, the boiled silkworms were not wasted as they were consumed as food. These may indicate the present welfare of silkworm and its significance in local way of life. Furthermore, the use of silk as daily clothing in many rural areas and the growth of silk market-led production in Thailand have shifted its status from an extravagant to alternative choice of affordable high quality traditional fabrics for consumers.

Hence, the development of silk production at grassroots level should take into consideration the sustainability of the cottage industry, the natural environment and the well-being of the community. The sustainable concepts which are applied in the project will be discussed in the following section.

2.5 Conceptual Framework of the Study

Given numerous crises encompassing the economy, society, culture, politics and environment, Thai people started to reconsider the previous direction of national

development. As a consequence, the Eighth National Economic and Social Development Plan (1997-2001) which focused on human development, was developed prior to the 1997 economic crisis. Improving the quality of life and livelihood for both individuals and society in general was imperative in this plan. Furthermore, resources and environmental management, economic capabilities and environmental development, as well as the improvement of potential for regional and local development were adopted to support sustainable development.

According to DEQP (1999), it is evident that the community, the most primary level, needs to be strengthened and stabilized in order to tackle the environmental and resource problems. Several tools for achieving the sustainable goal at community level should be considered such as the SEP and SL concept.

The 1992 World Environment and Development Conference resulted in many international organisations being obliged to make their businesses more environmentally responsible. As a result, the Thai export industry had to increase its awareness of environmental issues. Moreover, the government has enacted the 1992 Enhancement and Conservation of National Environmental Quality Act, which introduced an explicit policy such as the Polluter Pays Principle (PPP), to enforce the enterprises to be responsible for their pollutants by applying pollution treatment systems to their operations (DEQP, 1999, p.155). Because this tool can enhance industrial efficiency, profitability, and competitiveness, CT concept is selected to investigate the process of silk production in order to enhance the cost effectiveness of the production.

Hence, this research project has selected these three tools to investigate and develop an appropriate strategy for the sustainability of the Thai silk cottage industry. The details of the three tools will be discussed in the following section.

2.5.1 Sufficiency Economy Philosophy (SEP)

a. Conceptual framework of the SEP

There are several alternative economic concepts that are similar to the SEP, e.g., *"Green Economy"* (which focuses on sustainability), *"Self-Reliance Economy"*, *"Community-Based Economy"* and the most well known *"Buddhist Economy"* (a term introduced by Schumacher 1973). However, these concepts are not completely

new for the Thai people due to their way of life. Developed from his long term experience in rural development and knowledge of these economic concepts and Buddhist philosophy, His Majesty the King of Thailand presented the Thai people with the SEP. It has become broadly and quickly accepted by Thai society, particularly in the post-economic crisis (Ma-Mankorn 2000).

Sufficiency Economy has been discussed by His Majesty the King since 1974. At that time, Thailand was on the edge of turmoil because of the worldwide economic recession and the political rivalry between the West and the Soviet block. In addition, the country suffered unequal income distribution largely due to the development of industrialisation and urbanization (Panyarachun 2000). Yet the resulting riot in 1976 between two political polarizations, i.e. democracy and military, which ended with the military takeover may have been the main factor for the delayed implementation of the SEP. However, the industry-led development and the 1997 economic crisis made the Thai people face hardship not only in terms of wealth but also natural resources. This concept has, thereby, arisen again to suggest how to survive and subsist under these circumstances.

According to the NESDB (2003a), the SEP was defined as a guide to people as a way of living or behaving at all levels toward the Middle Path, derived from Buddhist perspectives. The guidance aims to develop a balance between the development of national economy and the response for any rapid changes in the social, environmental and cultural context. Based on positive concepts and the world dynamic system, it can enhance people's capability to cope with short and long term problems for security and sustainability.

NESDB defines sufficiency as *"moderate"* means or actions which are based on *"reasonableness"* and building up *"self immunity"* to decrease any impact from internal and external shocks and excesses. Firstly, Ven P. A. Payutto (1988: p.23) states that *"moderation"* means to do activities in dynamic optimum in every aspect. Knowing moderation means knowing the optimum amount, how much is *"just right"*. It is an awareness of that optimum point where the enhancement of true well-being coincides with the experience of satisfaction. This optimum point, or point of balance, is attained when people feel material satisfaction, having answered the need for quality of life or well-being. Furthermore, economic activity must be controlled by the

qualification that it is directed to the *"attainment of well-being"* rather than the *"maximum satisfaction"* sought after by traditional economic thinking.

Secondly, *"reasonableness"* is defined as a capability to consider all information, evaluate the reasons and understand the entire consequences on the stakeholders before making a decision for moderate action (UNDP 2007). Jitsuchon (2002) believed knowing the cause and result can be used to adjust man's pleasure to avoid unnecessary consumption. This leads the conduct of economic activities in harmless way for oneself, society and environment (Ven. P. A. Payutto 1988). Lastly, *"self-immunity"* is an ability to assess, manage and cope with any risks that might arise from any unexpected internal and external changes in the present and future. UNDP (2007) stated that building up of *"self-immunity"* probably indicate the development of self-reliance and self-discipline.

To achieve sufficiency, NESDB (2003a: p.15) states that people need to have two presuppositions: breadth of knowledge and ethical qualifications. Breadth of knowledge includes three components: acquisition of all relevant knowledge; thoroughness in planning by connecting all required knowledge; and careful utilization of knowledge at any point in time in implementation of plans. The last two components make the acquisition of knowledge in the SEP similar to the learning process theory.

Ethical qualifications are, especially important for people in influential positions. As honesty and integrity will encourage people to select appropriate knowledge and plans. In addition, perseverance and tenacity will ensure people conduct their lives in a sufficient way. At present, ethical issues are included in good practices in business, for example business code of conduct and Corporate Social Responsibility (CSR), in order to enhance business image, business performance and marketing. Figure 2.3 illustrated the process of attaining "sufficiency".

Since the SEP was introduced, several academics have interpreted the concept into many practical approaches. Tantivejkul (1999) and Vasi ((1999) stated that most approaches have shown commonality which can be categorized into two aspects (cited in NESDB 2003c: pp.32-36):

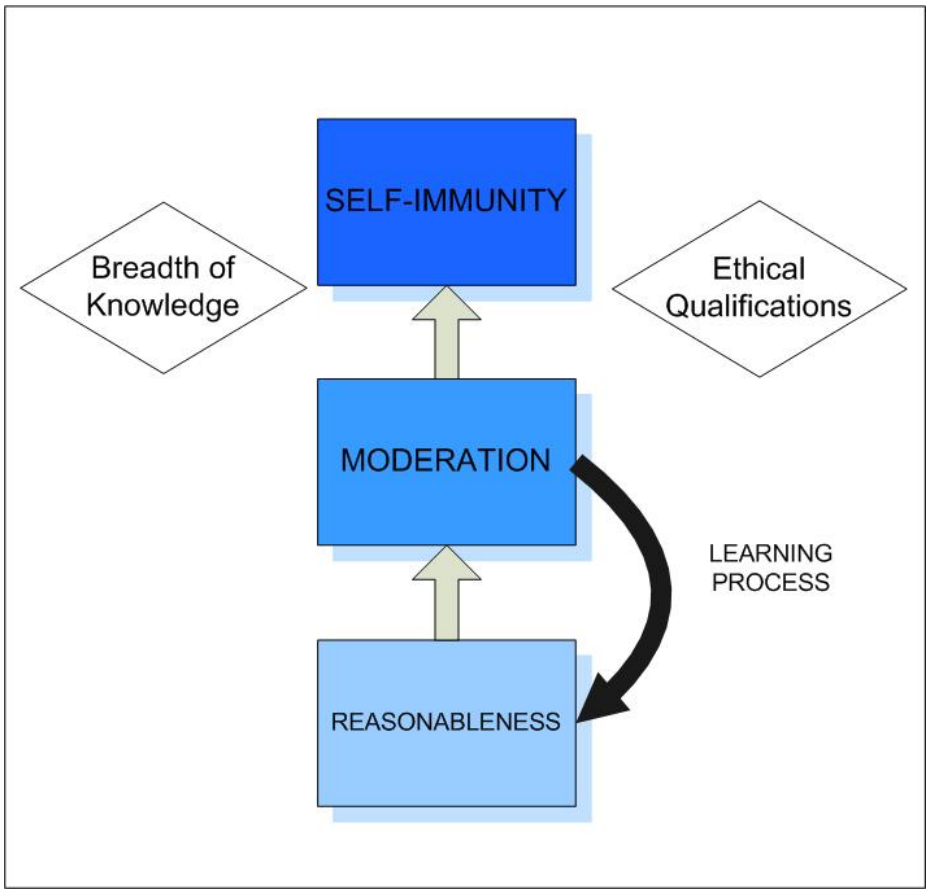


Figure 2.5: Sufficiency Economy Philosophy
(Source: NESDB, 2003)

1. Internal aspect – Emphasizing the individual, man should have sufficiency in *mind*, *wisdom* and *security*. *"Sufficiency in mind"* is to love and show generosity to other people. *"Sufficiency in wisdom"* means continuing the learning process to know how to live and adapt to others. *"Sufficiency in security"* indicates the living state should not make individuals feel insecure. Extreme living conditions can lead to stress, anxiety, and depression as well as potentially suicide.

2. External aspect – To attain a *"sufficient"* life, people need to develop society, culture, economy, natural resources and technology to a subsistence level. *Sufficiency society* fosters and empowers individuals, family, community and society to solve problems or deal with impacts of change. *Sufficiency culture* indicates that the way of life of the community should be related to various environments. Economic activities should relate to and develop from the cultural base. *Sufficiency economy* means an adequate quality of life that is not too

extravagant and does not disturb others. *Sufficiency technology* means to implement an appropriate technology in accordance with the situation and the need of the country. Finally, *sufficiency environment* means to exploit natural resources effectively and prudently to conserve and nourish the environment for subsistence living.

b. The application of SEP in Thai enterprises

As agriculture is the main livelihood of the majority of Thai people, most research projects have focussed on how villagers can adapt and apply the SEP to their way of life. Several successful self-reliance communities, such as Naso community and Inpaeng network, have been studied to draw out their experiences. The consequences of the introduction of capitalism and market system into Thai rural villages have stimulated villagers' needs in terms of money for improving their lifestyles. However, it is found that the change of farming from self-reliance production to market-led production has prompted the communities to face similar problems, e.g. poverty, debts and natural resources depletion (UNDP 2007).

In order to solve difficulties, these communities have started to revive their self-reliance capability. Firstly, the process of participatory problem analysis of villagers led to a revival of household's food security and an establishment of saving group to reduce expenses. Secondly, other extended activities that respond to basic needs, e.g. producing herbal medicine, processing fruit or food products, establishing a rice mill, etc., which are then sold at community level have led to a reduction in consumption costs. These activities have generated additional income and created more employment for the Small and Micro Community based Enterprises (SMCEs).

Finally, the network arrangement between the village and nearby communities has promoted the growth of activities beyond farming, production and trading. Various type of activities, i.e. community bank, rice bank, cattle bank, and social safety net activities for both groups' members and social exclusion groups, e.g. illness subsidy, education fund, etc., as well as local exchange systems have been set up to strengthen people livelihoods assets (Kaewthep 2001; Nandasuwan 2002; Punthasen *et al.* 2002).

These three stages are known as the model of the SEP implementation in farming. As a result, villagers can keep and maximize the utilization of their production surplus

within the community and develop their learning and managing skills as well as improve their relationship with other SMCEs (Phongpit 2002).

On the other hand, Punthasen (2003) noted that the SMEs in the Thai industrial sector can apply the SE concept to their businesses in nine contexts: employment, appropriate technology, effective resource use, size of production, long term profit, honesty, reducing production risk, downsizing risk management, and local resources utilisation and market. In terms of the production, the business should focus on employment and use technology only in necessary processes. It should emphasize local resources utilization and markets. To respond to the market demand, the local, regional, domestic and export markets should be prioritised, respectively. All resources should be used in a prudent and effective way. Meanwhile, the enterprise should implement an appropriate technology which is practical and not expensive.

For the management process, the business should have an appropriate production size related to management capability. Honesty should be pursued with consumers, labourers and suppliers. The entrepreneurs should attempt to control their greed and to set business goals for long term profit. To reduce production risks, business should diversify various commodities or improve flexibility to adjust productivity and materials. Finally, the enterprise should minimise risk management by avoiding high level of debt. The example of thriving SME is the Preservation House who produces Sa or mulberry fibre craft products. The production capacity of Preservation House has depended on the availability of raw materials, labours, and accumulated capital of enterprise. Using natural dyes and traditional manufacturing processes as well as hand-made products are demanded by the international market. The expansion of business is rather slow, but secure, even during the 1997 economic crisis (UNDP 2007).

At the beginning of the SEP promotion phase, most research focussed on the defining the SEP nature and its key components in different contexts, e.g. economics, social development. Many successful case studies in both agricultural and industrial sectors were examined to find variables resulting on livelihood thriving that may be relevant to the SEP. Due to a large numbers of researches in farming, a concept of applying the SEP in farming and a guideline were developed and disseminate to the public since 1998. Nonetheless, although some of the main factors that affect the sufficiency of

business were identified, the relationship between these variables and the SEP main characteristics is still not officially stated. The scope of the SEP key elements in the business context remains ambiguous. Consequently, it is very hard for businesses to practise the SEP in the industrial and business sector.

According to the launch of the OTOP policy, the micro and small producers have been encouraged to manufacture their products on a large scale. Inexperience in quality control of great amount, marketing and business management makes these producers and local resources vulnerable. With the limited support from the government, all producers depend largely upon self-help. Since the SEP is based on self-reliance capability improvement and has been well recognised by Thai people, particularly in rural community, and been promoted as a core concept in two consecutive national economic and social development plans by the government, it is selected as one of the conceptual frameworks in this research. Due to resource constraints of MSEs and the fact that silk are non-edible product, the application of the SEP in order to sustain the silk cottage business in the agrarian community should be investigated.

2.5.2 Sustainable Livelihood (SL)

The livelihood concept was developed by Robert Chambers in the mid-1980s (DFID 2001). In the 1992 United Nation Conference on Environment and Development (UNCED), SL has been promoted as an action agenda in the Agenda 21. As the approach is based on the principles of people-centred, responsive and participatory, empowerment, multi-level links and intersectoral focus, partnership working and dynamic recognition, SL has become a tool widely used to understand the complexity of livelihoods and find appropriate entry points in order to reduce poverty (Allison and Horemans 2006; Korf and Oughton 2006; Singh and Gilman 1999). It has also been implemented by many international agencies (e.g. The United Nations of Development Programme (UNDP), Food and Agriculture Organization of the United Nations (FAO)), bilateral donor (e.g. the UK Department of International Development (DFID)), research institutes and NGOs (e.g. Intermediate Technology Development Group (ITDG), Oxfam) (Livelihood Support Programme 2004; Livelihoods Connect 2007; Oxfam 2006).

According to UNDP's definition (2001), livelihoods are described as the assets, activities and entitlements which people exploit to make a living. Assets are defined as not only natural/biological but also social, political, human, physical, and economic. Then, the sustainability of livelihoods becomes a function of how men and women utilize asset portfolios on both a short and long-term basis. DFID (2001) indicated that SL concept is derived from *"people's capacities to cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base"*.

The broad goal of SL is poverty eradication which is essential to develop individual, family and community capacities to improve their livelihood systems. It is important to understand people's coping and adaptive strategies, differing between genders, as entry points for analysis. The SL framework (illustrated in Figure 2.4) developed by DFID aims to enhance, understand and analyse the livelihoods of the poor. It requires qualitative and participatory analysis at a local level to assess the effectiveness of existing efforts to reduce poverty.

Considering people operate in a vulnerable context, which comprises of shocks (e.g. natural disaster, sudden economic situation, disease or conflicts), trends (e.g. population, technology or resources) and seasonality (e.g. in food availability, employment opportunities or price) that people have difficulty with or no control over, it is imperative to assess assets and poverty reduction factors. The five assets or capitals in the livelihoods assets pentagon framework represent people's capability level to access these varieties of assets which enable people to adjust their livelihoods strategies in pursuit of their livelihood outcomes. The centre of the pentagon illustrates zero access, whilst the outer periphery represents the maximum access.

Furthermore, some factors, e.g. policies, institutions and processes, which influence people's abilities to develop the livelihood strategies, are needed to be considered. The livelihood outcomes are set up by people in order to achieve their own livelihood objectives (Baumann 2002; DFID 2001; Singh 2001; Twigg 2007).

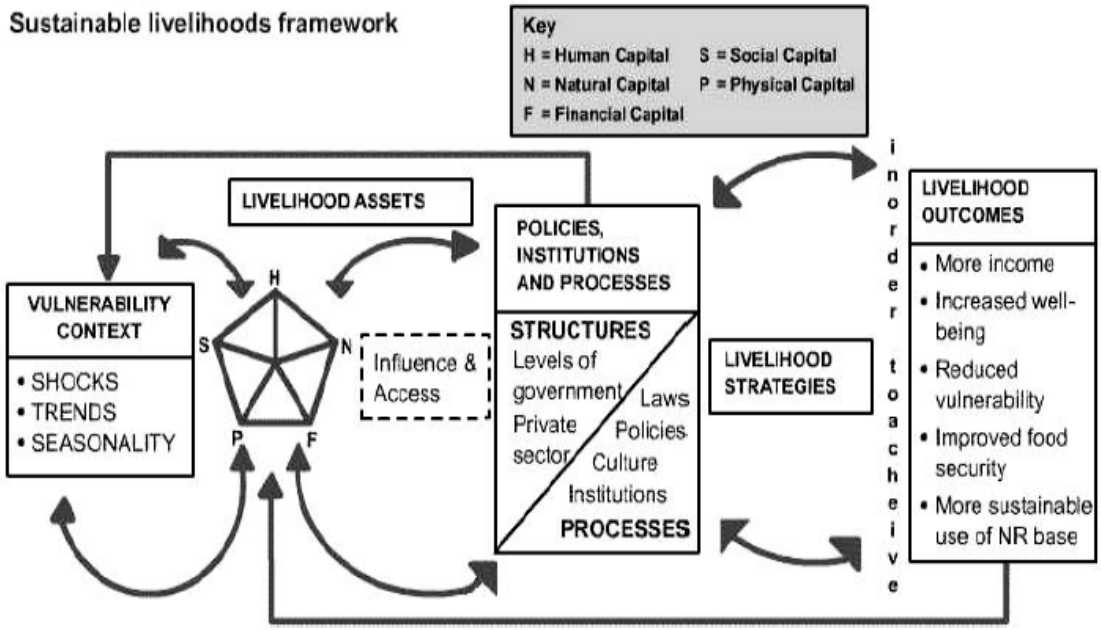


Figure 2.6: Sustainable Livelihoods Framework
(Source: DFID, U.K., 2001)

According to the studies by Bingen (2000) and Korf and Oughton (2006), the SL approach enhances the understanding of the social structure and processes which enable the identification of opportunities and constraints of people's livelihoods. It also increases the ability to analyse multi-level links between micro-level strategies of people and meso- and macro-level of related factors which are affecting the livelihoods. Consequently, the interventions which improve sustainable livelihood outcomes are appropriately designed and implemented.

Given that the SL framework illustrates the interaction between livelihood assets, vulnerability and transforming structure and processes, some weaknesses of this framework are discussed. Maqueen (2001) and Pretty (1999) argued that the lack of clarity defining and measuring assets may render the SL impractical and could potentially lead to the failure on capturing the linkages and trade-offs between assets (cited in Toner 2003). Neefies (n/d) also noted that the SL framework tends to be too abstract for Oxfam field staff particularly in improving understanding between poverty and environmental change. Political assets should be highlighted more explicitly in terms of power differentials between different actors much more than

presented in social asset. Clever (2001 cited in Toner 2003) and Brown (2006) also stated that as the SL has been perceived as a development tool for individual, household or community, it is likely to contribute to only changing livelihoods at the micro level, and is unlikely to lead to policy changes at the macro level.

Regarding poverty eradication, a large number of the SL case studies have focussed on maintaining and increasing stocks, food and income to reach basic needs (Neely *et al.* 2004; Sustainable Livelihoods for Livestock producing Communities Project 2001), managing natural resources productivity (Chernia *et al.* 2007; Glavovic and Boonzaier 2007); and obtaining ownership of and access to the assets and livelihoods' practices (Beck 2001; Larson 2003; Singh and Gilman 1999). Some studies, however, found that some important factors are not clearly addressed in the SL framework when apply with business related livelihoods. Market, private sector, technology and gender constraints and relationship between contemporary states and the market as well as risk and uncertainty are required to be examined in order to enhance achievement of the SL implementation (Albu and Scott 2001; Brugere and Lingard 2001; Middleton and O'Keefe 2001; Tallontire *et al.* 2001).

Due to its people-centred, sustainable, participatory, empowering and multi-level and holistic principles, the SL framework is selected to better data gathering and improve capabilities analysis as well as encourage the development of participatory coping and adaptive strategies of Thai MSEs with the SEP. The focus on the SEP with market and technology including the ethics and employment of entrepreneurs could complement the possibility of sustainable development of MSEs business in the agricultural based community in developing countries.

2.5.3 Cleaner Production (CP)

In the 1990s the world has experienced a watershed in terms of environmental protection and management. With considerable pressure resulting from pollution problems and intense business competitiveness, industry and business have been forced by society, government and world economy to take a more environmental stance. Several new concepts toward sustainable development have been developed and promoted by these sectors as a key role in pollution source reduction.

According to UNEP's definition (2001), cleaner production (CP), known as Cleaner Technology or Pollution Prevention or Waste minimisation (North America), is:

> *"A concept focusing on continuous application of an integrated preventive environmental strategy to processes, products, and services to increase overall efficiency, and reduce risks to humans and the environment. Under present environmental, technological and economic constraints, CP is a "win-win" strategy that not only protects the environment, the consumer and the worker, but also improving industrial efficiency, profitability, and competitiveness at the same time*"

As regards natural conservation, CP enhances the efficiency of the exploitation of raw materials, water and energy. It also reduces the amount of waste discharge and the public health and the environment impacts via reuse, recycling, treatment and disposal (EPA 2006). With these advantages, a great number of enterprises in developing and transition countries have adopted the CP concept to increase their competitiveness and facilitate their access to international markets (UNIDO n.d.).

According to UNEP (2001), the CP assessment can be divided into 4 phases. Firstly, the planning and organisation stage can start after the management commitment, CP team organising, goal setting and systematic and comprehensive identifying method planning. Secondly, the assessment procedure needs to study the material balance in the process and to identify appropriate CP options that can reduce or prevent loss of materials. The examples of CP options are presented in Figure 2.5. Thirdly, feasibility analysis needs to prove each of the non-obviously feasible options is technically and economically feasible and whether it contributes to environmental improvement.

Finally, implementation and continuation is the step of implementing the feasible prevention measures and monitoring and evaluating the results achieved by the implementation to ensure the ongoing application of CP (UNEP 2001).

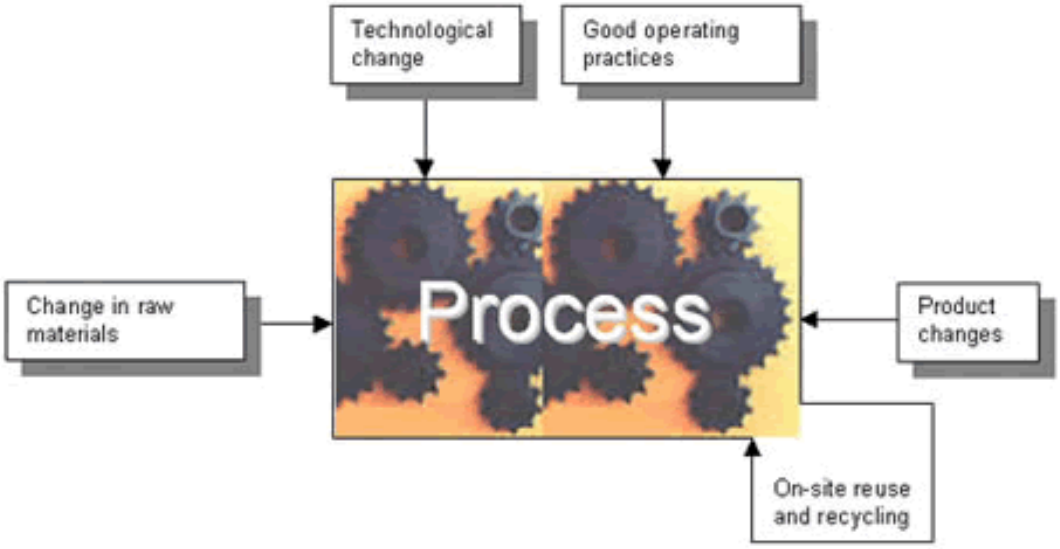


Figure 2.7: CP options to eliminate emission generation

(Source: UNEP, 2001)

Since 1996, CP has been introduced into the Thai industry sector with the support of international organizations from the USA and some European countries (Mizuno 1999). Most factories, which were supported for training and demonstrating, are SMEs. The implemented CP options are, however, not advanced in-depth because of the lack of knowledge of efficiency technology, machinery and process operating. Reuses, recycling of wastewater, good practice in management and basic energy saving technologies have been popular options implemented in these SMEs (TEI 2000).

In order to improve environmental quality by expanding the application of CP into other sectors and activities, the National Master Plan on Clean Technology was developed and implemented in Thailand in 2003 (DPC 2002). Six sectors which are promoted under the master plan include industry, agriculture, tourism and services, finance, education and research and development. Furthermore, there are numerous strategies to facilitate the revising of government and local authorities' regulation to support CP conducting at the community level.

Many research projects have studied the application of the CP concept in the textile industry. Samuel and Larry (2004) noted that using greener and lower impact chemistry and process optimization can make cost effective savings and reduce

chemical usage in the process as well as reduce toxicity of the waste water from operation. This also resulted in the reduction of aquatic toxicity in effluent and the improvement of local water quality. Jain A.K. *et al.* (2003) reported that converted activated carbon and activated slag developed from waste slurry samples of a fertilizer plant and from blast furnace waste can be used as low-cost adsorbents for colour removal from effluent. On the other hand, the application of regenerated natural sources like plants for textile dyeing instead of synthetic dyes, can reduce chemical load in waste water and result in ecological improvement (Bechtold T. *et al.* 2003).

Although a CP audit can systematically identify appropriate options that offer benefits in both environmental and business aspects, there are some constraints associated with this conceptual framework particularly in its implementation process in developing countries. First, lack of awareness on CP concept among staff and lack of commitment of the enterprises to CP may cause difficulties in the investigation of data about the characteristics and the amount of used raw materials, water and energy and produced wastes in the production process (Mitchell 2003). Second, Cushing *et al.* (1999) and Magarinos (2001) stated that lack of knowledge of manufacturing and financial benefit analyses, and of technical experts in CP audit leads to unclear sound incentives that result in weak motivation in the uptake of CP practice. Third, lack of motivations and incentives, such as laws enforcement, benefits from government support schemes, financial supports and business opportunities, have impeded the small and medium scale enterprises to adopt CP practice or reduce the environmental impacts to acceptable levels (Berkel 2000; Huhtala and Ciccozzi 2003).

At present the increasing pressure on environmental management from policemen and local authorities and lack of knowledge on hazardous waste treatment systems have forced micro small producers to solve these problems by themselves. The incentives of CP concept in terms of eco-efficiency and resource saving may suitably provide the growing informal silk cottage industry alternative solution to reduce the environmental impact from their production. The uptake of CP audit could provide essential data for improving business competitiveness and local environmental management. Therefore, CP has been employed as one of the potential framework to investigate the environmental impacts of the silk-cottage industry and technological capability in local community.

2.6 Conclusion

The nature of development practice in Thailand over the last half century was largely focussed on the modern sector. This has resulted in the majority of people who live in the agrarian community to be highly vulnerable to poverty. Due to lack of serious agricultural promotion in productivity and market as well as loss of young labours to the manufacturing sector, the villagers need to rely on their natural resources to increase their production yield and usually gain income at subsistence level. Villagers have been encouraged by the government to use local skills and knowledge to supplement their income. With inadequate support from government, there are numerous MSEs in rural areas and in lower income groups in cities. These MSEs can be divided into two types depending on its legal status: MSEs in the informal economy and SMCEs in the formal economy.

Silk weaving, as an area of local expertise, has become an important additional source of income for people in the north east of the country. Since the local silk business has expanded by the previous government's policy promotion, there has been a significant positive impact of silk weaving on the rural economy. The negative impacts, nonetheless, on social, health and environmental perspectives have started to cause significant problems in the community compared to the previous subsistence production.

Because of theirs similar goal in sustainable development, the SEP, SL approach and CP concept are selected as main conceptual frameworks to used in this research in order to investigate and develop an appropriate strategy for the sustainability of the Thai silk cottage industry.

In next chapter, details of the research methodology, study scope, target group selection, data sampling, and research methods as well as data analysis will be discussed.

Chapter 3
Methodology

The main conceptual framework and methods employed in the research will be presented in this chapter. In order to gain a clear understanding of the impact on the livelihoods of silk producers at community level, diverse data need to be collected using a range of qualitative and quantitative methods. Due to a shortage of secondary data from the Thai silk cottage industry, the empirical research was conducted to assess and analyse informal silk MSEs and SMCEs. The Sufficiency Economy Philosophy (SEP) and other sustainability concepts, namely the Sustainable Livelihoods (SL) framework and the Cleaner Production (CP) concept were used for collecting, analysing and interpreting data. The scope of this study and overall research methodologies are presented in section 3.1 and 3.2. Site selection criteria and data sampling in the preliminary survey are discussed in section 3.3. The details of methods employed in this study are shown in section 3.4 according to the type of production; i.e. modern or traditional. Data analysis and summary are considered in sections 3.5 and 3.6, respectively.

3.1 Introduction

The high demand for silk products and the backing of Her Majesty the Queen of Thailand have been vital instruments in stimulating the growth of the silk cottage industry in north eastern Thailand. The shift from self-consumption to commercial production has had a major effect on rural livelihoods. On the positive side, this shift has contributed to the development of the local economy by diversifying the economic base of rural areas, providing a much-needed resilience to rural communities. There have also been a number of negative effects associated with the pursuit of commercial silk in rural areas. These include the use of large quantities of chemical substances, dyes, wood and water in the manufacture of silk, which have had an adverse effect on other agricultural economic activities, the natural environment and people's health.

Since the majority of silk producers at the grassroots level are in the informal sector, it is difficult to find information about the economic, social and environmental effects of silk production. This is because the most available secondary data on silk production focuses on sericulture, traditional silk production processes and the fabric design of the Small and Micro Community based Enterprises (SMCEs). Moreover, there is limited publication and media coverage on the effects of modern production methods in silk manufacturing and the informal Micro and Small Enterprises (MSEs) which are key players in the silk cottage industry. Due to the effects of pollution from informal MSEs' silk production, the informal MSEs are also targeted for study in this research.

3.2 Research Methodologies

In order to explore and obtain a deeper understanding of the livelihoods of silk producers in MSEs and SMCEs and their effects on communities, both quantitative and qualitative research was conducted. It was deemed that the results from a combination of research approaches would provide a more accurate picture of the cottage silk industry in the north-eastern part of the country, and possibly give an insight into the type of pressures that rural enterprises in Thailand are currently enduring (Flick 2006).

Table 3.1 details the four phases of this research methodology. In Phase 1 the first fieldwork was conducted between February and April 2004 and consisted of a preliminary survey and review of secondary data as well as a survey of the study sites. In Phase 2 the fieldwork survey data was analysed and interpreted in accordance with the three conceptual frameworks. In Phase 3, the second fieldwork was conducted between October and November 2005. Focus group discussions were employed to feedback the survey results and investigate target groups' opinion and their coping plans for sustaining the silk business. Finally, in Phase 4 the data from both field trips was synthesised in order to achieve the research objectives.

3.2.1 First fieldwork

a. Preliminary survey and review of secondary data

When this study was initially launched, the aim was to investigate the Sato (local fermented liquor) and other local distilled liquor industries in rural areas and their role in supporting community livelihoods. One year into the study, these local liquor industries at the MSEs level collapsed in Thailand because of overproduction, uncertainty of quality control, and fierce competition in the market. This led to a re-design of the basic research idea and a shift to another important cottage industry, silk production. A preliminary survey and literature review were needed to explore the general data of the silk cottage industry. In line with this requirement, production sites were visited to examine criteria factors that were used for selecting target areas. Visits of extension officers and group leaders also helped to ensure that sufficient cooperation and support would be obtained when the fieldwork began.

b. Survey

In order to investigate the MSEs' and SMCEs' style of silk production and their impact on silk producers and their communities, the survey was conducted in four silk production sites in the Nakhon Ratchasima province (shown in Figure 2.2.) between February and March 2004. As shown in Table 3.1, this fieldwork involved four types of data gathering techniques. The first technique involved semi-structured interviews of key informants that covered the SEP, SL and CP framework. The second technique consisted of carrying out focus group discussions to understand the nature and mechanics of business management on each production site. Thirdly, data about silk promotion plans and policies at local and provincial level were collected by in-depth interviews of local authorities, silk promotion related extension officials and health promotion officials. Finally, the CP audits were conducted in two small and medium dye-houses producing silk by modern style production methods and a micro-enterprise producing silk in the traditional method. Samples of wastewater from the two different types of silk production were sent for analysis of Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD).

3.2.2 Survey data analysis

The survey findings, in-depth interviews, focus group discussion and additional literature review, as well as the CP audit, were analysed using statistical tools, coding procedure and material balance analysis. The analysed data was then interpreted under the three mentioned frameworks.

3.2.3 Second fieldwork

The analysed data and findings were fed back to the silk producers through focus group discussions between September and November 2005. The aim of convening the focus group had two fundamental objectives. Firstly, it aimed to explore the possibility of stimulating and encouraging silk producers to develop their livelihood strategies, the SEP framework. Secondly, it was to observe the similarities and contrasting responses of the silk MSEs and SMCE in the development of a sustainability plan for their businesses and the communities. In addition to the focus group discussions, in-depth interviews were conducted to collect pertinent information on the silk promotion policies at national level. The interviewees consisted of government officials in the Department of Industrial Promotion and the Queen Sirikit Institute of Sericulture as well as the President of the Thai Silk Association.

3.2.4 Data synthesis

All surveyed data and results from interviews and focus group discussions from the first and second fieldwork were analysed and synthesised. The silk livelihood of MSEs and SMCE were discussed and assessed in terms of their sustainability, and the three frameworks used in this research were appraised with respect to their application to the Thai silk cottage industry.

Table 3.1: Field Research period, methods and expected results

Phase	Time period	Methods	Expected Results
First fieldwork	Feb-Apr 2004	Semi-structured interview	Details of silk producers, silk production and impacts on local economy, society and environment
		In-depth interview	Details of silk related plans and policies as well as institutions at local level
		Focus group discussion and SWOT analysis	Details of SWOT of silk business in each group
		CP auditing in SMCE's silk production	Details of input-output balance in bleaching and dyeing processes in traditional production
		COD and BOD analysis	Characteristic of effluent from traditional and modern production
Data analysis	May 2004-Aug 2005	Data analysis	Data of silk MSEs and SMCE presented in form of SL framework
Second fieldwork	Sep-Nov 2005	Focus group discussion	Silk sustainability plans of 2 groups of MSEs and a SMCE
		CP auditing in MSEs' silk production	Details of input-output balance in bleaching and dyeing processes in modern production
		In-depth interview	Details of silk related policies and institutions at provincial and national levels
Data synthesis	Dec 2005-now	Data synthesis	Details of silk production of MSEs and SMCE and its impacts on people's livelihood Factors for sustaining silk livelihood Suggestion for improving the implementation of three conceptual frameworks

3.3 Target group selection

According to the literature review in Section 2.4.2, silk expertise and sericulture are still plentiful and easy to find in the villages of north-east Thailand. The preliminary field work in phase one of this research revealed that there are two types of production in the silk cottage industry; modern and traditional. Hence, this research focuses on both types of silk production in the northeast region.

Over the past six decades, modern production of silk fuelled by the growth of market demand for silk products has promoted silk production as the main livelihood in many communities. The modern style of production has had a much higher impact on rural livelihood assets than traditional style manufacturing. Six villages in the Pak Thongchai district, Nakhon Ratchasima province, a major silk production site in the country were chosen to investigate the modern style of production. Because the majority of silk producers in these villages are MSEs who run their businesses in the informal economy and aim to maximise profit, this research will refer to this group of producers as MSEs and this type of production as silk manufacturing or market-led production.

In terms of impact, the traditional style of production is not considered to be as intensive as its modern counterpart. However, traditional production is popular with the majority of silk producers in Thailand, and therefore the cumulative impact of this production style may be significant. Two villages in the Sida district in the same province were selected to collect data that is representative of traditional production techniques. Since the objective of this production is to increase additional income, most silk producers have operated their businesses in the form of SMCEs. The study will consider this type of production as subsistent production in accordance with the SEP.

3.3.1 Criteria in target selection

Some of the key criteria of the SEP framework, e.g. group or networking arrangement, resource management efficiency, and the attempts to solve local environmental problems, were used to select the study site of modern silk production in Pak Thongchai.

The criteria include;

- having at least one silk group operating in the area
- having environmental problems from silk production and;
- having been trained and had demonstrated the application of Clean Technology (CP) concept in bleaching and dyeing process by the 11th Region Environment Office (11th REO) in order to promote environmental awareness

The details of all study areas are shown in Table 3.2 and 3.3.

Table 3.2: List of villages, sub-districts and districts investigated in the survey

Villages	Sub-district	District
Doo and Doo Noak	Mueng Pak	Pak Thongchai
Don Khwang and Kud Kradi	Ngew	
Han and Han Tai	Ta Ku	
Fhake and Non Samran	Sam Mueng	Sida

Table 3.3: Relationship between criteria and selected targets

Villages	Criteria in target selection		
	silk group operation	environmental problems	CP training
Doo and Doo Noak	✓	✓	✓
Don Khwang and Kud Kradi	✓	✓	×
Han and Han Tai	✓	✓	✓
Fhake and Non Samran	✓	×	×

3.3.2 Target sampling

To access data from the informal producers who may be afraid of being taxed by local authorities, it was essential to get support from group leaders in the communities as a way to gently introduce the survey team and to ask for the co-operation of these key informal producers. The sample units, particularly producers and other residents, were selected randomly covering the whole village area. Like other survey research in developing countries, Bulmer (1993) stated that it is difficult to do sample design in accordance with the standard principle. The shortage of sampling frame and extensive information, particularly in the informal economy, has promoted the implementation of non-probability sampling in this research.

The sampling employed in the preliminary survey is based on the size of enterprise (quota sample), the location on the map (mapping) and the availability of the respondent (volunteer sample). At the same time, the other residents were selected by clustered random sampling around the area near the silk producers' houses. The map of the sampled silk producers and community residents in four communities is presented in Appendix 1. To assess the effect of the community development and silk promotion policies, the village leader, TAO administration chairman, health promotion officer and silk-related promotion officer were selected according to the level of responsibility in their jobs and the on-site working period.

3.4 Methods

As mentioned in Section 3.1, the SEP, SL and CP have been used as main frameworks for collecting data using six methods. Due to their different main interests in each framework, the collected data from the five methods are different in detail. The relationship between the study frameworks and the result from the empirical study is briefly summarised in Table 3.4.

Table 3.4: Relationship of the framework, research methods and empirical result

Framework	Methods	Empirical result
SL	Transect walks	Data about infrastructure and natural resources in the community and a map of targeted villages
SEP SL and CP	Semi-structured interview	The details of silk production in silk cottage industry and impacts of silk production at household and communities levels.
SEP and SL	In-depth interview	The silk related plans and policies at local, provincial and national level
SEP and SL	Focus group discussion	• The strengths and weaknesses of the producer as well as coping strategy. • The silk strategy plan for sustaining their group's businesses
CP	CP auditing	The input and output of materials in the silk production process in the SMCE and MSEs
CP	COD and BOD analysis	The quality of wastewater from the bleaching and dying process

The details of employed methods and their relationship with the research frameworks are presented in the next section.

3.4.1 Transect walks

Transect walks is one of the Participatory Rural Appraisal (PRA) tools used to observe and obtain a horizontal view of an area as well as evaluate the environment and the quality of the infrastructure of the study site. A map of each study site was drawn up to use for sampling targets in the semi-structured interview process (The Sustainable Fisheries Livelihoods Programme (SFLP) 2002).

3.4.2 Semi-structured Interview

Due to the limited literacy skills of villagers and lack of familiarity with self-completion questionnaires, semi-structured interview was the method employed to collect data. Oppenheim (1992) noted that this method provides a high response rate and that there are more benefits from personal contact. The researcher can explain questions and observe respondents' behaviour as well as the local environment. Although this approach can be undertaken by non-skilled interviewers, the shortage of respondents' attention in the

interview could cause biases. In order to reduce such errors tape recorders and fieldworkers' group discussions were used to re-check and clarify ambiguous responses from face to face interviews.

Questionnaires were designed using both closed and open questions under the three frameworks. The interviews consisted of general details about the respondent, of the silk production and of the impact on local economy, society and environment. The attitudes of the silk MSEs and SMCE to applying the SEP and the CP concept to silk production were also investigated. The details of the questionnaire are presented in Appendix 2. Due to its reliability and simple format, the Likert scales were employed to measure attitude. A respondent can score from one to five positions of agreement; strongly disagree, disagree, uncertainty, agree and strongly agree (A.N.Oppenheim 1992; Alreck and Settle 1995).

The development of question scope under the SEP framework was based on the nine key factors of the study on the application of the SEP in the Royal Chitralada Projects initiated by the King of Thailand and the Nongpho Dairy Cooperative Limited under the Royal Patronage (Punthasen *et al.* 2003). These factors were investigated within the five categories of the questionnaire: producer, silk production, economic impacts, social impacts, environmental impacts and attitudes. Other factors related to the SL and CP framework were examined. The details of all these factors are shown in Table 3.5.

Table 3.5: Detailed criteria factors in questionnaire

Frame-work	Factors	Produ-cer	Silk Produc-tion	Econo-mic im-pacts	So-cial im-pact	Environ mental impacts	Atti-tudes
SEP	Job creation	General data	✓	✓	✓	-	✓
	Resource utilisation effectiveness		✓	-	-	✓	✓
	Appropriate technology		✓	-	✓	✓	✓
	Appropriate production size		✓	-		✓	✓
	Long term profit		✓	✓	✓	✓	✓
	Local raw material sourcing and local market		✓	✓	-	✓	✓
	Business ethics		✓	✓	✓	✓	✓
	Product diversification/ flexibility		✓	-	-	✓	✓
	Risk management		✓	✓	-	-	✓
SL	Livelihood assets		✓	✓	✓	✓	-
	Vulnerability context	-	✓	✓	✓	✓	-
	PIPs	-	✓	✓	✓	✓	✓
CP	Material sourcing	-	✓	✓	-	-	-
	Production process	-	✓	✓	-	-	-
	Environmental problems	-	-	-	-	✓	✓
	Waste management	-	✓	✓	-	✓	-

To cross-check data, the question in each category was put to other stakeholders at both village and district level. These included other residents, group leaders, village leaders, local authorities, extension officers and an environmental promoting officer. Different questions were asked in each group in accordance with their social role and responsibility related to silk production. In total, the interviews were conducted to gather data from 36 producers, 6 group leaders, 81 other residents, 6 village leaders, 4 local authorities, 4 health promoting officers, 8 extension officers and 1 environmental promoting officer. A detailed of responses summary and questionnaires are shown in Table 3.6 and Appendix 2.

3.4.3 Focus group discussion

Another effective tool employed in the field research for gathering data and developing strategy plans is focus group discussion. Krueger and Casey (2000) stated that this method helps the researcher to gain insight about the particular topic because selected participants are asked to share their perceptions and thoughts freely without pressure. The observation of nuances of voices, expression and manner, as well as interaction in discussion, could increase the understanding of the relationship and the attitudes and opinions of group members. The combination of this practice with other research methods can increase more specific empirical findings and the clarification of obtained information from other approaches (Morgan 1997).

In the first phase of the study, the focus group discussion technique was implemented to enable micro-enterprises in the self-analysis of their businesses. The SWOT (Strength, Weakness, Opportunity and Threat) analysis was used as a framework for the discussion. This participatory method can assist in the assessment of coping strategies, entitlements, assets and information and enhance the understanding of the assets and the potential for vulnerability in business (Alreck and Settle 1995).

Due to time restrictions and an annual trade fare in the provincial city, all silk producers, who were key informants, had to participate in order to sell their products and to receive awards from the provincial silk contest. The focus group was only held in the Baan Doo villages. Participants of both genders were selected from the members of the Baan Doo silk weaving group and independent silk MSEs in the villages. The snowball sample

(whereby the group leader starts the invitation process) was employed to select participants for the discussion of this informal business.

Table 3.6: Detailed summary of responses

Topics	Target groups		Question Topic
	Pak Thongchai	**Sida**	
Silk producer	27 Producers 5 Group leaders	9 Producers 1 Group leaders	Producer's general data (gender, age, education, etc.)
Silk production	27 Producers 3 Group leaders 1 Silk related promoting officers	9 Producers 1 Group leaders 2 Silk related promoting officers	Production style, production capacity, production cost, products, income, market and distribution, financial data, external support etc.
Local social and economic impacts	27 Producers 3 Group leaders 62 Other residents 6 Village leaders 3 TAO administration chairmen 1 Silk related promoting officers	9 Producers 1 Group leaders 19 Other residents 3 Village leaders 1 TAO administration chairmen 2 Silk related promoting officers	Relationship between producer and neighbourhoods and community, Community development and local economic contribution from silk production etc.
Local environmental and natural resources impacts	27 Producers 3 Group leaders 62 Other residents 4 Village leaders 3 TAO administration chairmen 1 Silk related promoting officers 1 Environmental promoting officer	9 Producers 1 Group leaders 19 Other residents 2 Village leaders 1 TAO administration chairmen 2 Silk related promoting officers 1 Environmental promoting officer	Degree of environmental problem from silk production, Solid and waste water management, Water and fuel supply, etc.

Since a SWOT analysis of Baan Fhake and Non Samran silk SMCE (Suranaree University of Technology 2003) and of silk SMEs in Pak Thongchai had been conducted in 2003, it was decided to use the recent secondary data of the SWOT of these silk businesses for the purposes of this study. However, the SWOT analysis of the silk MSEs in Baan Han and Han Tai villages was conducted in the second phase, due to the unreadiness for group discussion of silk MSEs in the first phase.

In the second phase of the empirical research, the analysed data from the SEP, SL and CP frameworks was communicated through focus group discussions to the MSEs in Baan Doo and Doo Noak villages and the Baan Han and Han Tai villages and to the SMCEs in Ban Fhake and Non Samran communities.

According to the SEP framework, it is essential to encourage people to evaluate what is reasonable to expect from their livelihoods by considering moderation and reasonableness of their previous and current livelihood. This self-awareness could then be developed to recognise and reduce risks from fluctuating factors. Since all producers had had free time for two to three hours in the evening, the focus group discussion was held over two days. The first day consisted of a feedback of the synthesised data and a discussion about livelihood strategies and expected outcomes as well as the possibility of applying the SEP to the silk livelihood. The aim of the second day was to stimulate the participants to develop strategic plans for improving the sustainability of the silk livelihood. These plans include marketing, social development, environmental management and production improvement. The profile of the participants and focus group topics are summarised in Table 3.7 and 3.8.

Table 3.7: Summary of focus group participants

Villages	No. of participants	Description of group
Baan Doo and Doo Noak	13	Silk MSEs, members of silk weaving group and workers
Baan Han and Han Tai	14	Silk MSEs, members of silk weaving group and workers
Ban Fhake and Non Samran	16	Administrative team and members of SMCE

Table 3.8: Discussion topics and used tools

Topic discussions	PRA tools and techniques used
Livelihood strategies	Time trends Facilitated discussion
Livelihood outcomes	Facilitated discussion Ranking
Applying SEP in silk MSEs	Facilitated discussion
Marketing	SWOT analysis Marketing Mix
Social development	Facilitated discussion
Environmental management	Seasonal calendar Ranking
Production improvement	Seasonal calendar Ranking

3.4.4 In-depth interview

In-depth interview is a significant tool in qualitative research as the interviewer has the flexibility to ask questions that provide the opportunity to explore deeper understanding of issues or the discovery of new issues from the informants (Jones 1985). However, some interviewing errors and ambiguous questions in the interviewing process and data analysis can affect the reliability and validity of data (Alreck and Settle 1995).

In this method, open-ended questions were asked to stimulate and provide interviewees with the freedom to talk in order to achieve important information about previous and present policies and plans related to the silk cottage industry and silk business that they are involved with. In terms of government plans and policies, the question focussed on the provincial silk strategy, the OTOP policy, and future plans for the promotion of the silk cottage industry. Non Government Organisations (NGOs), e.g. silk network groups and the Thai Silk Association, which promote the silk cottage industry at village, regional and national levels, were interviewed to gain more understanding of the silk business and market from the private sector's viewpoint. Moreover, this method was used to invite comment on draft silk strategy plans, which are developed by the target groups in the study, from the related silk promotion agencies. Personal interviews and telephone interviews were conducted in order to facilitate the respondents and follow up the questionnaire results. The list of these informants is presented in Table 3.5.

Table 3.9: List of the organisations surveyed by interview

Type of Organisation	Level	Organisation
Government	Local level	Ministry of Industry Nakhon Ratchasima Industrial Office The 6th Regional Industrial Promotion Centre Ministry of Agriculture and Cooperatives Nakhon Ratchasima Sericultural Research Centre Ministry of Interior Nakhon Ratchasima Community Development Office Pak Thongchai Municipality Ministry of Education Suranaree University of Technology
	National level	Ministry of Agriculture and Cooperatives The Queen Sirikit Institute of Sericulture Ministry of Industry Bureau of Cottage and Handicraft Industries Development, Department of Industrial Promotion
Non-Government Organisations (NGOs)	Local level	North-Eastern Silk Net
	National level	The Thai Silk Association

3.4.5 CP preliminary audit

The CP audit is a process assessment to identify the source of waste production and identify the CP option for reducing waste or improving the efficiency of the process. The procedure of the CP audit consists of five steps: planning and organisation, pre-assessment, assessment, feasibility study and implementation. The flow chart of these procedures is shown in Figure 3.1 (UNEP 2004).

In this research, the objective of employing the CP audit is to assess resource consumption and waste production in the silk production process. This data could support the development of local resource management and waste management as well as increase the competitiveness of the silk cottage industry. In order to gather these data, only the first three steps were conducted in this study.

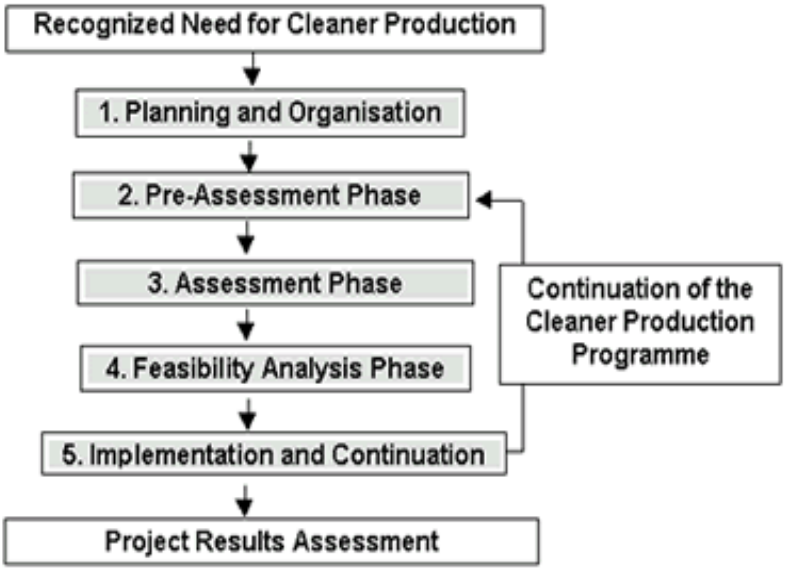


Figure 3.1: Flow chart of the CP assessment in industries

(Source: UNEP, 2004)

To plan and organise the CP assessment, the researcher informed group leaders and producers about the advantages of the CP assessment. Potential producers were identified and asked to cooperate in the CP audit. The pre-assessment of the silk production process was conducted through semi-structured interviews and observation. The outcome of his assessment revealed that the bleaching and dyeing stages are the most significant processes in terms of consuming resources and producing waste.

An assessment of these key processes was made to develop a material balance and identify CP options. Two dye houses in Baan Doo Noak and Baan Donkhang villages were selected to represent modern production and two other houses in Baan Fhake and Non Samran villages were chosen to represent traditional production. Two research assistants, from the local universities who were trained on the CP audit were recruited to evaluate the processes in each mode of production. The amount and type of consumed resources and emerged wastes in each step of the process were identified in the material balance diagram. Then, the CP options were developed to reduce wastes and the health and safety effect in these processes. The result of the CP assessment is presented in Chapter 4, 5 and 6, whilst the CP options are shown in Appendix 3.

3.4.6 Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD) analysis

Silk production has boomed in the villages over the past years. The lack of waste treatment systems in these rural areas has raised questions about the impact of the untreated effluent on the silk production sites. Identifying the effluent characteristics could increase understanding and help local communities and related organisations to find suitable solutions for waste reduction and local environmental management.

Even though the qualitative data on environmental impact of silk production was gathered from the stakeholders, scientific analysis of the wastewater is also essential. Two popular indicators, COD and BOD, were selected to rapidly measure the quality of the waste water sample in a laboratory test. These indicators are commonly used to indicate the effect of pollution and whether or not it could have a negative effect on living organisms in the water (Moss 1998). Waste water from the bleaching and dyeing process

was collected from four different sites of silk production and also from a public pond. The samples were then sent for analysis at the laboratory of the Suranaree University of Technology (SUT) and the 11th REO. The result of this analysis is shown in Chapter 4 and 5.

3.5 Data analysis

Because of the shortage of secondary data from the silk cottage industry and the informal business of MSEs, the integration of quantitative and qualitative research was implemented to investigate the overall nature of MSEs and SMCE livelihoods and the impact of silk production in communities.

3.5.1 Quantitative data

Since there were a small number of respondents in the survey, the survey data were analysed and interpreted by basic statistical tools. In order to examine the relationship between variables from a set of quantitative data from the survey, frequency distribution, such as percentage and ratio, was used to interpret survey result. Moreover, the mean, which is a common average, was used to describe the most typical response of respondents (Fielding and Gilbert 2000). Due to its limitation with the nominal and ordinal data and extreme values, this study used the mean to interpret the result of people's attitudes.

3.5.2 Qualitative data

Data from focus group discussion and in-depth interview methods was transcribed and analysed by qualitative content analysis. The content analysis is a method to create valid inferences from textual material by using a set of paraphrased statements. Due to its systematic and objective manner, this approach can be used to determine relevant characteristics of messages. The example of this method's application are coding open-ended questions in survey, disclosing the attention of group, explaining attitudinal and behavioural responses of communicator, etc. (Riffe *et al.* 2005; Weber 1990).

As the aim of content analysis is to reduce textual material to manageable data, it is essential to paraphrase material that is related to the research question and generalise the statement. Similar generalised statements are categorised and connected to develop concepts and theories that describe the findings (Daymon and Holloway 2002; Flick 2006). However, the emphasis on statements which are related to the research question is a weakness of this analysis, particularly in overlooking the interaction between participants (Silverman 2006).

3.5.3 SWOT analysis

In order to examine the performance of the silk micro business and the current market situation, a SWOT analysis was conducted to encourage the silk MSEs and SMCE to identify their strengths, weaknesses, opportunities and threats. This technique is popular with businesses for marketing purposes and overall strategic planning (Kern 2001). In addition, the matching positions of strengths and weaknesses with opportunities and threats could lead to a process of strategic development which may improve the success of their businesses in the future (Formisano 2004).

3.5.4 Mass balances

Based on the law of conservation of mass, which states that mass cannot be created or destroyed, mass balances or material balance are methods that chemical engineers use for accounting for the total mass that is involved in the process (Griskey 2000). Mass balances are used to evaluate materials and energy consumption and emerged wastes from the process. Since they can monitor the input and output which help in budget calculations, these approaches become popular tools in the CP concept. Moreover, the analysed data could help to improve not only waste reduction, but also effective use of resources (EPA 2001; Office of Technology Assessment 1995).

In this research, the input and output in bleaching and dyeing processes were audited and analysed by the total mass balance equation. Due to their batch processes, the equation can be written as:

$$\textit{Total Mass In} = \textit{Total Mass Out}$$

3.5.5 Interpretation

As shown in Figure 3.2, the analysed data was interpreted and presented mainly with regard to the SL framework. Other data which is not clearly indicated in the SL framework, e.g. technology, markets, ethics, etc., will be interpreted by different frameworks. For example, the details of input and output in the bleaching and dyeing processes is analysed by the CP concept and illustrated in the mass balance flowchart. Meanwhile, the rest of the data will be interpreted in terms of the SEP.

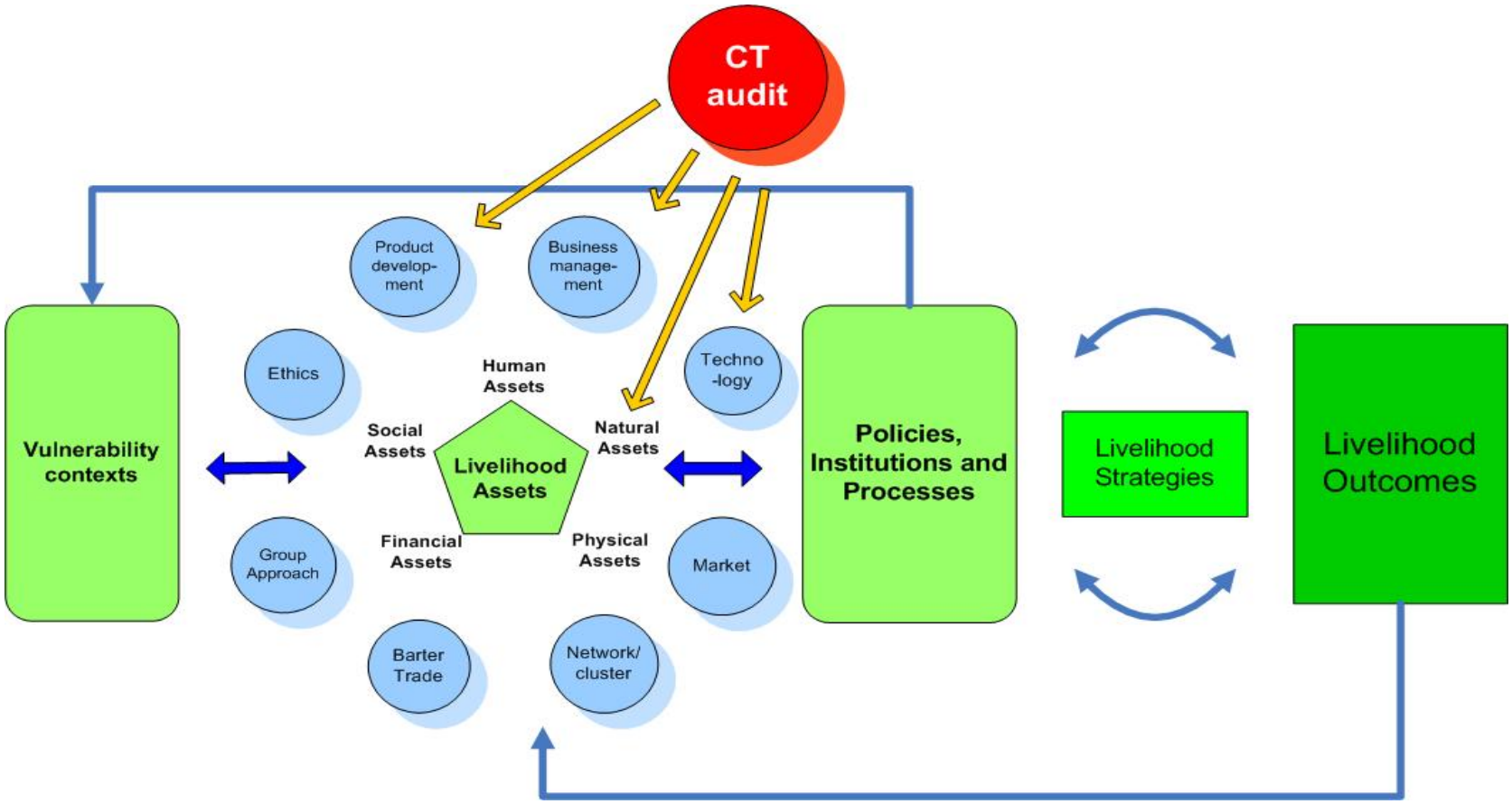


Figure 3.2: Relationship between data interpretation and three employed frameworks

(Source: Survey data, 2004)

3.6 Conclusion

The study of the Thai silk cottage industry in both the formal and informal sector needed to be investigated through fieldwork due to the lack of secondary data on the silk livelihood and its impacts on community. In order to understand these complex relationships, qualitative and quantitative data were collected from one traditional production site and three modern production sites in Nakhon Ratchasima province, the largest production site for the silk cottage industry in Thailand.

In the fieldwork, transect walks, semi-structured interviews, focus groups discussions, and in-depth interviews were employed for gathering data. The CP preliminary audit and COD and BOD test of effluent were conducted to gain more understanding about the consumption of resources and the waste production in the production process.

Quantitative data were analysed using statistical tools, whilst content analysis was used to analyse qualitative data. Data from the CP preliminary audit was analysed and illustrated by the mass balances technique. Business and market data were examined by SWOT analysis technique.

The SL framework was used to interpret the relationship of the silk cottage industry within communities, whilst the SEP was employed to interpret data and encourage silk producers to develop a strategic plan to sustain their businesses and communities. Regarding the different production formats of the silk cottage industry, the results of the survey and data analysis of modern production silk MSEs are presented in the next chapter.

Chapter 4
Result of Silk Production Livelihoods Survey in Pak Thongchai

This chapter presents the results of the investigation into silk craft production and livelihoods of MSEs in Pak Thongchai. To gain more insight into this type of production, the background of the silk MSEs' development will be outlined in the first section. The Sustainable Livelihood (SL) approach was employed to explore the vulnerability context, associated with the silk producing areas, which includes trends, seasonality and institutions that have a bearing on the health of silk enterprise. Livelihood assets, policies, institutions and processes, livelihood strategies and livelihood outcomes are also discussed. The Cleaner Production (CP) concept is applied to explore the production line process, focusing particularly on the most pollutant producing aspects. Certain key components of the Sufficiency Economy Philosophy (SEP) application in Thai SMEs which were not specifically categorised in the SL framework such as technological and market factors are also examined.

4.1 Overview of Pak Thongchai Silk MSEs

Agriculture, such as rice growing and cattle feeding, is used to be a major livelihood for villagers. According to the group discussions, there has been a recent watershed in the Pak Thongchai silk production. When the cottage industry in the Pak Thongchai municipal area was established in the late1960's, silk weaving work was sub-contracted to villagers outside the municipality and had become a regular source of supplementary income.

Since the 1980s, increasingly MSEs (freelance workers) have taken on the role of SMEs in terms of silk production. As part of the aim to produce mass quantities of fabric, division of labour and new production tools have been introduced into the villages and nearby communities which promoted silk production as the main livelihood for both women and men. In this research, 80 female (20 producers, 53 other residents, 2 group leaders, 1 village leaders, 3 health promotion officials and 1

silk related promotion official) and 27 male (10 producers, 8 other residents, 1 group leader, 5 village leaders, 3 TAO chairmen) were interviewed. The details of producers categorised by gender and age distribution are presented in Table 4.1. The significance levels of the probability values of producers' data between two variables - gender and age distribution – and between modern and traditional type of production are further presented in Appendix 2.9.

Table 4.1: Details of surveyed silk producers in Pak Thongchai

Villages	Gender		Age distribution			
	Female	Male	< 35	35-44	45-54	>55
Doo and Doo Noak	7	4	-	4	6	1
Don Khwang and Kud Kradi	6	3	2	2	3	2
Han and Han Tai	7	3	3	3	3	1
Total	20	10	5	9	12	4

From the survey of 27 producers and 3 group leaders[1] in 6 villages in Pak Thongchai, it was found that the number of entrepreneurs in Pak Thongchai increased to more than 56 per cent of the total producers after the economic crisis in 1996-1997. In Baan Doo - Baan Doo Noak villages and Baan Han-Baan Han Tai villages, the figure has dramatically increased by 90 per cent and 80 per cent respectively. Nearly three-quarters of producers have started to produce silk as a new business because of market demand, whilst one-fifth of producers developed silk weaving from their family activities. As a consequence of the implementation of the village fund loan in 2003, it is believed that every household in villages became silk entrepreneurs. In turn, SMEs have become more like middlemen in the silk trade. This shift is partly due to the desire on the part of SMEs to take less business risks following the 1997 financial crisis. Furthermore, interviews with silk producers who lived in non-municipal areas revealed that the enforcement of the municipal wastewater discharge fee has been another motivation for SMEs in Pak Thongchai municipality to subcontract the production order to the MSEs.

[1] The other two groups' data is not shown because those are not yet formally operating as a group

The survey showed that nearly all the respondents (97 per cent) indicated that silk production is their main source of income. As shown in Figure 4.1, approximately 63 per cent of responses are independent entrepreneurs in villages, while the rest describe themselves as group members.

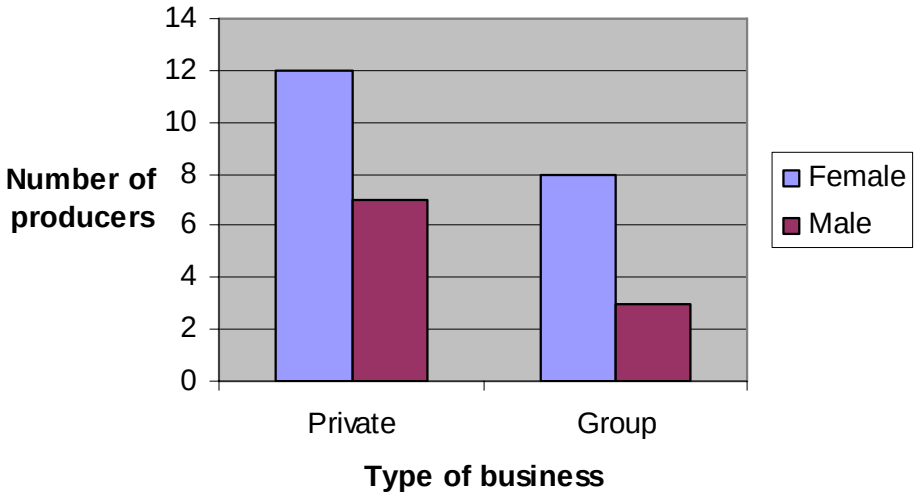


Figure 4.1: Number of producers categorized by gender and type of business in Pak Thongchai

(Source: Survey data, 2004)

According to the Thai SME definition[2] and the number of employees being hired per one loom production[3], the size of enterprises in the survey site can be categorized into 4 groups; 7 per cent of producers are micro (< 4 looms), 77 per cent are small (4-25 looms), 3 per cent are medium (26-110 looms) and 13 per cent are large enterprises (> 111 looms)[4].

From Figure 4.2, it is evident that the number of silk entrepreneurs in the villages has doubled since 1999. This significant boom in silk production at village level was the reason given for this increased activity, according to the Baan Doo silk weaving group leader. As a result of the large number of purchasing orders from SMEs in Pak Thongchai municipality and the promotion of village funding policy, many freelance

[2] Thai SMEs definition is divided into 4 sizes of enterprise by the number of workers; micro (<10), small (11-49), medium (50-199) and large (>200) [National Statistic Office]

[3] It is estimated that one loom of silk production can provide many different jobs (for six people at least)

[4] See Appendix 4.2 for more details in employment

home-workers and unemployed workers have become silk entrepreneurs. The size of new enterprises is mostly small and medium according to their capital and accessibility to financial loans.

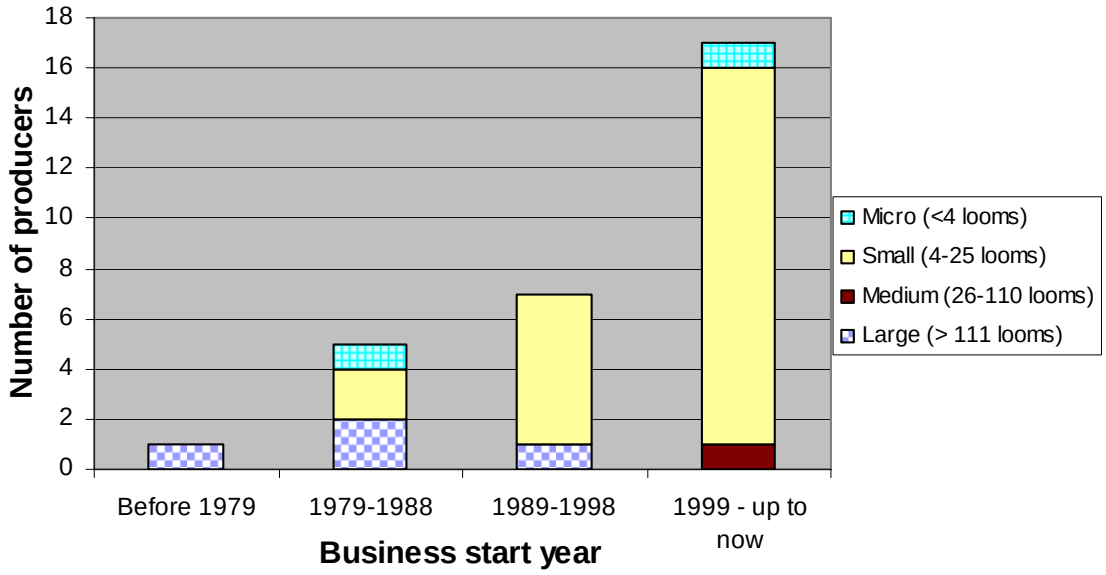


Figure 4.2: Number of enterprises categorized by size and business start time in Pak Thongchai

(Source: Survey data, 2004)

From the interviews and observation, the production processes adopted from factory manufacturing can be classified into consecutive steps; bleaching and dyeing silk yarn, spinning yarn, reeling warp thread on bobbins, reeling weft thread into shuttles, reeling warping frame and storing with reeds, tying warp with heddle and beater and weaving. The diagram of whole production process is illustrated in Figure 4.3[5].

[5] The pictures of silk production process in MSEs are shown in Appendix 3.1

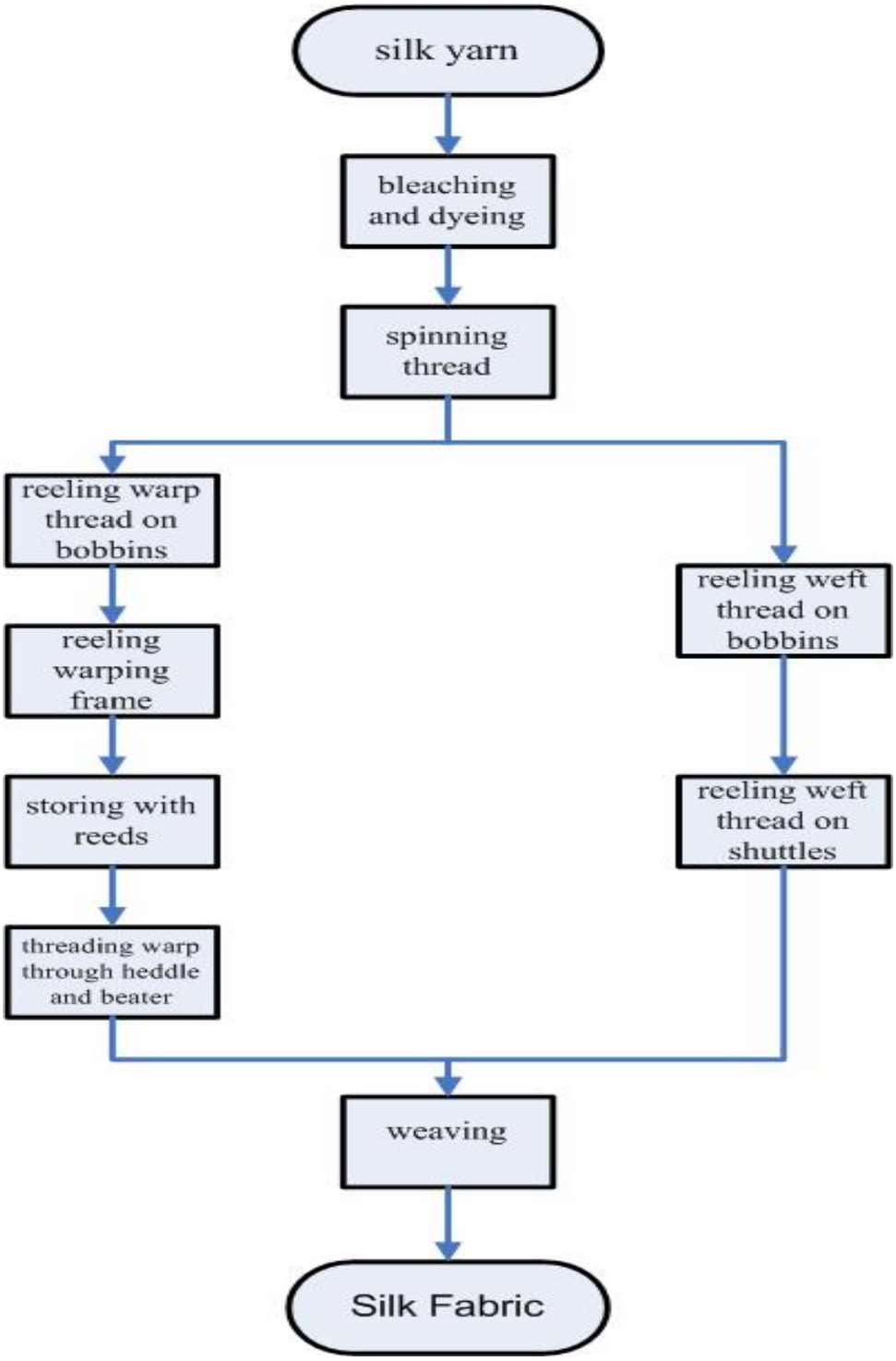


Figure 4.3: Silk production process in Pak Thongchai

(Source: Survey data, 2004)

Producing on a mass-scale with limited resources, these MSEs have to use division of labour in their craft production. Most recruitment of labour takes place in the villages and surrounding areas. To control quality and centralization, manufacturers will send the dyed thread and other equipment to the auxiliary craftspeople in each stage of the process. After finishing their task, the craftspeople deliver the finished tasks to manufacturers who then inspect the quality of work before sending to the next craftsperson and finally to the weaver. These craftspeople will receive payment for the piece and any new order. In order to increase their capacity, some essential tools e.g. percussion looms, are also provided to the weaver by these enterprises. Therefore, it is necessary to hire 6-8 craftspeople to produce a roll of silk fabric depending on how much of the process can be done by the enterprise themselves, like bleaching and dyeing, spinning yarn or weaving.

4.2 Vulnerability contexts

4.2.1 Trend

The most important positive trend affecting the silk business of MSEs is a regional promotion of traditional silk thread production and a new national silk fabric standard. To compete with the largest silk producers at regional and international level, such as China, Vietnam and India, traditional silk yarn has been promoted to be used as the premium product. With its unique characteristic of thread, some representatives in both government and private sectors indicated the fabric made from this type of silk yarn could potentially develop and build its own niche market; and the interview with Mr.Setr Vanijvongse, the president of Thai silk association. The change of the main livelihood from agriculture to silk production and the emigration

of young labour force to the city make villagers vulnerable to food and economic insecurity. With time and labour constraints, several MSEs indicated that they had let their land to landless farmers or reduced the scale of rice planting in order to satisfy annual household rice needs. In recent years, regular visits by various fresh food and ready meal mobile vendors to the villages could imply that most villagers prefer buying to producing or making food themselves

4.2.2 Seasonality

The effect of seasonality on the silk livelihood of MSEs can be categorized into two issues: production cost and production capacity. Since the Pak Thongchai district started producing silk fabric on a commercial basis, silk cultivation has faded away in villages because people have no time for this delicate work. All producers need to order all silk yarn from the big silk manufacturers, middlemen and farmer groups which rear silk worms on a large scale. From the interview with producers, it is found that the market price of thread varies all year round and depends on the silk yarn supplier. The more the market demands, the more the price increases. At times the price can even vary within a single day. This unstable trend discouraged MSEs from investing money in maintaining their thread stock.

The peak time for silk marketing is in the dry season in line with the large number of festive celebrations and ceremonies in the country which take place after the harvest period. Despite the high demand for fabric in this season, the fabric quantity can not increase much because of the shortage of labour during the harvest period.

4.2.3 Shock

As a consequence of wholesale distribution combined with strong competition in the market, middlemen have become more powerful and often pay by post-dated cheque which can take up to 3 months to clear. Sometimes these middlemen pay for large amounts of fabric using bad cheques and then disappear. A recent major case of fraud in Pak Thongchai in 2002 resulted in not only the loss of 300,000 GBP or 515,385 USD[6] silk fabrics in the whole district, but also the collapse of wholesale prices. Because large quantities of silk fabric from the fraud had been sold at a very low price, other wholesalers had to sell the fabric at the same low price. Over the past five years, profit decreased more than 50 per cent, which had a serious impact on producers' profits.

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[6] The data is based on the calculation from the sale price in February-March 2004 and the exchange rate in

April 2004 at 1Great Britain Pound (GBP) = 67 Thai Bath (THB) or 1 US Dollar (USD) = 39 THB

In recent years, drought conditions have been more severe and lasted longer in Thailand. During group discussions in 2005, producers in Baan Doo reported almost a whole year of drought in the area (July 2004 to July 2005). This situation delayed all crop planting and harvesting schedules as well as having a drastic effect on productivity of both food crops and mulberry. This led to food insecurity in the community and soaring silk thread prices. Moreover, Baan Doo's MSEs needed to start purchasing increased amounts of water again from the mobile vendor for production and daily use.

The rise of world oil prices in 2005 has seriously affected the Thai economy. The high inflation rate made people become less inclined to spend which led to a slump in market demand and sales of luxury products such as silk fabric. However, raw material prices and distribution costs increased dramatically.

4.3 Livelihood Assets

4.3.1 Human capital

As previously mentioned, the ancestors of the Pak Thongchai people were the Tai Lao who passed on their knowledge of silk manufacturing through the female line. Since the introduction of percussion looms and the growth of the silk business in the early 1960s, men have started to become involved in silk production, especially in physical demanding processes like dyeing and weaving.

The survey of 27 producers and 3 group leaders showed that two-thirds of respondents are female. About 70 per cent of respondents are between 35 and 54 years old (shown in Figure 4.4). More than half only have primary level education and 80 per cent of the entrepreneurs have medium sized families (4-6 people).

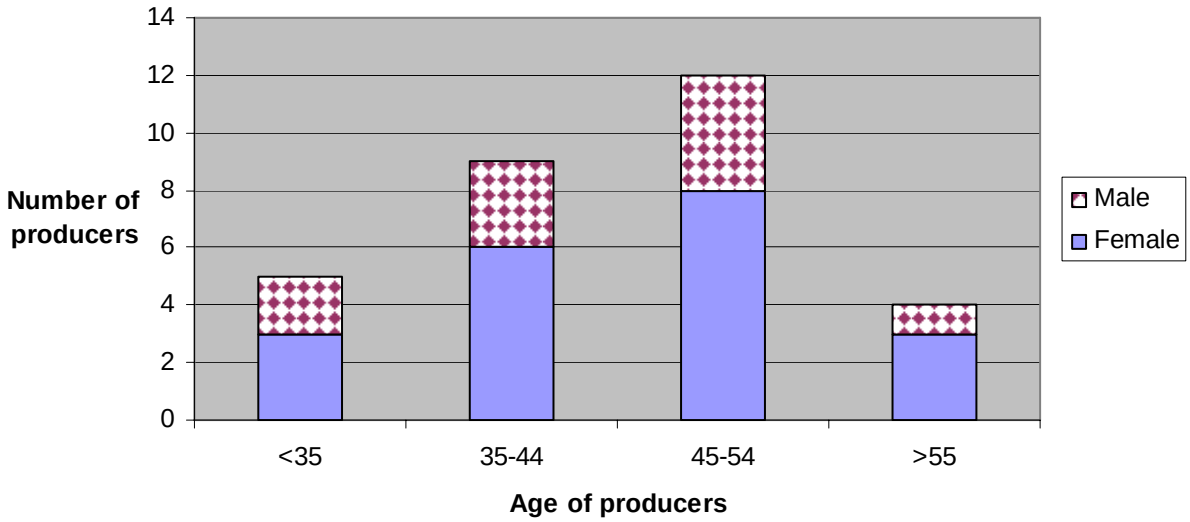

Figure 4.4: Number of producers and group leaders categorized by age and gender in Pak Thongchai

(Source: Survey data, 2004)

Due to its informal status and the division of labour in the production process, the skills transfer focuses on a specific process, not the whole procedure, depending on the trainer's skill and trainee's interest. More than half of entrepreneurs have derived their silk know-how from the family. About 40 per cent of enterprises make silk on a trial and error basis only, whilst the rest consult the experts to produce and improve production.

In order to investigate health impacts from silk production, the producers, other residents and health promotion officers were asked about their opinions on statements about the emerging of four silk-related symptoms between two periods of time; when silk was a supplementary source of income and when silk becomes the main source of income. The producers were asked questions relating to the health effects of silk manufacturing in their family members and non-family members (workers or other community residents).

Similar questions were raised with other residents about health impacts they were aware had occurred to other community residents. Table 4.2 shows the results in terms of average frequency percentage of only those respondents from each category who agreed there was an increase of health effects, though some respondents

indicated there was either no difference or a decrease in the frequency of these health problems.

Table 4.2: Health impacts from silk production on producers and other residents in Pak Thongchai

Effected system	Percentage of agreement			Symptoms
	Producers		Other residents	
	Family	Non-family	Community	
Respiratory system	29.4%	57.1%	61.5%	Allergic to dust, irritated eyes, nose and throat, breathing problems when exposed to silk dust in the spinning and reeling process.
Dermatology system	17.6%	28.6%	48.1%	Rashes when exposed to silk dust and thread, especially in local silk yarn, in the bleaching and dyeing, spinning and reeling process. Sometimes people felt hurt when the weather was hot and they got sweaty.
Nervous system	70.6%	85.7%	44.2%	Anxiety, stress and headaches, particularly among entrepreneur when the fabric price fluctuates.
Muscular system	64.7%	57.1%	71.2%	Muscular aches and sprains when working in the same position for a long time

More than half of the producers and other residents agreed that the muscular symptoms have increased since silk becomes the main source of income due to long working hours, attributed to activities related to silk production. Whilst other symptoms were indicated differently depending on the information obtained from each respondent groups and the subcontracting tasks exposed to chemical substances.

Although chemical substances have been used in production for over two decades, only a few manufacturers seem to be aware of the hazards involved and work safety. As a result, health and safety problems mostly relate to exposure to chemical substances and dyes, particularly in bleaching and dyeing as well as spinning and reeling thread. Most entrepreneurs hire skilled labourers, however, some producers do

the bleaching and dyeing of silk yarn themselves. It appears that the illnesses occurred among workers or other community residents more than among the entrepreneurs' family members.

Meanwhile, the survey of local health promotion offices revealed that three out of four of these offices did not identify the relationship between these symptoms and silk production due to insufficient data. This is because most producers, who have good financial status, prefer going to the district hospital or private clinic than to health promotion centres. Only the officers responsible for health promotion in Baan Han area reported that these illnesses, particularly in the respiratory system, would possibly increase in the future. Other symptoms of ill health were found, for instance, inflammation in the uterus and vagina from weaving for a long time as well as nausea, headaches, vomiting and fainting from the odour of chemical substances and wastewater. Greasy and solid waste in waste water usually blocked the drainage system and could be a reproduction source for flies and mosquitoes.

Although the majority of the respondents agreed that silk livelihood has enhanced the transfer of local traditional know-how, there are still concerns about the shortage of skilled young labour and successors as well as the change of traditional know-how of this livelihood in the future. Since most skilled craftspeople and weavers are in their late forties, fifties and sixties, one large enterprise owner strongly indicated that she might have to stop her business when her skilled workers retire.

Table 4.3 illustrates the survey result in producers, group leaders and other residents about silk know-how transference. It shows that since silk became the main source of income, there is an increase of the revival or re-innovating of silk traditional know-how in the process of recruitment and know-how transferring to the younger generation. This knowledge includes the techniques in spinning traditional silk yarn and weaving old pattern fabric by using percussion loom. It was found that much of the transfer of know-how occurred within the family or in private factories via the informal training system, except the current silk weaving and designing training supported by government agencies. Furthermore, some respondents believed that this knowledge transfer was largely focused on industrial style tasks, which are not related to the local traditional silk know-how. This can be seen in some students, who were

open to doing part-time jobs, have learned how to spin silk yarn by using machine in the factories.

Table 4.3: Silk know-how transference since silk became the main source of income in Pak Thongchai

Silk know-how transference	Percentage of agreement			
	Producers	**Other residents**	**Village leaders**	**TAO**
Increasing the revival or re-innovating of silk traditional know-how transferring	57.1%	64%	50%	33.3%
Not different from the traditional silk know-how	32.1%	9.8%	16.7%	33.3%
Not involved with the traditional silk know-how at all	7.1%	26.2%	16.7%	33.3%
Decreasing the know-how transferring due to the shortage of younger worker and the current uneconomic business	3.6%		16.7%	

Due to the increase in the length of compulsory education (from 6 years to 9 years) and its lack of relevance to local livelihoods curriculum, the younger generation of Baan Han village preferred to study further and to join the white collar workforce. Meanwhile most of the young generation of Baan Doo are likely to remain as blue collar workers since they do not progress beyond the compulsory education level. Although there was an attempt to promote silk weaving as a supplement to the curriculum in Baan Doo primary school in the past three years, this skill is difficult for children to acquire. Furthermore, the price of silk yarn was increasing which made it difficult for the school to afford such training on a long term basis and was subsequently discontinued.

From the in-depth interviews of the village leaders, it was found that the dramatic increase in industry investment has exacerbated the shortage of young labour in silk craft production. Conversely, the former abbot of Bhodi Sri temple in Baan Doo and other manufacturers had an interesting view regarding how silk production in Baan Doo may still keep going.

"Most children in this village will be trained at least to know how to spin silk yarn because they are brought up with silk production. Working in a factory after graduating from secondary school, these children can not work in these types of jobs for a long time. This is because employers tend to lay off older workers who are less efficient and more expensive to employ. Many have decided to go back home again, so silk production may offer a safety net for those who already have some basic skills. In addition, this is a chance to work independently and to be an owner of business"

The silk weaving training scheme in Baan Han seeks to support the development of silk production as a safety net for local people by training mainly women over 35 years old, who can not find any job in the formal sector and want to earn additional income as silk weavers. The interview showed that the training course was successful in producing a number of weavers because most trainees have learned some silk know how from the family since they were young. Nevertheless, the survey also revealed that silk know-how would be transferred less within the family if the current situation of dwindling markets and impoverished business was not improved. Currently no manufacturers are encouraging their own children to work in silk production as a cottage industry.

4.3.2 Social capital

Since the income of producers in the district has increased, their lifestyles are changing as a result of production. All data was provided by the producers, other residents, village leaders and TAO representatives in 2004. Table 4.4 shows the percentage of agreement on statements about the impacts of silk production on the producers, other residents and whole communities between two periods of time; silk production as an additional source of income and silk production as a main source of income. The result is presented in terms of the average percentage of impact frequency.

Table 4.4: Social impacts from silk production on producers and communities in Pak Thongchai

Impact	Percentage of agreement			
	Producers	**Other residents**	**Village leaders**	**TAO**
Positive impact				
• Enhancing the ability to support their children's education higher than compulsory level (Grade 9)	88.9%			33.3%
• Creating jobs in local areas	100%	96.7%	83.3%	
• Decreasing family members' migration to work	29.6%			
• Increasing time for communicating within family	65.4%			
• Enhancing the relationship between producers and neighbours	44.0%	27.4%		
• Enhancing the relationship between producers and the community	60.7%	42.6%	83.3%	66.7%
• Participating more in community activities	64.0%	56.7%	50%	66.7%
• Providing more cooperations in community development activities	53.3%	63.9%	66.7%	33.3%
• Contributing to the community development	67.9%	61.3%	100%	100%
Negative impact				
• Decreasing the relationship between producers and neighbours due to a need of time for the silk business and production	8%	8%		33.3%
• Decreasing the relationship between producers and the communities due to the business competition and pollution problems	3.6%	13.1%	33.3%	33.3%

Impact	Percentage of agreement			
	Producers	**Other residents**	**Village leaders**	**TAO**
Negative impact • Having less participations in community development activities	16%	8.3%		
• Having adverse effects on the community due to the business competition and pollution problems			75%	66.7%

Consequently, most producers strongly agreed that the income from the production of silk has contributed to the improvement of social status of producers and their families since silk becomes a main source of income. This included the ability to support their children through their higher education, employ workers and provide more time and financial support in community development activities. Moreover, this craft production has created jobs for elderly people who are unable to find a job in factories, as well as housewives, and students who can work and earn money in the community.

As silk production is an indoor activity, it is evident that most producers and workers have more time to stay and work at home. This helps to reduce labour migration out of the village, excluding students and young people who generally prefer to live and work in big cities. As a kinship society, Thai rural villagers usually help each other and the community as a whole when support is needed. With more time, money and assistance, the relationship between producers and neighbours and the community had improved markedly. In contrast, some negative impacts from silk manufacturing on the relationship were also observed resulting from the change of silk production from part time to full time work, business competition and pollution problems. However, more than half of the respondents agreed that silk production has contributed to the general improvement of living conditions of the community.

Table 4.5 presents the results of the attitude survey conducted in 2004 and shows that silk producers perceive silk weaving to play an important role in the community culture. It has been recognized as an intermediary of culture transfer which either

promotes the social status of the producer or provides secure jobs for the young generation to make a living.

Table 4.5: Results of silk MSEs' attitudes survey on social and community aspects

Statement	Average score[7]
Silk production is a job which can pass on local culture to the next generation	4.55
Silk production is a job which enhances social status and acceptability by the community	4.38
Silk production is a secure job for the young generation to adequately support their future life	4.21

No social problems from the unprecedented growth of silk production at village level seem to have arisen. For example, there is no immigration labour problem and no subsequent community congestion. Regarding other social problems, it is difficult to draw conclusions due to government intervention over this period. For instance, crime and drug problems had decreased by more than three quarters because of the impact of the government's drug elimination campaign in 2003. There have also been conflicts within the communities regarding waste and wastewater management and the reduction of groundwater, the key source of water in Baan Doo. As these issues relate to the environment, further details will be given in Section 4.5 (Natural capital).

According to the definition of group production in Thailand, most group producers in the informal sector, particularly the agriculture sector, are mainly cooperating in order to sell products together. The majority of groups have been set up as a result of government policy to promote group production. Many groups have failed to operate their businesses despite support from government officers because they lack motivation and business experience.

[7] According to the Linkert scale, the maximum score of this attitude survey is 5 (strongly agree) and the minimum score is 1 (strongly disagree)

Although there have been many attempts to set up cooperation among MSEs in the form of groups (Baan Doo silk weaving group), cooperatives (Pak Thongchai Silk cooperative), and associations (Nakhon Ratchasima silk association), most members work independently in their own businesses and are not eager to work cooperatively to solve these problems. Moreover, there is high competition between groups and other enterprises in the village, particularly new MSEs. The lack of collaboration has caused price wars amongst the entrepreneurs causing financial problems and undermining the competitiveness of MSEs.

4.3.3 Physical capital

Due to the growth of silk entrepreneurs' income over many years, it is clear that the living conditions of people and the infrastructure in Pak Thongchai district have improved compared to other districts in the same province, except the city district. The producers, other residents, village leaders and TAO chairmen were asked about their agreement on statements about the impacts on physical assets compared to the period before and after silk become the main source of income. The results of a survey of the economic impacts are shown in Table 4.6 in terms of the average percentage of frequency of each impact.

Table 4.6: Impacts on physical assets in Pak Thongchai

Impact	Percentage of agreement		
	Producers	**Village leaders**	**TAO**
• Improving living condition	85.2%		33.3%
• Possessing tools, apparatuses and machines for silk production	100%		
• Increasing other entrepreneurs' physical assets that are not involved in silk production	50%	50%	100%

It has been observed that most silk enterprises possess more luxury electrical goods, motorcycles and cars and better housing. Some entrepreneurs have been able to buy more land to extend their businesses. Indeed, in general, the living condition of major silk operating villages is better than the agriculture-based villages because of increases in silk-related jobs and the growth of the village economy. Village leaders

and the TAO chairman reported that the community's infrastructure only lacked a waste treatment system.

In terms of essential tools and equipment of silk production, all manufacturers possess basic tools such as looms and silk-related apparatuses; warp and weft spinning machines; and dye houses with dyeing tools and equipment. Other assets, for example, cars and luxury electrical appliances, are obtained more since silk became an important occupation.

4.3.4 Financial capital

The survey investigated four aspects of the producers' financial status; capital, income, debt and savings. Of the 30 producers, about 83 per cent of capital sources used for starting businesses are from the producer. Nearly three-quarters of capital exceeds 100,000 THB (1,493 GBP or 2,564 USD) while the rest is less than 100,000 THB.

In terms of debt, 69 per cent of debt exceeds 100,000 THB, 17 per cent is less than 100,000 THB. However, about 14 per cent of producers reported no debt. The survey found that there were three major sources of loan; informal financial organizations (30 per cent), financial firms (22 per cent), and combined support from both government and financial firms (19 per cent). About 85 per cent of loans were used for investing in the business, whilst the rest was used for both business and living costs.

In terms of income sources, about 63 per cent of income was obtained from tailor-made order production and product distribution and the other 33 per cent came from product sale only. As a main job, silk can provide an income of more than 100,000 THB per annum for every entrepreneur. For example, micro producers who only have a loom can earn at least 189,000 THB[8] per annum. With regard to savings, about 62 per cent of small, medium and large producers can save more than 100,000 THB, whereas nearly 38 per cent of micro producers and small enterprises that have less than 15 looms can save up to 100,000 THB per annum. About 53 per cent of

[8] The calculation is based on the production of a roll of 210 yard fabric in every two month and the sale price of a fabric is 150 baht per yard.

producers used their saved money for cash flow in their business, while the other 47 per cent spent their saved money for cash flow in their business and family costs.

Figure 4.5 shows that although the silk cottage industry required a lot of capital, the high income per annum enabled the entrepreneurs to acquire savings. On the other hand, it also led to increased debt for producers because of the fluctuating price of fabric and silk yarn.

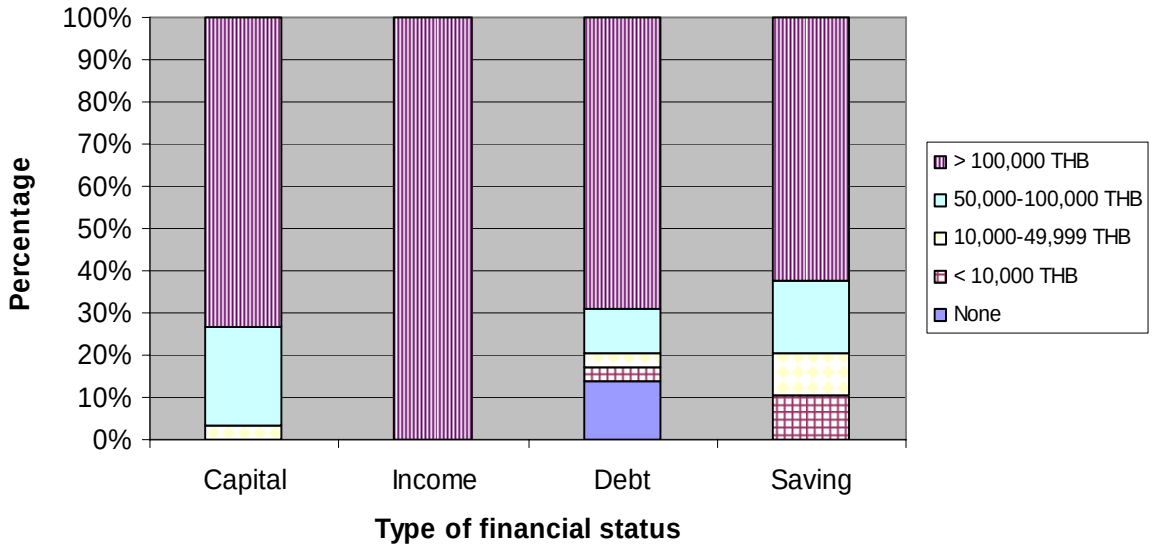

Figure 4.5: Detail of producer's reported financial status in Pak Thongchai

(Source: Survey data, 2004)

Conversely, the negative economic impacts are probably partly caused by the status of the entrepreneurs. As silk production is recognized as a non-farm activity in the informal sector, most MSEs do not get any support from government agencies or local authorities. This has led to the majority of producers avoiding paying tax on their business to decrease the cost of production. There is also a lack of work-related welfare. Both producers and workers need to be responsible for any cost of impacts on health and accidents resulting from work.

Table 4.7 shows the perception of producers and communities about the impacts of silk manufacturing after it becomes the main source of income that it not only affected manufacturers' economy but also boosted the local economy. The growth of retail shops and bistros as well as the increase in the number of mobile vendors selling various types of product are indicators of the strong economic status of communities.

Some manufacturers can also contribute revenue for the TAO via taxation. With limited capital, however, almost all the producers started their businesses using their own savings and therefore have more risk. The fluctuating prices of silk yarn and fabric as well as credit purchasing fraud have accelerated the amount of debt. As a result of the recent collapse in fabric price, it is hard for enterprises to get out of debt whilst one-third has run out of savings due to further investment in their businesses.

Table 4.7: Impacts on producers' financial assets in Pak Thongchai

Economic impact	**Percentage of agreement**			
	Producers	**Village**	**Village leaders**	**TAO**
Positive impact				
• Having capital to invest in the next batch production	60%			
• Increasing self-sufficiency in finances (debt elimination)	20%			
• Enhancing development and expansion of retail businesses and services in the community		100%	100%	100%
• Being part of a vital market for domestic suppliers to sell loom and apparatus, fuel-wood, silk yarn, water and chemical dyes and substances	100%			
• Contributing taxation to local authorities	20%			100%
Negative effect				
Increasing risk of getting into debt from the expansion of production scale (> 3 times the production cost)	67%			

4.3.5 Natural capital

As stated in Chapter 2, the expansion of the silk cottage industry in Pak Thongchai has had an effect on natural resource depletion and environmental deterioration. The environmental effects are explored by comparing two periods; the period when silk production was a supplementary occupation and the current period when silk is the main occupation of the community. Key natural resources in silk production, such as water, fuel wood and silk yarn, and other environmental problems resulting from production e.g.wastewater, odour and solid waste, are investigated. Waste water from both styles of production, as well as public reservoir samples, are analysed to identify characteristics which potentially harm the environment.

a. Natural resource depletion

i. Water

In the semi-arid plateau of the north-eastern region of Thailand which frequently faces drought, the most vulnerable resource is water. The overuse of ground water, the degradation of public ponds and canals, the contamination by pollutants from both agriculture and manufacturing as well as the continuing drought have caused the lack of water supply to become more serious in this area than in recent years. The survey, included questions about water in two categories; drinking water and supply water, are presented in Table 4.8.

Table 4.8: Impacts of silk production on water resources in Pak Thongchai

Degree of problems	Percentage of agreement			
	Producers	**Other residents**	**Village leaders**	**TAO**
I. Before silk became the main livelihood of the community				
Drink water				
• No problem	89.3%	83.9%	83.3%	66.7%
• Little problem	7.1%	14.5%	16.7%	33.3%
• Serious problem	3.6%	1.6%		
• Very serious problem				

Degree of problems	Percentage of agreement			
	Producers	**Other residents**	**Village leaders**	**TAO**
Supply water				
• No problem	82.1%	95.2%	66.7%	66.7%
• Little problem	10.7%	3.2%	33.3%	33.3%
• Serious problem	7.1%	1.6%		
• Very serious problem				
II. Since silk became the main livelihood of the community				
Drink water				
• No problem	89.3%	38.7%	66.7%	33.3%
• Little problem	7.1%	14.5%	16.7%	66.7%
• Serious problem	3.6%	22.6%	16.7%	
• Very serious problem		24.2%		
Supply water				
• No problem	53.6%	43.6%	50%	33.3%
• Little problem	3.6%	9.7%	16.7%	33.3%
• Serious problem	21.4%	11.3%		
• Very serious problem	21.4%	19.4%	33.3%	33.3%

In terms of drinking water, the key sources in the non-urban areas are rainwater, wells, ponds and canals. When silk production was additional work in the community (the years before 2003), a majority of the respondents stated that there was *"no problem"*. At present, however, almost a quarter of other residents indicated that the lack of drinking water is increasing, between *"serious"* and *"very serious"* levels.

The Lum Saw canal is an example of the affected resource. This canal which flows pass Baan Han, Pak Thongchai municipality and Baan Doo, is a major water resource in Pak Thongchai survey site for community activities, such as, consumption, growing rice, cleaning and washing silk yarn. All the respondents in Ban Doo stated that the water quality in Baan Doo area has deteriorated to such an extent that it can no longer be used for drinking. The community now consumes rainwater instead.

In terms of non-potable water, almost all villages in Thailand have their own village water supply system to produce clean water for villagers. Ground water or ponds in villages are the main sources of water. Most of the respondents stated that there was no problem or a little problem about non-potable water in villages when silk was the supplementary occupation. However, more than one third of the respondents said that

the lack of sanitary non-potable water has become a serious or very serious problem nowadays.

Two villages are facing a serious lack of sanitary supply water. In Baan Doo and Baan Doo Noak, inadequate sanitary supply water has resulted from over-use of the ground water for self-consumption and silk manufacturing for 20 years by the villages. This has led to a dramatic fall in ground water quantity as a source of village water supply. Most villagers need to buy water from external merchants in the dry season. This has inevitably forced the production cost in Baan Doo to increase.

In order to investigate the quantity of water used in the bleaching and dyeing process, CP preliminary auditing has been employed in two dye-houses in Baan Doo and Baan Kud Kadi. Due to its small scale business, manufacturers in Baan Doo have conducted bleaching and dyeing by themselves. In the meantime, medium scale manufacturers in Baan Kud Kadi have employed skilled labourers to operate the processes. In addition, Baan Doo producers prefer using cheaper traditional silk thread to imported factory yarn, whilst producers in Baan Kud Kadi like to use imported factory silk yarn from Vietnam due to its availability in large amounts all year round.

The CP audit found that there is a significant difference in the quantity of raw material used in the processes in both production sites which are presented in Figure 4.6 and 4.7. Since each dye house had dyed 4-5 different colours of original bleached silk yarns in each batch, a large amount of water was consumed. On the other hand, a lot of wastewater was emitted. Table 4.9 shows the total amount of water, fuel wood and wastewater from bleaching and dyeing processes in the dye house was higher where the hire labourers worked than where the owner worked by themselves. As these workers are paid on a daily basis, the quicker they work the sooner they can finish. This drove workers to over-use materials. Due to the shortage of skilled workers in this physical work and the informal nature of employment, producers cannot strictly control the workers to optimize the use of materials.

Moreover, the different type of silk thread used in the production process, especially the imported silk, may consume more resources than using domestic produced silk yarn. In the interview in 2004, the Baan Doo weaving group leader stated that the introduction of imported factory silk yarn from Vietnam in 2001 forced MSEs to

increase the quantity of chemicals used in the cleansing process for removing ground in dirt which led to increased pollution in the locality.

Table 4.9: Quantities used in bleaching and dyeing processes per batch

Quantities used in the bleaching and dyeing processes	Self-operating	Hired skilled workers
Water (Litre)	8,168	9,510
Fuel wood (Kilogramme)	120	286.5
Liquid Petroleum Gas (LPG) (48 kilogramme/container)	-	Up to 6 batches of bleaching or dyeing processes
Waste water (Litre)	8,072	9,580

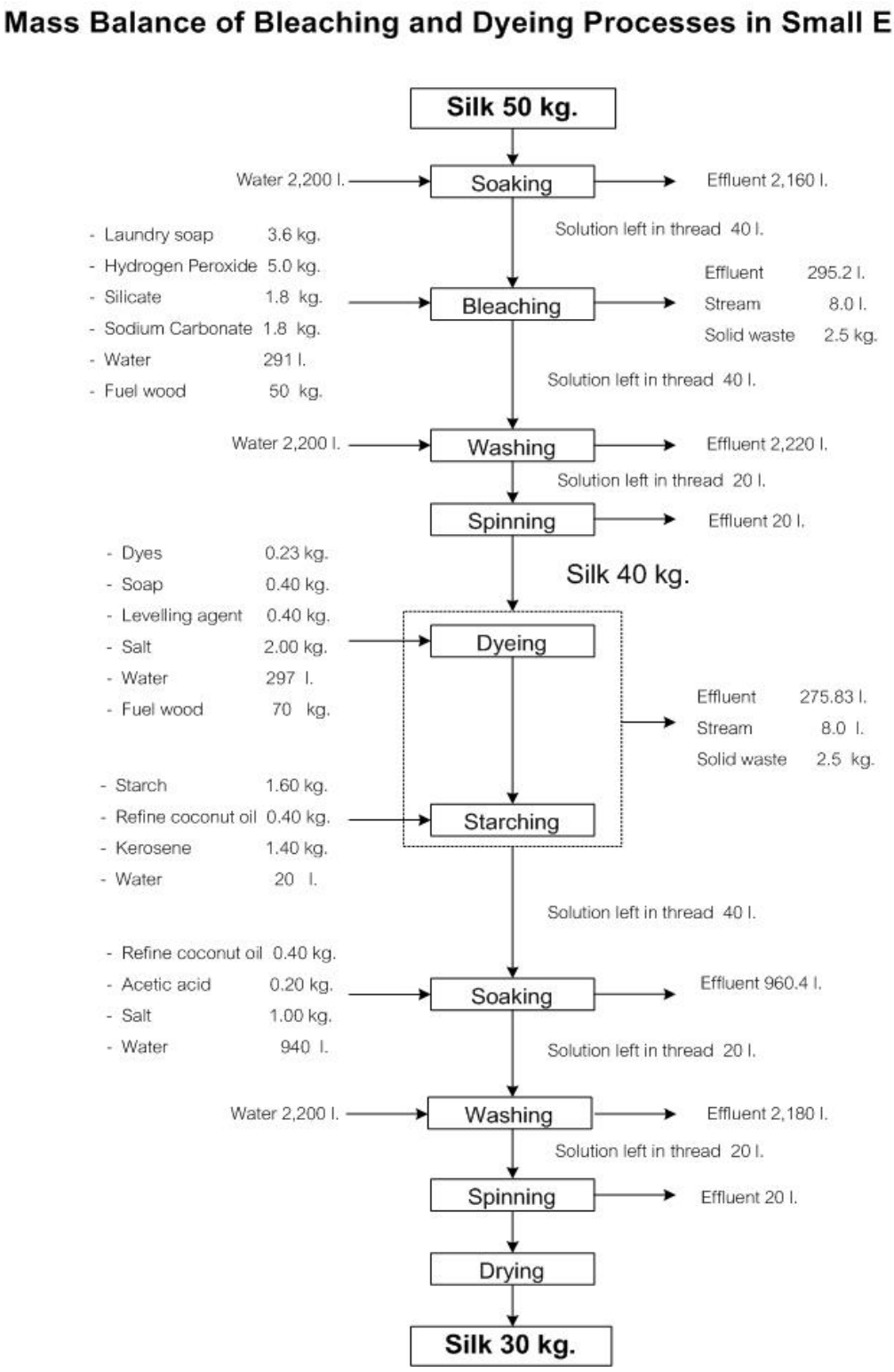

Figure 4.6: Mass balance of bleaching and dyeing processes in small enterprise in Baan Doo

(Source: CP preliminary audit in the second fieldwork, 2005)

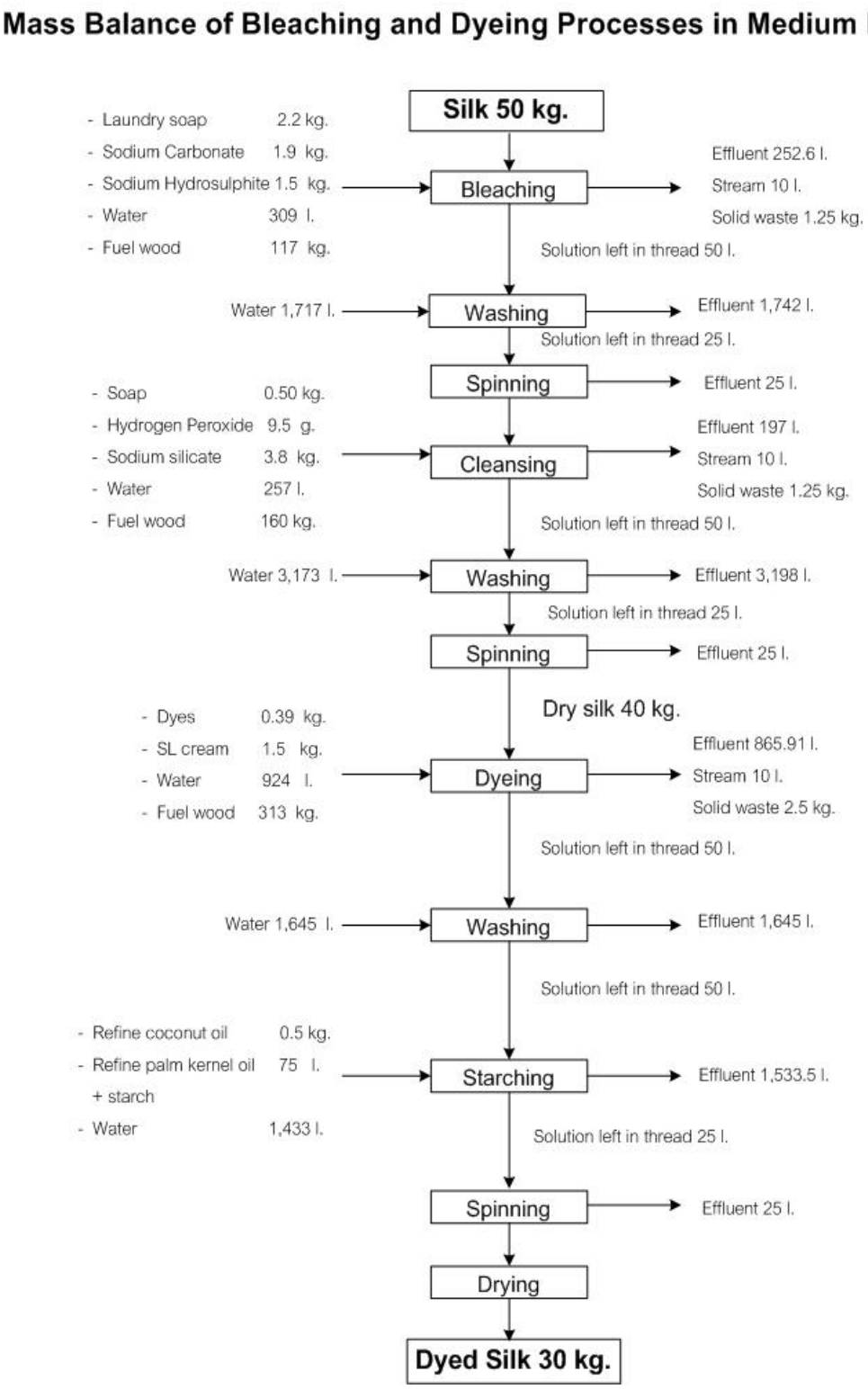

Figure 4.7: Mass balance of bleaching and dyeing processes in medium enterprise in Baan Kud Kadi

(Source: CP preliminary audit in the second fieldwork, 2005)

ii. Fuel-wood

All producers in Pak Thongchai have to buy a great deal of wood for fuel for the bleaching and dyeing process. This wood can be categorized into two types. Hard fibrous wood is sourced from public land or forest. The other type of wood comes from agro- forestry, such as Eucalyptus. Wood is sold by unit of truck size by mobile vendors. As hard wood is more effective than soft wood, it is more expensive and has become scarce in recent years. Some producers have started to use dried corncob and coconut fibre (seasonal availability only) mixed with wood, while another has used Liquid Petroleum Gas (LPG) for fuel. Table 4.9 shows that the consumption of fuel wood per batch of production is 120-286.5 kilogramme. Moreover, the survey found that there is one entrepreneur who used LPG as fuel in these processes. The interview with the hired skill workers result reveals that a 48 kilogramme of LPG may use for three days. This could imply that the LPG can be used in up to six batches of bleaching or dyeing processes[9].

According to the interview with Baan Doo TAO's chairman, there is concern that the rising demand for fire wood is increasing the rate of illegal logging in the forest reservation zone of the nearby district.

b. Pollutants

i. Waste water

Even though the producers have used chemical substances and dyes for decades, the amount of waste water from self-consuming production was lower than it is now. Due to a lack of awareness regarding the hazardous nature of chemical substances, effluent was released directly into the ground or canal. Most other residents, village leaders and local authorities stated that they believed there was no impact from sewage in the period when silk was a supplementary job.

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[9] The bleaching and dyeing processes are not continuous process and were conducted in different day. The bleaching process will be conducted since early morning to noon. Bleached yarn was dried by the sunlight. Then, it will be dyed in another day later. Since this dye house has three stoves operating at the same time, it is estimated that the workers could do at least two batches of bleaching or dyeing processes per day.

Table 4.10: Impacts on waste water from silk production in Pak Thongchai

Degree of problem	Percentage of agreement			
	Producers	**Other residents**	**Village leaders**	**TAO**
I. Before silk became the main livelihood of the community				
• No problem	51.9%	79%	80%	66.7%
• Little problem	40.7%	21%	20%	33.3%
• Serious problem	7.4%			
• Very serious problem				
II. Since silk became the main livelihood of the community				
• No problem	14.8%	30.6%		33.3%
• Little problem	22.2%	11.3%		
• Serious problem	40.7%	17.7%	20%	33.3%
• Very serious problem	22.2%	21%	80%	33.3%

In the past two decades, more chemical substances and dyes have been introduced in the manufacturing process. The expansion of silk business has increased the amount of untreated waste water emitted. From Table 4.9, it is estimated that the discharged effluent per production batch is between 8,072 and 9,580 litres. Table 4.10 shows that the majority of the respondents believed this problem has reached a serious or very serious level, except some who live far away from silk production site and with sparse silk manufacturing in the villages. Other residents gave the following examples of the effects of environmental degradation:

- The water in the canal, which flows past silk production sites, has affected rice growing. In some areas rice was growing well, but could not be grained, while another area reported that all crops died. It has been suggested that washing water from the dyeing process can make trees in orchards grow well, but without bearing fruit.
- In some canals, fishing in the dry season is no longer possible, because there have been several reports of people getting sick after consuming fish and other aquatic animals.
- Some water sourced from the shallow water table had colour contamination.

- With a low plain landscape, there is flooding in Pak Thongchai almost every year. This led to the dispersion of effluent and solid waste into household and public resources.
- The household sewage system did not work properly and needed to be drained out by service trucks once or twice a month.

After several petitions to provincial authorities, the police have played a key role in monitoring and prosecuting people who discharged untreated waste water to public drainage since 2003. All producers, who are bleaching and dyeing silk yarn by themselves, have been asked to build a temporary storage tank to collect effluent. This tank is made from a long concrete cylindrical pipe which is normally used as a household sewage tank. The size and number of tanks depend on the producer. Without any instruction from government agencies, the capacity of tanks is not related to waste water load. Therefore, the overflow of sewage has mostly flowed into public drainage and the environment as before.

Nonetheless, the most popular way for entrepreneurs to eliminate waste is by hiring a service truck to pump the sludge and excess waste water out from the well or pond. The cost of eliminating waste water is 1-3 GBP or 1.72-5.15 USD per the container of human sewage disposal truck. The entrepreneur who usually does bleaching and dyeing every day needs to use this service every 3 days. According to producers, it is believed that these trucks discharge this waste in isolated places in the district or neighbouring districts.

TAO in Baan Han and Baan Han Tai areas proposed to invest its budget in the construction of a waste water treatment system if the producers in their sub-district bought new land to build a stove for central bleaching and dyeing. There was, however, no guarantee of quality dyed silk yarn from this central system. Also, silk yarn is the most expensive raw material which must be monitored and cared for when drying. When dyeing at home, the producer can keep doing other activities and monitor their silk at the same time. Therefore, most producers rejected the TAO proposal.

After receiving the petitions about the waste water problem, the provincial organization assigned the 11 th REO to deal with the problem. The 11 th REO has

developed plans to solve the problem in both the short and long term. Short term, CP was selected as a means of reducing the chemical intensity in waste water. Three CP training courses were provided for producers. Meanwhile, meetings with producers were held to find the most effective waste water treatment system to solve the problem long term. Consequently, the entrepreneurs preferred the small on-site system to the central treatment system.

Presently, these systems are being developed by researchers in the Suranaree University of Technology (SUT) and the Thailand Science and Technology Development Institute. The local authority is planning to enact thereby forcing producers to implement the systems after they have been successfully developed.

However, the government agency at the district level has also started to address the waste water problem. At present, there are two plans being proposed to the provincial authority for financial support:

- The construction of a central sewage treatment system is proposed by Pak Thongchai municipality. This system includes a central bleaching and dyeing area for subletting to producers. The waste water from silk manufacturing and from community sewage will be treated together; and
- The construction of a large scale bleaching-dyeing stove is proposed by Pak Thongchai Technical College. The bleaching-dyeing stove will provide services for all producers. With the effluent treatment system, the college can cope with the waste from silk production.

Table 4.11: Producers' preference of waste treatment system in Pak Thongchai

Preference	Type of waste	
	Waste water	Solid waste
System		
• Individual	60%	66.7%
• Central	40%	33.3%
Maintainer		
• Producer	41.4%	60%
• Local authority	48.3%	36.7%
• Technical expert	10.3%	3.3%
Investor		
• Producer	36.7%	56.7%
• Local authority		3.3%
• Both	63.3%	40%

Table 4.11 presents a majority of entrepreneurs preferred the small on-site waste water system to the central treatment system. This system should be developed appropriately for producers to maintain and be able to invest in by themselves or invest with local authority. These results match the findings of the attitude (Table 4.12) which show that the producers are aware of the public resources problem which is affected by discharging untreated waste water. The findings also show that the current effluent treatment system is not working effectively according to all of the respondents. Furthermore, the respondents *"fully agreed"* with the Polluter Pays Principle (PPP) and CP, though some respondents did not know how feasible the CP concept is in terms of implementation. Some conflict with the PPP concept was expressed as MSEs *"fairly agreed"* that local resource and environmental management is the responsibility of local authorities, not the villagers.

Table 4.12: Silk producers' attitudes and beliefs to local resources and environmental management

Statement	Average score
There is no impact on surrounding soil and water resources from discharging untreated wastewater from the bleaching and dyeing process	2.62
Local resource and environmental management is the responsibility of local authorities, not the villagers	3.10
Polluters should respond to any environmental impact in the local area caused by any waste from the production process.	4.00
At present, most implemented wastewater treatment systems can effectively treat sewage as the legislative regulation requires	2.70
The use of effective and valuable resources, such as water, chemical dyes, etc., will minimise waste and save production costs	3.96

Regarding the effluent analysis, samples of waste water from silk production and from the public reservoir where there is considerable silk sewage flow, were collected. BOD, COD and pH measurements were employed to analyze the effluent. The samples were examined by two laboratories. First, the sewage was examined by the chemical engineering department, SUT with regard to the development of the waste water treatment system research project. Secondly the samples were analyzed by the 11th REO in order to make baseline data of the "*Potential Environmental Impact from Certain Occupations"* project. With different criteria and objectives in each project, the incomplete data, particularly in pH and COD, is shown in Table 4.13.

According to the Thai industrial effluent standard, most samples have high pH value but only two samples exceed the standard (5.5-9.0) level. Regarding the BOD analysis, it was found that all samples' BOD are higher than the standard by at least 10 fold.

Furthermore, the COD value in sample 6-8 is also at least 7 times greater than allowed in the national standard.

Table 4.13: Results of laboratory analysis of silk effluent composition in Pak Thongchai

Sample No.	Sample type	Sample site	Characterization		
			pH	BOD (mg/l)[10]	COD (mg/l)[7]
1	Bleaching effluent	Baan Doo, Pak Thong-chai	8.9	3,690	
2	Bleaching effluent with shining promoted substance		8.7	1,260	
3	Dyeing effluent		8.9	902	
4	Mix effluent in public reservoir		7.9	1,323	
5	Dyeing effluent	Baan Han, Pak Thong-chai	9.3	2,015	
6	Dyeing effluent (Green)			1,606	2,362
7	Dyeing effluent (Blue)			355	1,413
8	Dyeing effluent (Black)			211	850

ii. Odours

Odours mostly come from bleaching-dyeing areas and discharging effluent in public drainage. The level of this pollutant depends on the location of residents, the drainage system and the season. People who lived close to the dyeing site, in crowded areas without good ventilation, or near bad drains will suffer from the odours, particularly in very hot weather. Many people have reported sinus and eye irritation, nausea, vomiting, breathing problems and headaches. Some became so stressed that they got sick.

[10] According to the national standard of industrial effluent, the BOD, COD and TDS in effluent before discharging into the public should less than 20, 120 and 3,000 mg/l, respectively, whilst the pH should be between 5.5 and 9.0.

Table 4.14: Impacts of odours from silk production in Pak Thongchai

Degree of problem	Percentage of agreement			
	Producers	**Other residents**	**Village leaders**	**TAO**
I. Before silk became the main livelihood of the community				
• No problem	74.1%	72.1%	83.3%	100%
• Little problem	22.2%	23%	16.7%	
• Serious problem	3.7%	4.9%		
• Very serious problem				
II. Since silk became the main livelihood of the community				
• No problem	14.8%	26.2%		33.3%
• Little problem	33.3%	19.7%	33.3%	
• Serious problem	40.7%	13.1%	16.7%	33.3%
• Very serious problem	11.1%	41%	50%	33.3%

Table 4.14 shows that most of the respondents indicated that they experienced *"no odour problem"* at the first stage of silk production, whilst more than half of those agreed that the problem is now *"serious"* to *"very serious"*. Even though many complaints from residents are made to village leaders, the producers still do nothing to solve the problem. Other people employed by the enterprise have not complained to avoid arguments. Compared to other villages, the severity of the problem reached its highest point in Baan Han and Baan Han Tai, because the concrete drainage prevents the sewage from being absorbed into the ground. If there is waste blocking the flow, the sewage tends to overflow and flood over the road. Nevertheless, the producer in Baan Don Kwang and Baan Kud Kradi has solved this problem by adding calcium carbonate and enhancing microorganisms (EM) liquid as well as planting water hyacinth in the sewage tank to decrease the odours.

iii. Solid waste

Owing to the lack of central solid waste treatment, most villages outside the municipality have to burn and bury their litter in their area. All solid waste from silk production, such as paper and plastic from the packing of silk yarn, chemical substances and dye plastic packages including silk thread and knots, are usually burned in bleaching and dyeing stoves in both districts. The impacts of increasing solid waste are presented in Table 4.15.

Table 4.15: Impacts of solid waste from silk production in Pak Thongchai

Degree of problem	Percentage of agreement			
	Producers	**Other residents**	**Village leaders**	**TAO**
I. Before silk became the main livelihood of the community				
• No problem	77.8%	86.9%	50%	50%
• Little problem	18.5%	9.8%	50%	50%
• Serious problem	3.7%	3.3%		
• Very serious problem				
II. Since silk became the main livelihood of the community				
• No problem	63%	52.4%	33.3%	
• Little problem	22.2%	21.3%	33.3%	
• Serious problem	14.8%	19.7%	16.7%	100%
• Very serious problem		1.6%	16.7%	

Unlike the impact of waste water, most producers, other residents and village leaders reported that the rubbish problem posed "*no problem*" or "*slight proble*m" since silk became the main livelihood source. Because of inadequate landfill, the villagers have to burn all solid waste in their house area. The odour from burning is sometimes disturbing for the neighbours. However, the problem of odour has become serious for all TAO, making the provision of appropriate solid waste treatment facilities and services for local communities a priority.

In terms of reuse and recycling, some chemical plastic containers are sold back to suppliers for re-use. Some silk thread and knots are re-spun and reeled whilst some people use the thread and knots to stuff cushions. Low quality fabric or remnants are reprocessed e.g. re-dyed or finished or used to make new products such as bags, purses or gift wrapping to increase value.

4.3.6 Other key factors for sustainable enterprise development in Sufficiency Economy Philosophy (SEP)

As discussed in Section 2.5.2 of Chapter 2, there are some limitations when applying the SL framework within a business context, particularly micro and small enterprises. Some studies of the application of the SL approach to enterprise development, found that some important factors affecting the survival of business, such as market (Hobley 2001), and technology (Albu and Scott 2001; Gunter and Bjerregaard O. 1999) have not been highlighted in the SL framework.

From the empirical research, it was found that there are several essential elements for enterprise development which are frequently mentioned by the respondents. These components include business management, risk management, labour management and product diversification as well as business ethic. These business related components have not been stated clearly in the SL framework, though they could create immense impacts on economic, social and environmental aspects of the community. Since these seven elements are one of the key characteristics of the SEP applied by Thai SMEs, noted by Punthasen *et al.* (2003), this study has investigated these factors and found some significant data on silk MSEs development as described in the following sections.

a. Technology

The introduction of the percussion loom and chemical dyes in the 1960s supported the silk industry in Pak Thongchai and helped it become the largest production site in Thailand. The emergence of silk factories in the district in the 1970s-80s modernized the production using the division of labour system and introduced new technologies to increase productivity. Although MSEs have learned about new production techniques and technologies, they needed to adapt these technologies to smaller production scales and limited capital.

To date, most technologies, such as warp reeling and weft reeling machines, are locally made. However, some high quality dyes need to be imported from other countries. Stoves originated from kitchen stoves which were enlarged and made from brick and clay by local skilled artisans. The increased capacity of these stoves made it possible to bleach and dye around 50 kilogramme of silk thread per batch. As the

stoves consumed a large amount of wood, the producer in Baan Kud Kadi started to build new improved stoves with heat loss prevention by using refractory brick and metal sheets.

Although the instruction in the use of chemical substances for bleaching and dyeing processes is provided by the company, producers and skilled labour needed to test the right amount of substances for their various types of thread. Therefore, the know-how of small scale bleaching and dyeing is developed individually. To promote good practice for bleaching and dyeing processes, the CP application workshops for silk MSEs were held in Baan Doo and Baan Han in 2003 by the 11 th REO. When interviewed, a textile expert, who was a trainer in those workshops, stated that most trained MSEs were not interested in optimizing chemical substances. Because of time consumption, they preferred using more dyes to ensure achieving the right shade in the shortest time. The CP preliminary audit clearly illustrates the different levels of know-how between small and medium enterprises. The different procedures of bleaching and dyeing processes in both firms and the example of CP options from the audit are shown in Figures 4.6 and 4.7 and Appendix 4.1.

b. Business management skills

Due to uncertain market conditions and lack of communication with retail customers, most producers did not have a business plan. They believed that the more fabric they produced and sold, the more profit they would make. As a major livelihood, the production period takes place throughout the year. The time duration for each batch production is variable, depending on the length and quality of the fabric roll, and the length of the product delivery period. More than 90 per cent of enterprises can produce a roll within 30-60 days. In the modern-production method, the production unit is always in the form of a roll of silk. More than 70 per cent of rolls produced are 210-240 yards long. It is estimated that the capacity of producers is from 10,500 yards to 288,000 yards of fabric per annum.

To control quality in every process of the division of labour system, all manufacturers applied their own quality control standard to examine each task after craftspeople sent the finished task. About 90 per cent of entrepreneurs mainly inspect product quality, the other 10 per cent consider both product quality and delivery time.

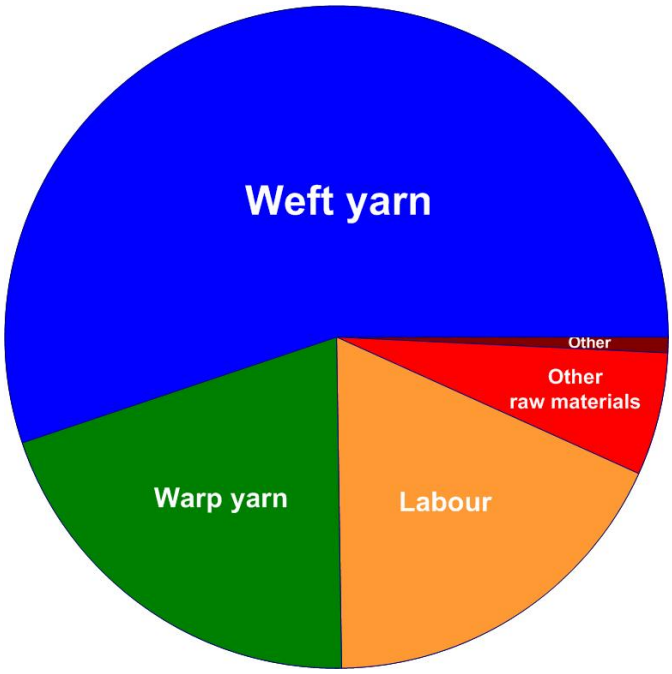

Figure 4.8: Production costs in modern style production

(Source: Survey data, 2004)

According to Figure 4.8, more than three-quarters of expenditure is on silk yarn, particularly weft yarn (55 per cent). Since the Pak Thongchai district started producing silk fabric on a commercial basis, silk cultivation has disappeared in villages because people have no time for this delicate work. The producers need to order all silk yarn from the big silk manufacturers and farmer groups which rear silk worms.

From the interviews with silk producers in 2004, it was found that the market price of thread varies all year round and depends on the silk yarn factory. The more the market demands, the more the price increases. In addition, silk yarn manufacture in Thailand is almost completely monopolized by the largest factory. The producers have no choice but to buy silk at a higher price if they want high grade yarns. When low grade silk is used, it is hard to control the consistency of colour fixing and the size of threads. Generally fabric made from low quality yarns from smaller factories can sell at a lower price than normal yarn.

About 18 per cent of production costs are spent on labour wages, while the other 6 per cent is used for other raw materials. To meet the requirements of customers most raw materials are the same quality as used by factories. High quality chemical dyes and other chemical substances are used to guarantee the colour fastness and precise shading. The quantity and formula of each colour has been recommended by the suppliers and developed by the skilled workforces. Silk yarn is chosen in accordance with the fabric order.

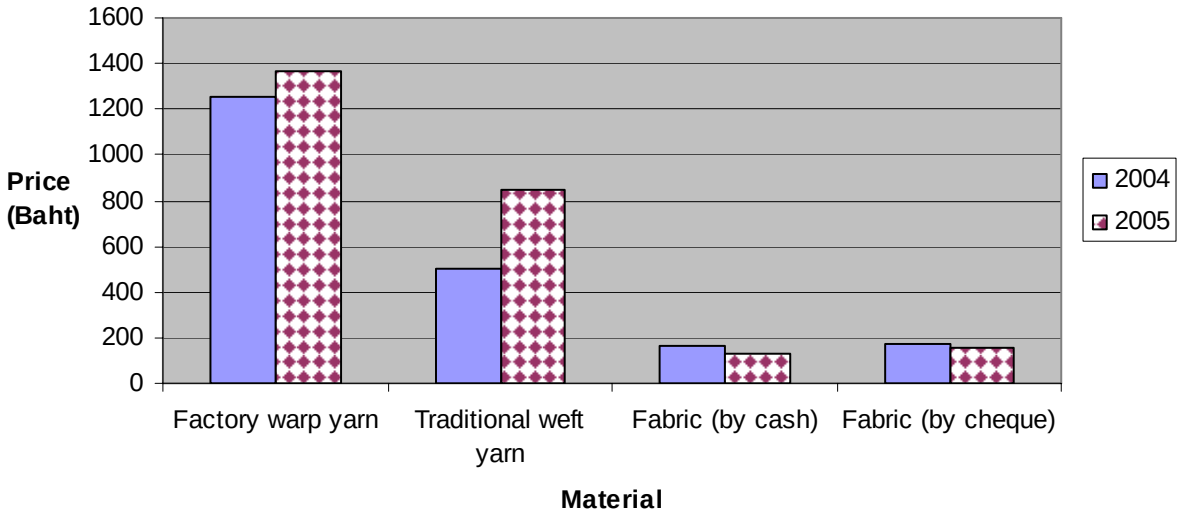

Figure 4.9: Fluctuation of material and product price between 2004 and 2005

(Source: Survey Data, 2005)

The continuing decline of fabric price and the rising costs of silk thread in 2005, as shown in Figure 4.9, have impelled all micro enterprises to stop business and go bankrupt. Even though most small scale firms are struggling to market their products, they still produce fabric on a smaller scale particularly those who have regular clients. However, several small producers have sold their assets to gain more capital to keep their business running.

c. Labour management

Owing to the low level of technology and the delicate process of silk production, human labour is extremely important in production to ensure the quality of the product in each process. Productivity is inconsistent due to the lack of availability of

workers within this agricultural area. This is because the workforce works from home at slack times in the farming year. At certain periods e.g. rice plantation (May-June) and harvesting (October- November), there are very few workers available, particularly when the entrepreneurs have to escalate their production yield for the New Year festival. The workers are recruited from nearby villages when the village labour force is insufficient, though most workers come from the village itself.

In 2004, most manufacturers reported it was hard to strictly control their workers, particularly in some processes where there is a severe lack of skilled artisans, e.g. bleaching and dyeing, threading warp yarn with the heddle, and weaving. As most workers worked at home, producers needed to compromise with some mistakes to keep their productivity level. This led to a problem of inconsistency of quality of product which resulted in the drop in product prices and high production costs.

d. Risk management

According to the low interest loan from the village funding policy at the beginning of 2003, most silk related workers had started to set up their own silk business by using this loan and other financial sources. Competition in the wholesale market became very serious. Almost all MSEs were focusing on producing fabric as much as they could.

Without any marketing knowledge and cooperation between producers, middlemen became dominant in fabric and silk thread price control and payment. The shortage of capital pushed many MSEs to sell their product at a reduced price to obtain cash. This resulted in increasing debt and bankruptcy of MSEs who mismanaged their businesses and had inadequate capital.

e. Product diversification

The survey in 2004 showed the main product in Pak Thongchai is a roll of monochromatic cloth (97 per cent), the rest is patterned fabrics. When the roll is sold, it is cut into smaller lengths depending on the middlemen's requirement. The length varies from 30 to 80 yards. Other new products, i.e. clothes and scarves, are processed in order to increase the value of the original product and reduce bargaining pressure from middlemen. Some producers have reused their old or faulty products by

applying new finishing techniques like painting or batik dyeing to make new products such as scarves, neckties, etc.

Even though there is an over-supply of plain fabric, most producers continue to produce it. Since this type of fabric is suitable for making various products, it is easy to wholesale and secures producers' cash flow. Compared to the patterned fabrics, there is a high risk of loss of profit because of the short cycle of fashion, quick imitation in the market and the preference of middlemen. In the meantime, processed products need additional time and capital for marketing and producing sufficient stock to meet market demand. Due to long turnover time and lack of marketing knowledge, most manufacturers do not want to invest their limited capital in diversifying various products in this declining market.

f. Business ethics

To obtain a greater share of the market, some new entrepreneurs started a price war to get more customers. The sale of fabric at a lower price resulted in a reduction in quality. As a result, MSEs could not sell fabric at a profit. Furthermore, whole villages could no longer maintain their reputation in terms of their capability to produce quality fabric. This has also created dissatisfaction among producers and has had a negative impact on social cohesion within the villages. Moreover, the acceptance of longer credit payments by some MSEs has led to the majority of MSEs having a shortage of cash, therefore, most micro enterprises have gone bankrupt.

4.4 Policies, Institutions and Processes

4.4.1 Key organisations and institutions affecting silk MSEs in Pak Thongchai

As a result of the empirical research, the key organizations and institutions influencing the community silk business in both positive and negative ways have been identified and summarized in the table below. For organizations, it can be divided into two types: the representative bodies of silk producers and silk-related organizations. The first firm is a group of silk producers who have joined together in order to strengthen their bargaining power and improve access to support from the government. The latter includes local authority and silk promoting offices.

Table 4.16: Key organisations affecting silk MSEs in Pak Thongchai

Organisations	Details
Producer representative firms	
Baan Doo Silk Weaving Handicraft Group	The group producer in Baan Doo that includes 32 micro-small and medium size enterprises in Baan Doo-Doo Naok. The group has been recognized as the most active producer group in Pak Thongchai because of its distribution of group work load and regular cooperation activity with the provincial authority. Nevertheless, there is no cooperation in production or marketing activities among members.
Baan Han silk weaving and batik group	The most active group producer in Baan Han-Han Tai which has got financial support under the OTOP promotion scheme. However, lack of cooperation with other medium and large enterprise members in marketing and product development made group operation weaker and dependant on a group leader. Under these circumstances and without financial support, group members are operating the business as individuals and have no interest in group activities.
Nakhon Ratchasima Silk Association	Extending from Pak Thongchai silk entrepreneur club, now this association has become a major representative of silk entrepreneurs, particular in Pak Thongchai, presenting suggestions and opinions to the provincial authority about provincial silk strategy.

Organisations	Details
Silk related organizations	
Tambon Authority Organisation	Most authority and budget from central government for community development, taxation and maintenance has been transferred to this key local authority which is also responsible for all resources in the sub-district area.
Community Development Office	Formerly the main organization which supported the general development of the community as well as silk groups in the villages. It has played an important role in supporting the group's activities particularly in marketing and some free distribution channels related to provincial trading fare and OTOP scheme as well as main coordinator for provincial silk strategy implementation.
Agricultural Office	A key organization which promotes the registration of community based enterprise in the district. If any silk group producer had registered under the scheme, it could receive some benefit in financial, marketing and community based enterprise development from government offices.
Nakhon Ratchasima Industrial Promotion Centre	Another organization that supported the training course in bleaching and dyeing technique and product processing.
Lower Isan Cluster-based Industrial Development Centre	The main centre which supported the study of the supply chain in Pak Thongchai silk industry and market research as well as promoting new silk entrepreneurs for export.

Organisations	Details
Silk related organizations (cont)	
The 11th Regional Environmental Office (the 11th REO)	The major government office which takes responsibility for the promotion of environmental monitoring and management in 4 provinces in the southern part of Isan region.
Ministry of Human Development	This organization had provided some courses and equipment for training housewives to weave silk fabric to earn more income.

There are two major institutions that control the silk cottage industry in Pak Thongchai, intermediates and the market. Intermediates, e.g. middlemen and vendors, can be either mobile suppliers selling silk threads, fuel wood and some chemical substances or customers buying wholesale fabric. These intermediates usually conduct their businesses with MSEs at MSE's house.

Another key institution for silk enterprises is the market. The survey found that local custom is a key market driving factor to encourage people to purchase silk for formal wear at important ceremonies. As silk can represent the economic and social status of the wearer, it is a popular gift in Thai society, especially for older people. Furthermore, it is usually used at important religious and traditional ceremonies e.g. monk ordination and wedding ceremonies. It is also a norm to wear silk dress at community activities in the Pak Thongchai district.

Since the producers in Pak Thongchai do not have their own product brand, they prefer selling their products to middlemen who have their own shops in the district or other provinces. Most middlemen have more negotiating power to ask for short term credit payment (1-3 months) when they buy the product on a regular basis. Therefore, many middlemen, especially from other provinces, frequently deceived their suppliers and disappeared after getting the fabrics. A recent major case of fraud in Pak Thongchai in 2002 resulted in not only the loss of 300,000 GBP or 515,385 USD of silk fabrics in the whole district, but also the collapse of the wholesale price.

Because large quantities of silk fabric from the fraud had been sold at a very low price, other middlemen had to sell the fabric at the same low price. Over the last five years[11], the slump in more than 50 per cent of profit drastically affected the producers' finance when the silk yarn price increased. Retail sales have become an important alternative market for these enterprises. To date, 40 per cent of producers sell their product to middlemen only, whilst the other 60 per cent sell in both retail and wholesale as shown in Figure 4.10.

The diversity of productivity depends on market demand. Traditionally festivals such as New Year and Thai New Year are the best sales periods. To distribute the product, 57 per cent of MSEs sell commodities to clients, both wholesaler and retailer, by themselves. The other 43 per cent of producers sell the product by themselves and through group/middlemen. Most commodities (93 per cent) are sold to the domestic market.

However, the results of the group discussion in October 2005 showed that the consequence of the rise in oil prices in the middle of 2005 and high inflation in the Thai economy, exacerbated the drop in fabric price and sales in both markets. At present, the wholesale price of fabric is about 100-140 THB for cash payment and 150-160 THB for 3 to 8 month cheque payment. It is difficult to expand the retail market due to high competitiveness in the plain cloth market and an increase in transportation costs.

[11] Refer to the data from respondents, the price of plain fabric per yard in 2000 was around 300-400 baht (4.48-5.97 GBP or 7.69-10.26 USD) and in February 2004 was 150-170 baht (2.24-2.54 GBP or 3.85-4.36
USD)

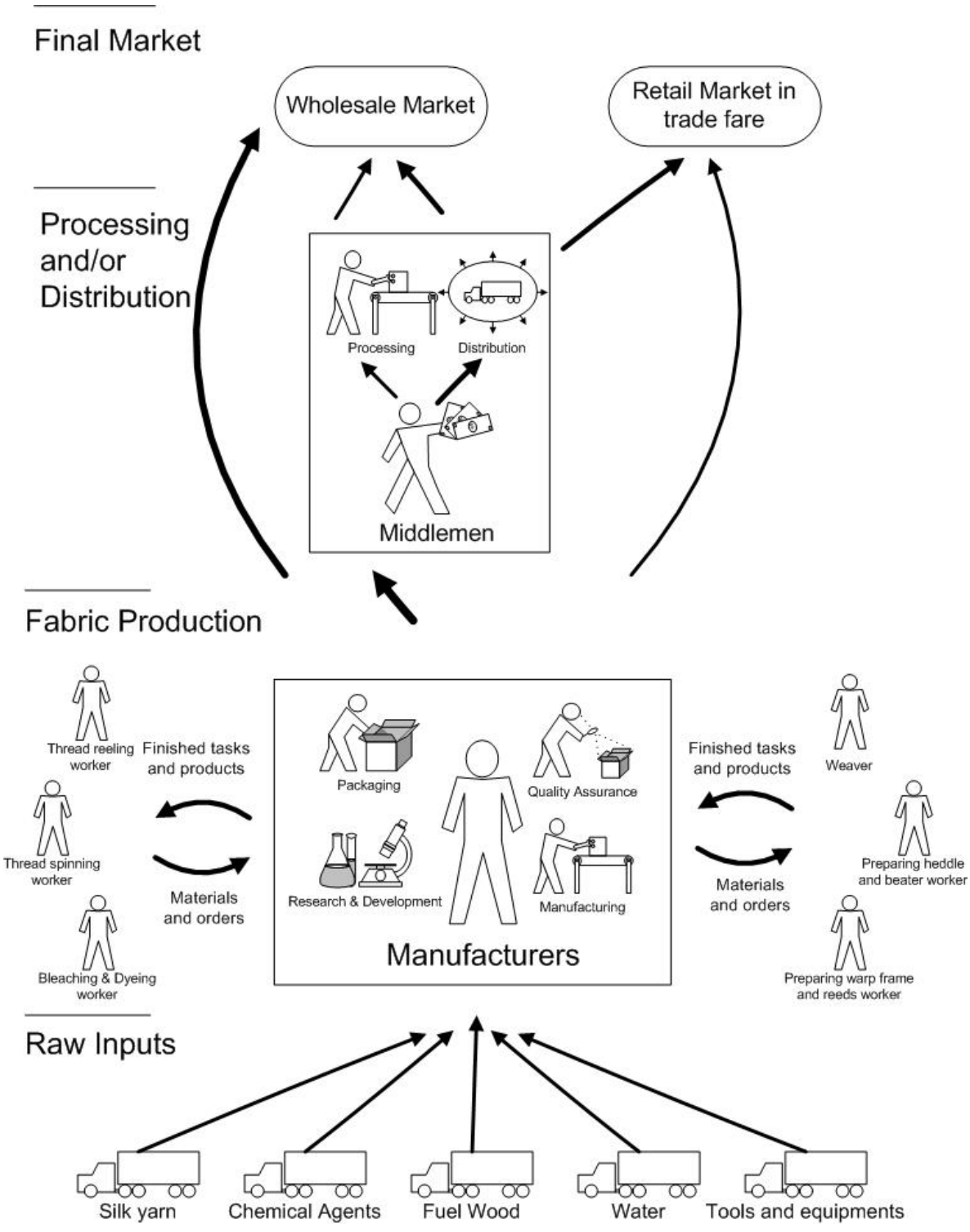

Figure 4.10: Subsector map of silk production in Pak Thongchai

(Source: Survey, 2004)

4.4.2 Key policies affecting silk MSEs in Pak Thongchai

As mentioned in Section 2.4.2a of Chapter 2, the lack of information about cottage silk production in the informal economy has had an adverse effect on cottage silk businesses. Since it was never recognised by policymakers, it is hard for informal MSEs to get any support from the state's policies. From the review, it is found that all key policies affecting silk MSEs are the same as those in Sida, which will be discussed in Section 5.4.2 of Chapter 5. Table 4.17 shows the list of policies and some brief detail of effects on the silk cottage industry in Pak Thongchai at both micro and macro levels.

Table 4.17: List of policies affecting silk MSEs in Pak Thongchai

Policy	Effect level	Detail
One Tambon One Product (OTOP)	Micro level	In order to increase the income for the poor, the policy has encouraged every community to produce one distinct local product. This product should either be the result of local knowledge or provide added value from the main product of the village. However, due to inadequate support from the government in market knowledge and product development there has been over-production of fabrics with similar design and patterns. Currently, most villagers' businesses have collapsed and fabric prices are continuously falling due to overproduction and market control by middlemen.

Policy	Effect level	Detail
Village Funding	Micro level (cont)	This policy grants one million THB to every village in Thailand. It aims to provide a revolving micro credit for villagers to invest in new businesses or increase productivity of on-going business. This low interest loan had played a vital role in encouraging silk related workers in villages to become MSEs. Nonetheless, the small amount of money does not cover the costs of producing one batch of silk. With financial insecurity, therefore, most new MSEs need to sell fabric as fast as possible to maintain a healthy financial status. This has forced new entrepreneurs to engage in price wars to sell products which have led to the current drop in product price.
Local Environmental Management and Pollution control		The announcements by Pak Thongchai policemen on pollution control enforcement over the last 2 years have led to producers installing a storage tank for wastewater treatment. At present, most producers still discharge wastewater illegally. A lack of knowledge regarding the appropriate size of the wastewater treatment system resulted in the overflow of effluent. This pushed producers in Baan Doo to discharge their wastewater directly into public drainage as in the past. In the meantime, TAO in Baan Han indicated that the building of new drainage in the villages and the monitoring of producers' storage tank implementation would solve the problem of odours and the spreading of effluent by heavy rain.

Policy	Effect level	Detail
Nakhon Ratchasima Silk Strategy Plan	Micro level (cont)	Due to the development strategy of Nakhon Ratchasima province, the silk industry has been selected to promote the production and product development to support the Asian Fashion Hub policy of the government. As it targets silk industrial production, some producers in Pak Thongchai benefited from attending training courses on fabric design and new marketing strategy.
Isan Silk Cluster Strategy	Macro level	Since Isan or Northeastern region is the largest sericulture site in the country, the sericulture at grass root level has been promoted to protect the traditional silk rearing business from cheap imported silk thread and to increase supplementary income for silk rearing farmer. In order to increase productivity and improve product quality to meet the requirement of weavers, the Strategy provides training courses, network-building and demonstration workshops on bleaching and threads reeling which are supported by the government.
National Silk Strategy		This new trademark scheme has been implemented to distinguish four levels of silk product quality. Key factors for grading products are the quality of silk thread used and the type of production process. Under this trademark, the highest quality products are made from traditional silk thread and weaving by traditional loom, while the lowest quality goods are made from silk blended material and weaving by industrial loom.

Policy	Effect level	Detail
Small Medium Community based Enterprise (SMCE) Promotion Strategy	Macro level (cont)	Since the SMCE act was enacted in 2005, the campaign for promoting SMCE registration has been launched throughout the country. Derived from the existing producer group identified as an important informal enterprise in the local economy, the registered SMCE will be able to access several types of support from government to promote the growth of business until it can finally become a SME.
Free Trade of Silk Thread and Product		According to the ASEAN12 Free Trade Agreement (AFTA), all ASEAN countries have to open their market and reduce tax to zero for imported silk thread and other products in 2010. The domestic sericulture that benefited from the government tariff would be heavily affected by the cheaper silk factory thread from Vietnam. This cheap thread would solve the problem of unstable silk prices for silk manufacturers at every level. Nevertheless, it may enhance SMEs' ability to compete in the domestic market. Moreover, the new style of fabric imported from neighbouring countries would have threatened MSEs share of the garment fabric market.

[12] ASEAN (Association of Southeast Asian Nations) is a political and economic organization of countries located in Southeast Asia. It consists of the Philippines, Malaysia, Thailand, Indonesia, Singapore, Brunei, Vietnam, Laos, Myanmar and Cambodia.

4.5 Livelihood strategies

As indicated in Section 4.1, the growth of the informal silk cottage industry in Pak Thongchai has started since the introduction of subcontracting by SMEs in Pak Thongchai municipality in the early 1990s. To produce a large quantity of fabric, division of labour has been implemented. This led to the employment of a number of workers in the villages and nearby communities. However, the unemployment which resulted from the 1997 economic crisis and the high demand of silk fabric had dramatically prompted the boom of silk manufacturers and workers in the informal silk cottage industry.

Because silk production is indoor work, it offers an opportunity for individuals excluded from the labour market i.e. housewives, unemployed middle aged workers, students and the elderly, to be employed as part-time home workers. This made silk an alternative source of income and important livelihood that strengthened the economic and social development of the community.

Since the launching of the village fund policy in 2003, all workers had the chance to access low interest loans and run their own silk business. Silk became the main livelihood and economic backbone of the whole village and nearby community between 2003 and 2004 as shown in Figure 4.11. Nonetheless, the overproduction of fabric and ferocious competition led to a drop in fabric price in 2004. With financial and market constraints, a large number of MSEs in the communities was obliterated.

In this section, the coping strategies of silk MSEs, weavers and other workers including family members of MSEs are examined in order to acquire an understanding of the strategies and the motivations which lay behind them. This information could be used as a benchmark for MSEs and policymakers to consider the development of suitable measures and strategies for sustaining their livelihood.

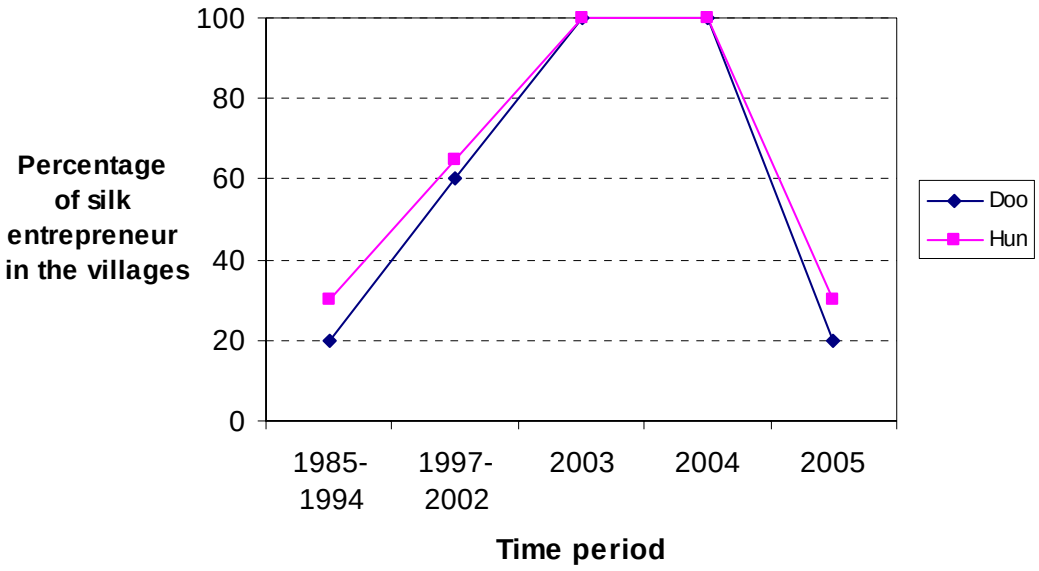

Figure 4.11: The percentage growth of silk entrepreneur in villages

(Source: Survey data, 2005)

4.5.1 Manufacturers

From group discussions in February-March 2004, some significant signals of the downturn of the informal silk cottage industry in Pak Thongchai were mentioned. These include the failure of the wholesale and retail price of fabric and the plunge of marginal profit. Regarding the limited capital and need for external loans, most MSEs had been struggling because of the cash flow shortage. Short term credit payment (1-3 month) of middlemen and the increased silk thread price put more pressure on MSEs' finances. Several enterprises had to sell fabric at cut-price to get more cash for their businesses, which resulted in the collapse of wholesale prices throughout the district.

Some medium and large informal enterprises that have strong financial status do not seem to be concerned by this price war. As they can offer longer credit payment terms (6 months) to middlemen, these enterprises can keep their market share by selling products at the normal price. Optimistically hoping for prices to recover, MSEs have continued to produce silk in spite of the saturated market. Eventually, the shortage of cash, low profit margin and high interest of new loans caused the collapse of the silk business at the micro and small level.

The group discussions in November 2005 reported that there were only 20 per cent of producers left in Baan Doo and 30 per cent in Baan Han. Most of them were medium and large sized enterprises. It was found that almost all MSEs have once again become informal workers in the silk cottage industry in order to make a living. Only some people have opted for a job outside the villages. Some informal medium enterprises have to find some supplementary income such as feeding cattle. Meanwhile, the formal medium and large enterprises in the district and nearby province only make fabric in response to orders and are likely to be middlemen who, in these circumstances, are able to make profit from trading with smaller informal firms. Although there are many attempts to promote product development from the government, the entrepreneurs have not shown any interest in a national new silk standard. As their main market is wholesale, they did not pay much attention to the retail market, with the exception of the Baan Doo weaving group leader. This will be discussed in detail in the livelihood outcome section.

Some measures have been implemented to alleviate the effects of the economic downturn and occupational hazards. The change of people's livelihood from farming to silk production caused the loss of self-reliance in terms of food. High living costs resulting from the changing life styles have had a tremendous effect on families and older people who earn an income solely from silk production in this continuing decline of the silk market. A few households have started to plant vegetables and produce some food again.

In the meantime, almost all manufacturers have hired skilled workers to bleach and dye the thread in order to avoid health problems derived from silk production. Therefore, the producers can work on safer processes such as weaving fabric or spinning thread. This could reduce both costs and health risks, as well as improve safety. These livelihood strategies of the informal silk cottage industry are concluded and presented in Figure 4.12.

4.5.2 Weavers and other workers

The decline of jobs in silk craft production in the villages has compelled most informal workers to look for silk related jobs in other areas. For young workers, it is easy to look for a job in factories due to the industrial promotion policy of the

province. In contrast, older workers, who are over 35 years-old, are mostly excluded from industrial employment. As these older workers are usually housewives or former home workers, they are forced to find hand-to-mouth jobs that fit in with their domestic responsibilities. With a downturn in the village economy, however, it is difficult to find a proper job that can earn adequate income to support the family and pay debts. This has made older people and older workers more vulnerable to poverty.

4.5.3 Family member

Some young members of families who operate silk MSEs were compelled to learn about silk production and help their parents during their free time. Only a few young people have full time work with their families after graduation. Nevertheless, the recession in the silk cottage industry has forced these young workers to find a job in factories or in the city to support the family business and to help with living costs. At the same time, the whole family has to compromise with their luxury lifestyles and liquidate some assets, i.e. cars and luxury electric appliances, to secure their finances.

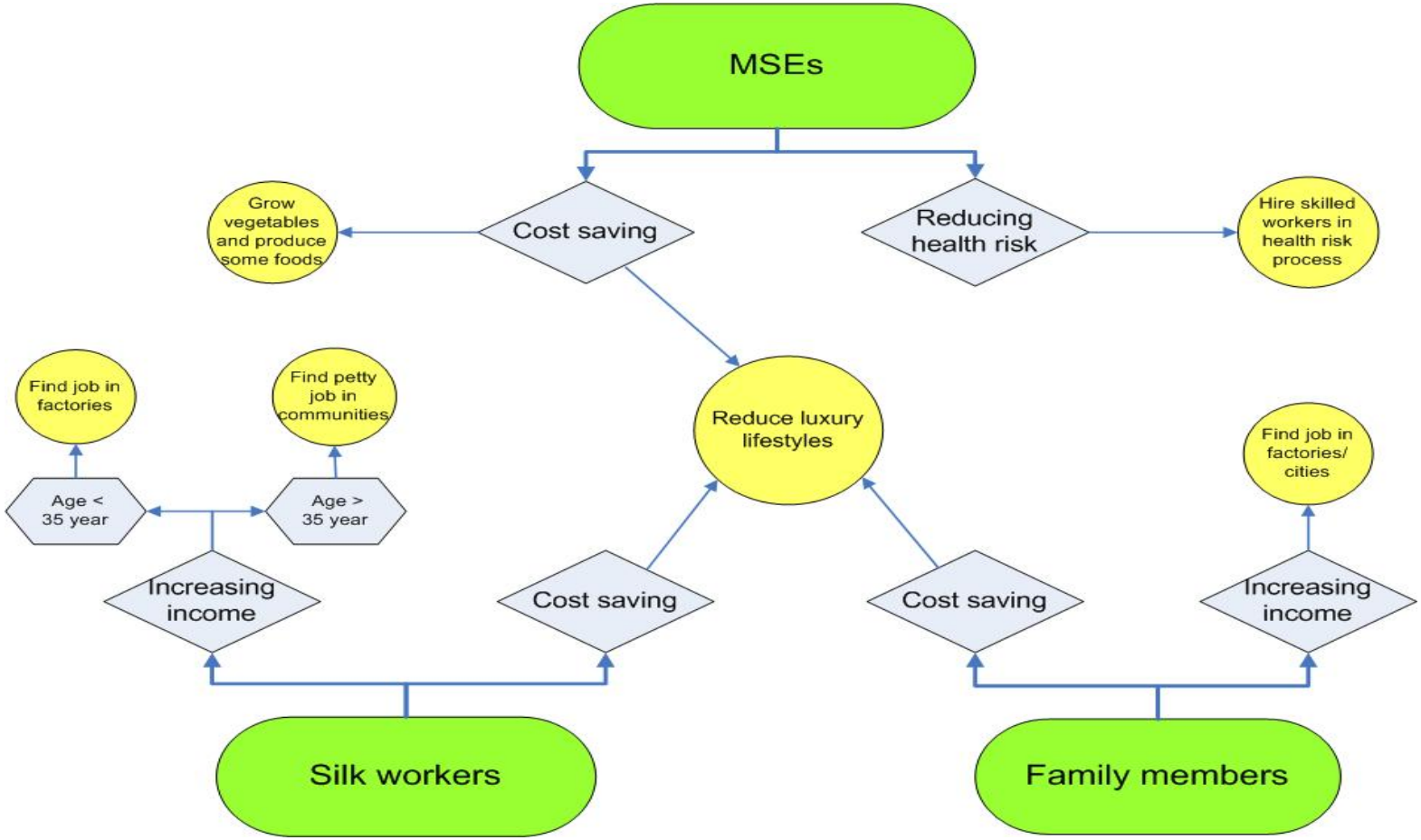

Figure 4.12: Livelihood strategies of silk manufacturers, workers and family members

(Source: Survey data, 2005).

4.6 Livelihood outcomes

The ultimate outcomes of MSEs gathered from focus group discussions can be summarised into two categorises: individual and community levels.

4.6.1 Individual

- Earning sufficient and regular income to support family's living costs, children's education and debt payments as well as emergency costs.
- Enhanced well being

Children remain with parents to support each other

4.6.2 Community

- Maintaining a good relationship with neighbours and the community
- Having a clean, tidy and well developed community that you can proudly present to visitors
- Good environment without pollution problems such as waste water and odours

4.6.3 Sustainability

After setting their expected livelihood outcomes, the results from the empirical survey and SWOT analysis of their silk businesses conducted in March 2004 was employed to provide data for focus group discussions held in November 2005. This qualitative data provides some business and marketing details excluded from the questionnaire, which also helped in cross-checking. In addition, they could encourage producers to develop suitable plans based on their strengths and opportunities. The summary of key SWOT data is shown in Table 4.18. Silk MSEs in two production sites; Baan Doo and Doo Noak and Baan Han and Han Tai, were encouraged to have group discussions on their coping strategies and to consider the sustainability of their livelihoods.

There are, however, no findings of the long term adaptive strategy from the silk MSEs in Pak Thongchai. From the Baan Doo group discussion, the group's members, who are medium enterprises, were not keen to change their business conduct and initiate a new market approach. Hence, the Baan Doo silk weaving group leader proposed a coping strategy to promote economic, social and environmental issues via their

group's silk activities in the short term instead. In the meantime, only five informal SMEs in Baan Han discussed an economic plan to promote their silk businesses.

Table 4.18: Pak Thongchai silk producer group SWOT Analysis

Issue	Details
Strengths	• *Resources availability* - Having plenty of resources to produce 100 per cent silk hand loom fabric in every colour and texture • *Design and innovation* - Having new design or group's own design (registered patent) and other processed product as required by order • *Well known product* – having got 4 out of 5 stars award from OTOP contest • *Good image of group production* – With strong group production in the district, it enhances the chances of getting support from other promoting agencies • *Providing jobs for local people* – Silk cottage industry makes a contribution to the local economy
Weaknesses	• *Incompatible group operation and management* - This led to higher production costs (raw material purchasing, marketing costs, etc.), - weak negotiating power with middlemen and lack of ability to access new markets, - lack of information exchange within group and from externals, - and loss of opportunity of receiving orders which needed group production capacity and which hinder development of group • *Cash flow deficiency* – This limited capability to stock the products when the market price falls and the middlemen push prices down when bargaining • *Inefficient product control due to human-based production* – Human and low technology factors led to an impossibility of getting exact colour shades in every dyeing batch and a chance of getting poor product quality when the product needs to be given to entrepreneurs on time.

Issue	Details
Weaknesses (cont)	• *Lack of flexibility to change or downsize production scale* – It is needed to keep the skilled workforce to work with and provide jobs to support their workers' families. • *Lack of chemical hazard knowledge and environmental awareness* – Without safety production and waste treatment, there were several effects on villagers' health and the community environment. • *Poor reputation of villag*e's *product and individual producers* – Because the producer decreased the quality of fabric to save production costs, they produced the low quality product to sell instead
Opportunities	• *Government policy – Silk production is supported as the rural economy is boosted and jobs created* • *Provincial and regional strategy – Silk production has become one of the provincial and regional development strategies* • *Many organizations promoting silk production – there are several promoting firms to foster group management training and marketing as well as financial support sources*
Threats	• *Government support does not match producers' requirements – For example, controlling raw materials price, marketing and technology to improve the production. Moreover, the increase in the number of new producers due to government support policy, escalated the overproduction of silk and resulted in a drop in price* • *Fluctuation of silk yarn price - This directly affects the increase in production costs* • *Imitate fabric design – The market can rapidly imitate the fabric design resulting in a decrease in sales. The producers need to wait for at least two months to sell it again after the previous fabric is out of the market.*

Issue	Details
Threats (cont)	• *Degradation of product sample – The product becomes degraded from dust and light when it has been displayed in exhibitions and retail markets. The group leader has to be responsible for the remnants of fabric if they can not sell the whole roll.* • *Pressure from Middlemen – The middlemen have more power to bargain and for buying mixed grades of fabric at a cheap price. Credit system of payment (2-3 months) made the producers lack cash flow and affected the fabric quality and design development.* • *Poor conditions and infrastructure of the community – The environment is not suitable for tourism and establishing a village silk shop.*

a. Economic sustainability

Owing to the high competition in plain fabric for garments in Pak Thongchai wholesale market, it is essential to identify new market channels to increase the sales of village craft production. As a consequence of the growth of the home textiles and household decoration market in recent years, it is expected that there should be another potential market for these informal small and medium enterprises. Furthermore, using traditional silk thread would make these products become more attractive in this market and help producers to reduce production costs.

For Baan Doo group's plan, the "*development of new product and marketing plan*" is proposed in order to find a new market and to restore the whole community's reputation in silk production. Since the middle of 2005 the group has been selected as a provincial representative in the One Province One Product for Export programme. It is planned that the expected financial support from this programme will be used to promote the group's capacity, securing the supply of traditional silk thread. Increasing self-reeling silk thread capability could reduce production costs. Meanwhile, this would enable them to get good quality thread to produce high quality fabric.

They are also planning to produce new household decorative items, such as kitchenware and dining sets, and decorative fabric in order to expand their market. In addition, the group has planned to cooperate with Mueng Pak TAO to propose to be an *"OTOP Tourism Villag*e" and *Community Learning Centre (CLC)"* in silk production. These initiatives would promote tourism and enable visitors to learn about silk production in villages. The plan not only serves to boost producers' retail market and village economy, but also to force producers and TAO to improve their local environmental management system and solve the pollution problems.

Although the Baan Han producer group has shown interest in home textiles, lack of knowledge about this product made them prefer producing plain fabric. In order to fill the gaps in supply of the OTOP community enterprise, the group has planned to *"promote their group's capacity to receive a large order"* (about 10,000 yards/month) via the government offices and provincial textile cluster. Furthermore, *"acquiring more information about home textiles"* would help them to produce various types of product at full capacity.

b. Social and environmental sustainability

In terms of social and environmental sustainability, all producers agreed that these issues were crucial, yet still less important than the current economic problem they faced. They suggested that if the economy of silk manufacturers had been improved, it would be more practical for producers and the majority of villagers to consider, and cooperate to solve social and environmental problems collectively. Nevertheless, they believed that these plans should be developed or initiated by the local authority.

After the development of the economic strategy process, two drafts of the silk development plan, e.g. *"OTOP Tourism Villag*e" and *"Silk CLC",* had been proposed to get feedback and ask for support opportunities from related silk promotion agencies and local authorities. Group leaders were informed of the feedback to encourage them to consider adjusting their plans and applying for support in the future. Nevertheless, the comment from the new president of one TAO elected in mid 2006 reveals some interesting viewpoints about social and environmental sustainability promotion. He stated that it is difficult for TAO to support any measures to solve local conflicts derived from pollution and natural resource management. He also implied that since

some MSEs who caused the pollution were key supporters of local politics, if the villagers initiated a plan he would give his passive support.

4.7 Conclusion

Since silk production has dominated agricultural activities in the villages outside Pak Thongchai municipality, there has been a drastic change in people's livelihood on economic, social and environmental levels. The consequence of the government campaign on grass root economy promoting policies has boosted silk production in MSEs. The current demise of silk production in MSEs is pushed by the over-production of silk fabric in the wholesale market and the diminishing of silk fabric wholesale and retail prices. Furthermore, social and environmental conflicts have emerged at both intra- and inter-community level ever since.

Although almost all silk micro and small enterprises cannot survive in this harsh environment, most medium enterprises prefer operating their business in the same way as in previous times. The economic sustainability was prioritised to enable the business to survive and to create jobs for workers in communities. Market and product development are considered to be the main problems which need to be improved. However, there are several issues which need to be developed to promote the sustainability of silk production in the villages. These issues will be discussed in detail in Chapter 6.

Chapter 5
Results of Silk Production Livelihoods Survey in Sida

Since the majority of silk weavers in Thailand produce silk fabric in the traditional style, this type of production needs to be studied. Moreover, these micro producers match with several key characteristics of SMEs that have implemented the Sufficiency Economy Philosophy (SEP) in their businesses. In this research, this type of production is referred to as representative of self-sufficiency production. Baan Fhake and Non Samran silk weaving group, which operates their business in the form of Small Micro Community Enterprises (SMCEs) in the Sida district, was selected as a representative of this type of production in order to compare with the MSEs in Pak Thongchai which is in the same province. As discussed in Chapter 4, the Sustainable Livelihood (SL) framework and the SEP were employed to assess the livelihood assets of silk producers and vulnerability contexts, policies, institutions and processes that affect silk weavers' adopted livelihood.

The livelihood outcome and livelihood strategies to cope with problems have also been summarised.

5.1 Overview of Baan Fhake and Non Samran silk weavers

Baan Fhake and Non Samran villages are located in the Sam Mueng sub-district of Sida which is a new district in Nakhon Ratchasima province. As a result of the dense population in Baan Fhake village, the district had set up a new village, Non Samran, separated from Baan Fhake in accordance with administration laws. According to Sam Mueng TAO' statistics, it is estimated that there were 304 households and approximately 1,469 residents living in these villages in 2003. Despite its location in an arid area, the main occupation is agriculture, such as rice growing and cattle feeding, which is largely seasonal and at subsistence level. As it is located a long way from the provincial city, most economic activities are mainly aimed at self-consumption or income supplementation. Silk production fits into this category.

As silk production is an additional activity carried out during slack periods and free time, it is still traditional in approach and does not use any new technology except for chemical substances for bleaching and dyeing instead of natural dyes. It is believed that this production style is likely to be an example of sufficiency economy because they can produce the main raw material, silk thread, themselves and family labour is utilised in the production process.

The semi-structured interviews were conducted with a wide range of people and organisations that had links with silk production and community development. Of the interviewees, 10 producers, 1 group leader, 18 other residents, 1 village leader and 1 health promotion official are female, whilst 1 other resident, 2 village leaders, 1 TAO chairmen and 2 silk related promotion officials are male. The details of producers categorised by age distribution are presented in Table 5.1.The significance levels of probability value of producers' data between age distribution in these villages, and of data between modern and traditional type of production are further shown in Appendix 2.9.

Table 5.1: Details of surveyed silk producers in Sida

Villages	Gender	Age distribution			
	Female	< 35	35-44	45-54	>55
Fhake and Non Samran	10	1	1	5	3

The survey results found that all entrepreneurs are micro enterprises. The purpose of production is to manufacture mainly for commercial purposes as well as for personal use. Figure 5.1 illustrates that most of the producers started to produce commercially since the establishment of the weaving group in 1994, though others began to sell a small amount of fabric before 1979.

Producers in the Sida district have implemented local know-how and technology to weave traditional clothing like pha sin (sarongs), pha ko ma (loincloths) and pha sabai (sash). Most clothes are woven in the Matmi (ikat) style which is more colourful than the plain styles produced in Pak Thongchai. Furthermore, many members have small sericulture units in their houses. Money is almost always in short supply. It is, therefore,

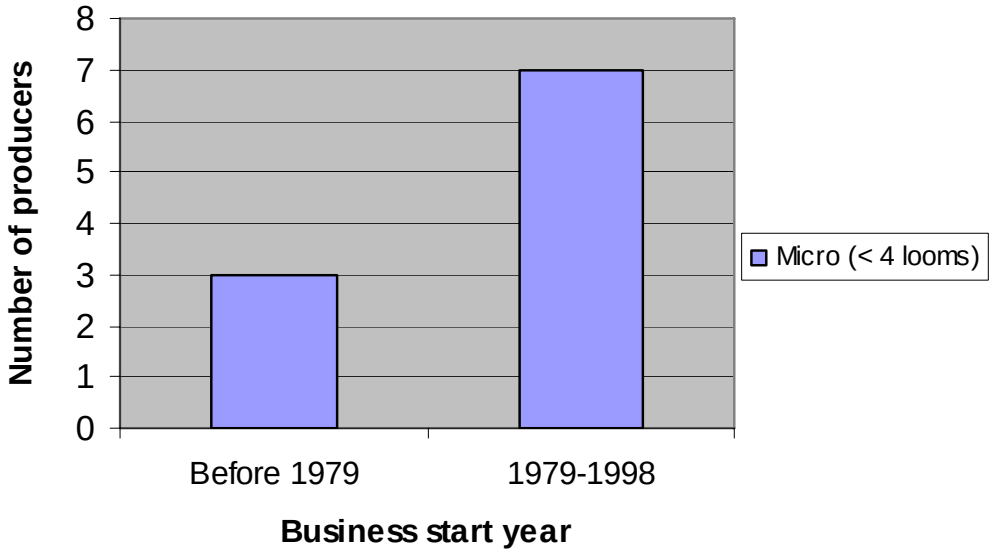

Figure 5.1: Size of enterprise and business start year range in Sida

(Source: Survey data, 2004)

necessary to produce at low cost by depending on their own resources such as family labour, traditional looms (Ki Kratob) and apparatuses, silk rearing units, and using some cheap low-quality chemical substances and dyes. As they rear the silk worm themselves, old style wooden apparatus must be used to reel silk strands from silk worms.

There is an important extra stage in the process of making Matmi fabric, which is the preparation of the weft yarn in a predetermined colour and pattern before weaving. The yarn is tied with plastic string in the required pattern on two wooden dowels or Lakmee. Then, the tied yarn is dyed, re-tied and re-dyed or has more ties for each colour addition. After reeling the patterned weft onto bobbins, the weft is kept in strict sequence to weave the pattern correctly. The bobbins are strung on to a length of twine to keep them in order for weaving. Then, the weft thread is ready for weaving. The whole production process is shown in Figure 5.2[1] ; reeling silk strand from boiled cocoons, dyeing the warp thread, reeling the warp on the warping frame in the required length, threading the warp through reeds, threading the warp through heddles and beater, attaching the heddle shaft to the treadle, making Matmi on the weft yarn, reeling the weft through the shuttle, and weaving.

[1] See Appendix 4.4 for the pictures of whole production process

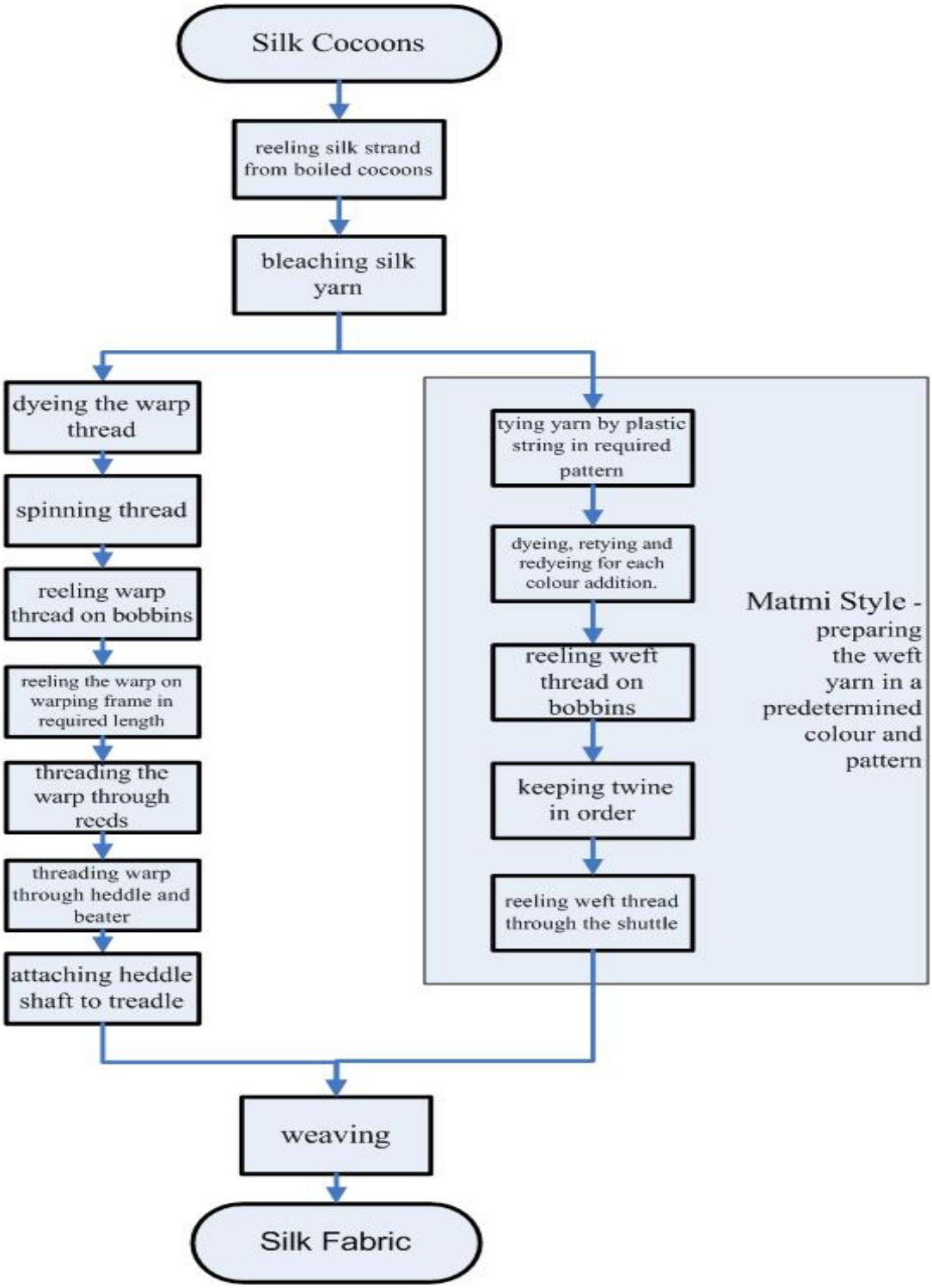

Figure 5.2: Silk (Matmi) production process in Sida

(Source: Adapted from Conway, 1992 and survey data, 2004)

5.2 Vulnerability contexts

5.2.1 Trends

The most important positive trend affecting the silk business of villages is the regional promotion of traditional silk thread production and the new national silk fabric standard. To compete with the largest silk thread producers, such as China, Vietnam and India in free trade markets, traditional silk yarn has been promoted as a premium product. With its unique characteristic thread, some representatives in both government and private sectors have indicated that fabric made from this type of silk yarn could potentially develop and build its own niche market (Kaewrueng and Pimpasali 2005; and interview with the president of the Thai silk association).

Generally, agriculture is the main economic activity of rural communities. The continuing emigration of young workers to urban areas has adversely affected agricultural productivity. In order to replace the absence of young workers, machinery and a system of temporary employment have been introduced into the villages to boost farmers' capacity. This has led to a rise in production costs which has put more pressure on household finances and food security, particularly in households with elderly members. In addition, the growth of mobile vendor businesses selling fresh food and ready meals including groceries indicates a behavioural change in community lifestyle and the loss of adequate food production capacity at present.

5.2.2 Seasonality

In agrarian society the busiest time for ceremonies and festive celebrations occurs following the harvest period. Despite the high demand for fabric during such festivities, the price of traditionally produced fabric can not greatly increase because of its small niche rural market. Furthermore, as silk-weaving is now an additional job, the weaver needs to buy extra thread from external suppliers, particularly warp yarn from a factory and weft yarn from other silk rearing farmers. Insufficient quantities and low quality of warp yarn available has forced weavers to rely completely on silk yarn supplied by factories. As there is no existing network with other sericulture farmers, it is difficult to gather sufficient quality yarn from other villages. To fill these gaps, middlemen have become important players, increasing their influence and control over the price of silk yarn. Due to high market demand as a consequence of

the OTOP policy and the rise of world silk yarn prices in recent years, the price of silk thread has soared.

5.2.3 Shock

According to the interviews, incidences of drought have become more frequent and more severe since 2002. This has delayed crop planting and harvesting schedules, as well as drastically affecting productivity of both cash crops and mulberries. Moreover, the drought has degraded the quality of water in the village pond. The death of the family head has a great effect on women in the villages. Food insecurity due to a lack of main labour in farming means that women need to earn more income to subsist. According to Thai social norms, children should take care of parents by sending some remittances to assist with living costs or have the parent live with them in the city. Widows who do not have anyone to support them are assisted by close relatives.

5.3 Livelihood Assets

The data from the questionnaires and in-depth interviews are categorised into five types of capital in terms of livelihood assets. Due to the lack of inventory records, manufacturers do not have accurate knowledge of the quantity of resources used in production. As a way to address the problem of resource depletion and emerging waste problems, CP auditing was employed in the bleaching and dyeing processes. Moreover, waste water was collected for analyzing the characteristics of water like Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD)

.5.3.1 Human capital

From the interviews carried out with the weavers and other residents, it was found that their ancestors were of Tai Lao ethnicity and migrated from Mahasarakham province over a hundred years ago. This led to these villages becoming recognised in silk weaving while other adjacent villages could not weave fabric. Knowledge of silk production is inherited only in Tai-Lao womanhood from one generation to the next. This valuable skill, which provides them with clothes for daily life and precious gifts for important ceremonies, has become one of the main occupations to earn additional cash income. Due to the introduction of walking tractors and other farm machinery in

the late 1940s (Sena-narong A. *et a*l., 1999), women have been freed to some extent from the farm work and and thus able to earn supplementary income. This income has given more financial support to families between rice cycle seasons in the past three decades.

The group discussions found that about 80 per cent of village households are producing silk fabric. The survey results of 10 producers showed that all producers are female and 80 per cent of them are aged 45 years or more. Details of the age break down of the producers are shown in Figure 5.3. About 90 per cent graduated from primary level education. Up to 60 per cent of the families are medium size (4-6 people). Every producer indicated that they are members of the "*Baan Fhake and Baan Non Samran weaving group*".

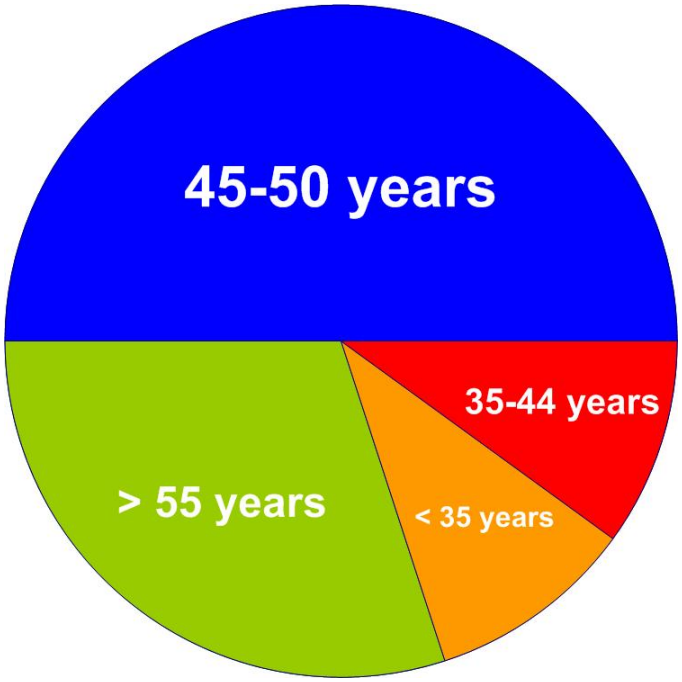

Figure 5.3: Age range of producers in Sida

(Source: Survey data, 2004)

It is reported that the production of silk for supplementary income is now spread across three generations of women in Fhake and Non Samran villages. As a result of the Elementary Education Act, which increased time spent at school, the pattern of learning silk–making skills has changed. Now, most girls have less time at home and therefore only have time to learn the auxiliary tasks, for example, winding thread, twisting and tying warp, etc.

After they complete compulsory education[2], all silk production skills are then transferred from mothers to daughters. The finished fabric is a measurement of the level of skill the girl obtained. The more complicated the pattern and the more beautiful the fabric, the more skill she has and the better wife she will become.

The consequences of industrial development in large cities in Thailand have changed not only labour migration, but methods of traditional knowledge transfer. In the past, the men needed to move into the women's family after their marriage, as part of the means to maximise labour force for a farmer's family. This increased labour force led to greater productivity and more food, as well as some surpluses which can be categorised into other kinds of assets. However, as a consequence of drastic changes in Isan rural society at present, because of emigration of young labour to work in the factories, labour force in the village has been severely depleted. As a result, weaving skills are now being transferred to daughters-in-law who are not ethnic Tai Lao and have never before had weaving skills.

In order to gain more merit from weaving a masterpiece for religious ceremonies and to be more accepted in the community, women have been motivated to develop their weaving skills. Nonetheless, the introduction of new technology means that even skilled weavers had to learn how to use chemical substances instead of natural dyes to make fabric. From the interviews, it was found that most know-how regarding use of low quality chemical dyes and other agents for bleaching and treating a fabric has been developed by producers. Given the lack of information and instructions on

[2] According to the enact of the 1935 and the 1980 Act of Elementary Education, the compulsory education level for the first generation weaver is grade 4th, while the second generation weaver is grade 6th. The current generation descendants have to complete grade 9th in the school due to the 2002 Act of Compulsory Education.

packages, they often used a *"trial and error"* method to find the most appropriate formula for their product. Although most training courses about good practice in the bleaching and dyeing processes had been supported by government offices, the producers were not able to implement the knowledge acquired through training. This is because producers use lower (and thus cheaper) grades of chemical substances to those used in the training courses. As trainers came from the textile industry, most materials and procedures were more suitable for industrial production. Although new skills such as making modern garments or new design techniques were transferred to the weavers, it appears that these skills have only been utilised by younger weavers. Older weavers still prefer weaving the traditional fabric, as they claimed they could not cope with new approaches at their age. Training also included group management, administration and marketing, however, only the group leader and a few other committee members attended, due to their responsible positions in the group.

Despite a few young labourers working in silk weaving in the villages, the Tai Lao textile knowledge has been passed on to the new generation. Table 5.2 shows that after silk becomes one of the main source of income the majority of the respondents agreed that silk rearing and Matmi weaving know-how is transferred to their children in both family and school, as well as to some interested adults. Since silk weaving has been promoted in the local primary school as a supplement to the curriculum, all students in grade 6 can now do almost every process except tying weft yarn into a pattern. To urge and give some incentive to these new weavers, fabrics woven by students are also allowed to be sold in the showroom of the SMCE.

Table 5.2: Silk know-how transfer after silk become the main source of income in Sida

Silk know-how transference	Percentage of agreement			
	Producers	**Villagers**	**Village leaders**	**TAO**
• Increasing the revival or re-innovating of silk traditional know-how transferring	77.8%	63.2%	100%	100%
• Not different from the traditional silk know-how	22.2%	31.6%		
• Not involved with the traditional silk know-how at all		5.2%		

From the group discussion, it emerged that there is a great concern about the lack of young labour. The heavy agricultural workload, financial insecurity and uncertainty and low profit from the silk business did not attract young people to keep working in villages. Most young teenagers who graduated from higher education prefer seeking jobs in the city to working in the village. Consequently, most of the older weavers in the villages are concerned that silk production is unlikely to survive in the villages beyond the next 20 to30 years. As the SMCE leader stated:

> *"To date, the young did not know even how to grow rice or weave fabric. So they just move out to work in cities. Only the older people like us stay and weave silk to make a living in the villages"*

The impact of using chemical substances and dyes used in bleaching and dyeing processes also has human health implications. From the survey, about 80 per cent of weavers agreed with the statement that the production of silk was likely to be affecting their health. When comparing the period when silk was produced only for self-consumption and the period when it was a supplementary income, the survey revealed that there was an increase in the four silk-related symptoms in terms of average frequency percentage. Table 5.3 shows that there has been an increase in complaints related to muscular, respiratory, nervous, and dermatological system, respectively.

Three out of the four health symptoms were related to the bleaching and dyeing process. Although these chemical materials were used in relatively small quantities compared to production in Pak Thongchai, cheaper prices and inadequate information about ingredients made the quality and safety more doubtful. The empirical study found that most producers lacked awareness and knowledge of the hazards of chemicals. Therefore, it may imply that the risk of chronic health problems in respiratory and nervous systems, as well as skin disorders may increase in the future.

In the meantime, all weavers believed that the high percentage of muscular symptoms was related to age and repetitive strain injury. The effects of continuing weaving on ovary inflammation were also mentioned. The interviews revealed that some older weavers or weavers with muscular injuries had to change their work from weaving to

lighter physical tasks like winding thread or twisting warp. The community health promotion official reported that the increases of muscular pain from repetitive strain are quite serious. Moreover, the headache and skin disorder from unidentified cause are slightly raise.

Table 5.3: Health impacts from silk production in Sida

Effected system	Percentage of agreement			Symptoms
	Producers		Villagers	
	Family	Non-family	Community	
Respiratory system	50%	33.3%	50%	Allergic to dust, irritated eyes, nose and throat, breathing problems when bleaching, dyeing silk yarn and re-bleaching coloured silk yarn
Dermatological system	25%	50%	16.7%	Irritated eyes and rashes when bleaching and dyeing silk yarn.
Nervous system	37.5%	40%	66.7%	Stress and headaches after rinsing silk yarn in the re-bleaching coloured silk thread process
Muscular system	62.5%	50%	41.7%	Muscular aches and sprains when working in the same position for a long time

5.3.2 Social capital

The rising income derived from silk business has clearly affected the lifestyles of rural villagers as shown by the results of the survey of producers and their neighbours in the villages. The impacts of production on the community are presented in Table 5.4.

Table 5.4: Social impacts from silk production on producers and communities in Sida

Impact	Percentage of agreement			
	Producers	**Villagers**	**Village leaders**	**TAO**
• Enhancing producers' image by improving habitation condition	85.2%			
• Enhancing the ability to support their children's education higher than compulsory level	100%			
• Decreasing family members' migration to work	30%			
• Increasing time for communicating within family	50%			
• Creating jobs in local areas	40%	100%	33.3%	100%
• Enhancing the relationship between producers and neighbours	20%	47.4%		
• Enhancing the relationship between producers and the community	20%	31.2%	66.7%	
• Participating more in community activities	30%	21.1%	33.3%	100%
• Providing more cooperations in community development activities	20%	15.8%	33.3%	100%
• Contributing to the community development	100%	73.7%	100%	100%

Table 5.4 illustrates the extent to which the producers agreed with statements about the social impact of silk production (percentage of agreement). Unlike many rural villages where labourers have to seasonally migrate to find temporary work to the cities or other regions during the dry season, many villagers, including elderly people, can work and earn money in the villages. Since producers have worked at home, this silk related work promotes close relationships in the family and increases community cohesion. In addition, the interviews with several awarded winning weavers found that high level silk weaving skills could gain recognition for the weavers among

traditional silk weavers and businesses as well as increase social status in the community.

In terms of kinship society, the relationship between weaver and neighbour or community is mostly identified as being as good as before. Another key factor that strongly supported the relationship between the weavers was the existence of the SMCE group. According to the survey, all producers are members of the registered SMCE *"Baan Fhake-Non Samran silk weaving group"*. The group has been established and supported as the farmer housewives' group by government organizations since 1994. Like other farmer housewives' groups, the aim of the group is to increase additional income for rural women in line with the cooperative concept.

With a clear structure and management system, the group has developed more successfully than groups in the Pak Thongchai district. Up to 170 producers from Baan Fhake and Baan Non Samran in Sida district are group members at present. Because these two villages have the most outstanding weaving skills in the district and have won many regional awards, the group has attracted several government agencies for continued support. For example, mulberry planting, silk cultivation, group management, dressmaking training, provision of market booths, showroom and group's office etc. have increased the capability of the group to compete with other businesses. The group can sell products via their showroom in the village and their stands at provincial, regional or even national trade fairs. These group activities further improve the relationship between producers, neighbours and the communities.

As a result of the growth of the group, it has been possible to set up several new benefits for members. The annual loan of 2 kilograms of silk warp yarn helps the weavers save their cash for the biggest proportion of production costs (cf Section 5.3.6 b for more detail). After the fabric is sold, the money is paid back to the group for silk yarn costs. The group provides some chemical materials for silk production which are hard to find in the district. A new savings programme has been established to strengthen financial status and provide local financial support for group members.

There are also social benefits from the 10 per cent of the group's annual profit allocated for community development activities. As a result, the producers can participate and offer more cooperation in activities which lead to community

development. When interviewed, the four village leaders, all agreed that all villagers were satisfied with the manufacture of silk in the community.

5.3.3 Physical capital

From observation, every family lives in their own or parental accommodation. Most houses are generally in fair to good condition depending on the financial status of the residents. Like other rural accommodation, the original house is made from wood. When people have more income and want to improve their house, the modified house is constructed in half wood half brick. The latest house model for high income villagers is built by brick and concrete, the same as a house in a city. The interview with the village leaders and TAO chairman showed that community infrastructure is almost complete, for instance, roads, village water supply and electricity. Only the telephone system still needs to be installed. Waste treatment is only available on a landfill system basis. Villagers need to carry their waste to a landfill themselves.

Table 5.5 shows the positive impacts of silk livelihood as there was no negative impact reported. All weavers own a set of essential basic tools. There were many new tools and buildings supported by several government agencies. For example, iron-traditional looms, thread winding machines, sewing machines, product display building and weaving house were enhancing the group's production and trading capability. Agricultural tools were found in almost every house. Other properties, such as, fundamental electrical appliances, bicycles, and household items are generally owned by the community. Furthermore, many young and middle aged weavers' families have motorcycles and cars.

Table 5.5: Impacts on producers' physical assets in Sida

Impact	Percentage of agreement
• Improving habitation condition	80%
• Possessing tools, apparatuses and machines for silk production	100%
• Increasing other entrepreneurs' physical assets that are not involved with silk production	30%

5.3.4 Financial capital

Due to agricultural based livelihoods, the income of the rural villagers is difficult to determine. Depending on the fluctuation of market prices and crop yield, most farmers farm mainly for family consumption. The profit from agriculture is mostly used to pay debts and for the next season's production costs. The rest of the money is not sufficient for day-to-day living costs like facilities bills and children's allowances. However, the continuing drought in recent years has greatly affected rice productivity which has an effect on villagers' finances. Several people have become deeply in debt. The survey found that supplementary income from silk weaving has played a vital role in people's financial capital at both individual and community levels.

According to the micro production scale, all capital comes from the producer. Figure 5.4 shows that up to 70 per cent of capital is less than 10,000 THB (149.3 GBP or 256.4 USD). In terms of income, about 80 per cent of weavers can earn additional total income from silk weaving of between 10,001 and 50,000 THB per annum, and the rest have an income of more than 50,000 THB (746.3 GBP or 1,282 USD). This is because of the different numbers of annual weaving batches and different grades of product. It was found that half of producer's income is obtained from tailor made order production and normal product distribution, whilst a further 20 per cent of income comes from fabric sales only. Due to the fact that they rear silk themselves, 30 per cent of entrepreneurs can earn more money from selling excess silk yarn, mulberry leaves, boiled silk worm and silk eggs.

In terms of debt, it was found that 60 per cent of weavers had debts less than 10,000 THB, whilst 30 per cent of weavers had debts higher than 10,000 THB. No debt was reported by 10 per cent of producers. The survey also found that the Baan Fhake and Non Samran SMCE provided two-thirds of loans to the producers. Financial organizations (30 per cent) and support from the government (19 per cent) were ranked in second and third place as financial supporting sources. Nearly 90 per cent of the loans from the SMCE were given in the form of two kilograms of silk yarn used for the next seasonal manufacture, whereas the rest was used for business and living costs.

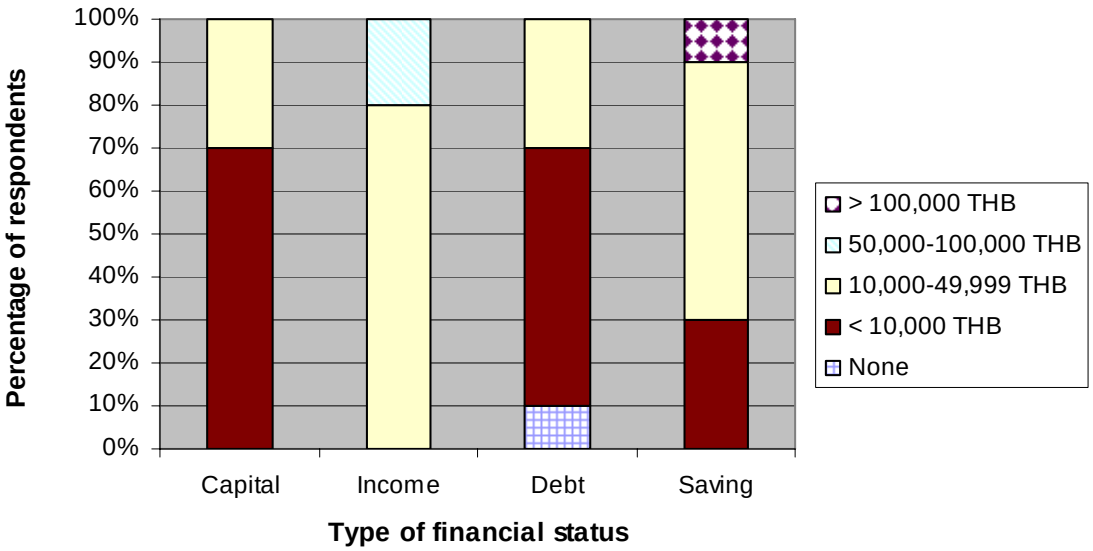

Figure 5.4: Detail of producer's reported financial status in Sida

(Source: Survey data, 2004)

In terms of savings, it is difficult for silk producers to give a precise estimate of savings derived from silk production since income from silk weaving was used for day-to-day living expenditure. The total savings per year from every economic activity of producers has been identified instead. It was reported that 90 per cent of producers indicated they can save up to 50,000 THB per year, while only 10 per cent can save more than 100,000 THB (1,493 GBP or 2,564 USD) per year. Although 60 per cent of savings were reportedly spent on their living costs and businesses, up to 40 per cent had been kept in the bank.

Due to its low production cost and micro production scale producers and village residents, only agreed with statements relating to positive economic effects. The impacts are summarized in Table 5.6.

Table 5.6: Impacts on financial assets in Sida

Economic impact	Percentage of agreement			
	Producers	**Village**	**Village leaders**	**TAO**
• Increasing self-sufficiency in finances (debt elimination) • Enhancing development and expansion of retail businesses and services in the community • Being part of a vital market for domestic suppliers to sell loom and apparatus, mulberry leaves, cocoons, boiled silk worm, silk yarn, and chemical dyes and substances	50% 30%	94.4%	100%	100%

The weavers accepted that silk can contribute significant extra income to the family. Silk fabric is not the only product they sell, but also the cocoons, boiled silk worm and mulberry leaves which can earn petty cash for the silk cultivating farmer. Some respondents stated that:

> *"Sometimes silk can make more profit than farming, in particular when the crops are affected by drought. Loss of adequate rain in the previous rainy seasons had failed the process of rice seeding several times. Fortunately, the profit from silk selling can contribute partly support for the living cost of the family"*

At present, this livelihood has become a significant income source because it can make more profit than rice cultivation. In particular, the older people, who have retired from rice growing, have become full time workers, weaving delicate masterpieces to send for award contests. The winner can earn not only reward in terms of money and jewelry but also sell their award winning fabric at a higher price.

5.3.5 Natural capital

The effect of silk production on the environment was studied. Similar to the survey in Pak Thongchai, the degree of problems experienced during the two periods of silk manufacturing; the period when production was for self-consumption and the period when silk is a supplementary occupation were explored. The investigation focused on effects on natural resources: water and fuel wood, and the pollutant problems from production: waste water, odours and solid waste.

a. Natural resource depletion

i. Water

As Baan Fhake and Baan Non Samran are located outside of the irrigation system, water is the most vulnerable resource for agriculture based villages. In both villages there is a large public pond which is used as the source of village supply water while rainwater, another vital source, is mostly used for drinking. Drought has become a more serious problem in recent years and this affects the livelihoods of nearly two-thirds of villagers. The survey found that the drought in the rainy season in 2003 caused the collapse of the majority of villages' rice productivity.

Table 5.7 shows most respondents stated that the quality of supply water in both villages which comes from the village pond had become a serious problem in the dry season. The eutrophication of raw water, which may come from water which passes through rice fields before flowing into the village pond, was assumed to be the cause of the problem. According to the respondents, water supply was greenish in colour and had an unpleasant smell in many occasions. Although the local authorities had attempted to solve the problem by adding more chemicals to treat water in the supply water system, their interventions have not been effective. The villagers needed to boil water or use chemical flocculants to separate the particles from the water before use. Also, this low quality water can only be used in the bleaching and rinsing processes.

However, the majority of respondents reported that they experienced no problem with drinking water. Rain is collected by large clay containers in every household in rural areas. This water can be used for drinking, day-to-day living activities and dyeing and rinsing processes.

Table 5.7: Impacts of silk production on water resource in Sida

Degree of problems	Percentage of agreement			
	Producers	**Villagers**	**Village leaders**	**TAO**
I. Before silk became the main livelihood of the community				
Drink water				
• No problem	100%	100%	100%	100%
Supply water				
• No problem	100%	100%	100%	100%
II. Since silk became the main livelihood of the community				
Drink water				
• No problem	100%	94.7%	66.7%	100%
• Little problem				
• Serious problem		5.3%	33.3%	
• Very serious problem				
Supply water				
• No problem	20%	42.1%	33.3%	
• Little problem	40%	42.1%		
• Serious problem	30%	10.5%		100%
• Very serious problem	10%	5.3%	66.7%	

A CP auditing was conducted in order to investigate how many resources were consumed in the bleaching and dyeing processes. Because of time limitations and non-continuous production, the data concerning bleaching and dyeing process was collected from different producers who used different sizes of container to bleach and dye silk threads. Figures 5.5 and 5.6 show an approximate amount of resources consumption in each production process. It was found that there were approximately 118 litres of water used in the bleaching process and 50 litres of water used in the dyeing process.

According to the survey, 80 per cent of producers usually make silk fabric in the dry season after harvesting (December-May) and during free time in the rice planting season. Then, a total amount of water needed by the bleaching and dyeing processes

would not be less than 68,544 litres per annum[3]. This figure does not include the other 20 per cent of producers who make fabric all year round.

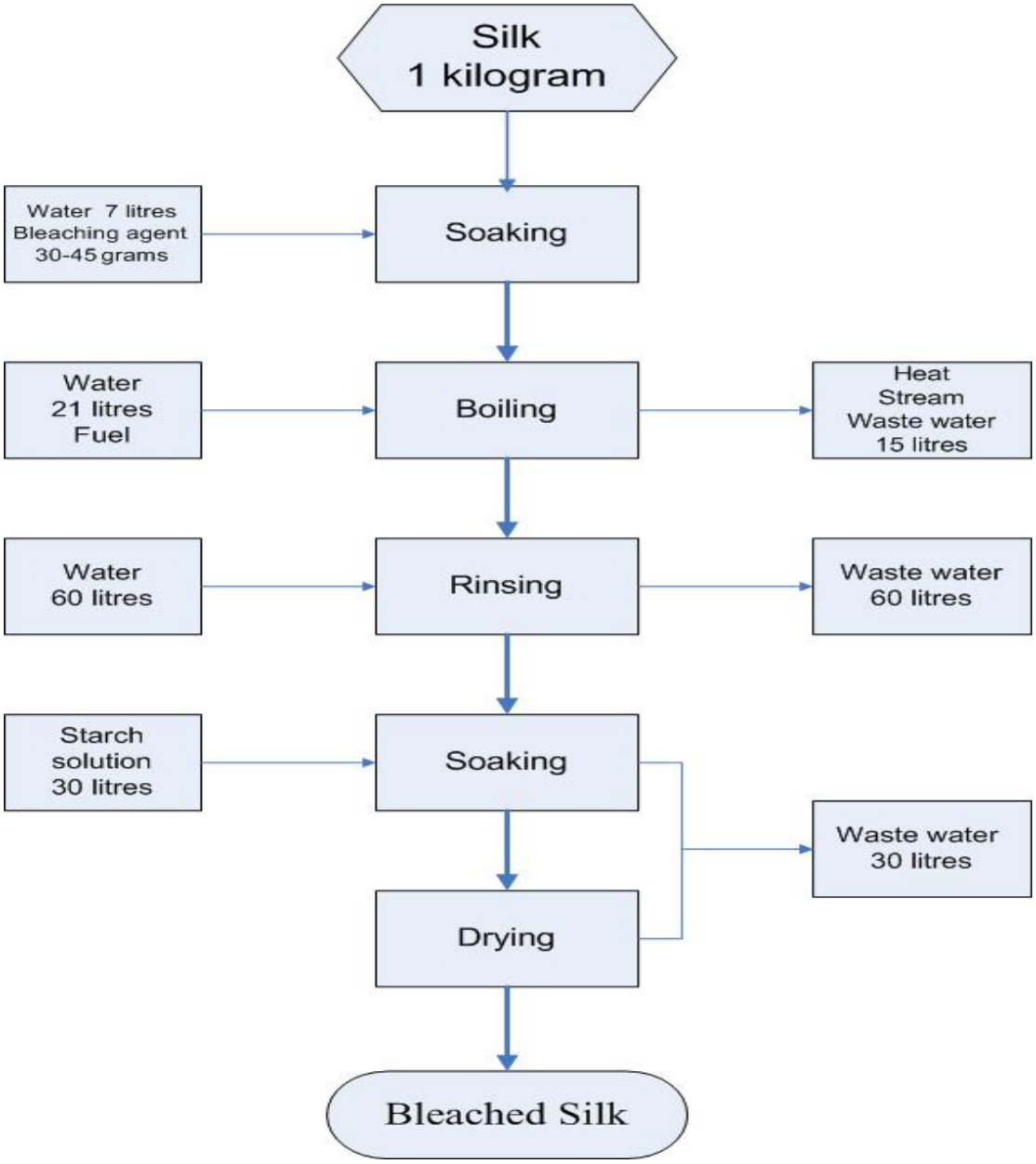

Figure 5.5: Process diagram of bleaching silk thread

(Source: CP auditing data from the first fieldwork, 2004)

[3] Based on the calculation of three batches production from 136 households (80% of 170 SMCE members)

ii. Fuel-wood

The survey indicated that none of the producers in the villages have a problem regarding firewood, because they can collect wood from their rice paddy area or public land. However, it is difficult to get detailed data of used fuel wood. As all woods are used for both cooking and silk production, it is hard for villagers to estimate the quantity of wood used specifically in silk production. Due to the fact that the exact start time of production was unknown, the CP auditor team was unable to ask producers to measure the quantity of wood before the beginning of production. Therefore, the CT auditing flowchart does not include an exact figure for the amount of wood used.

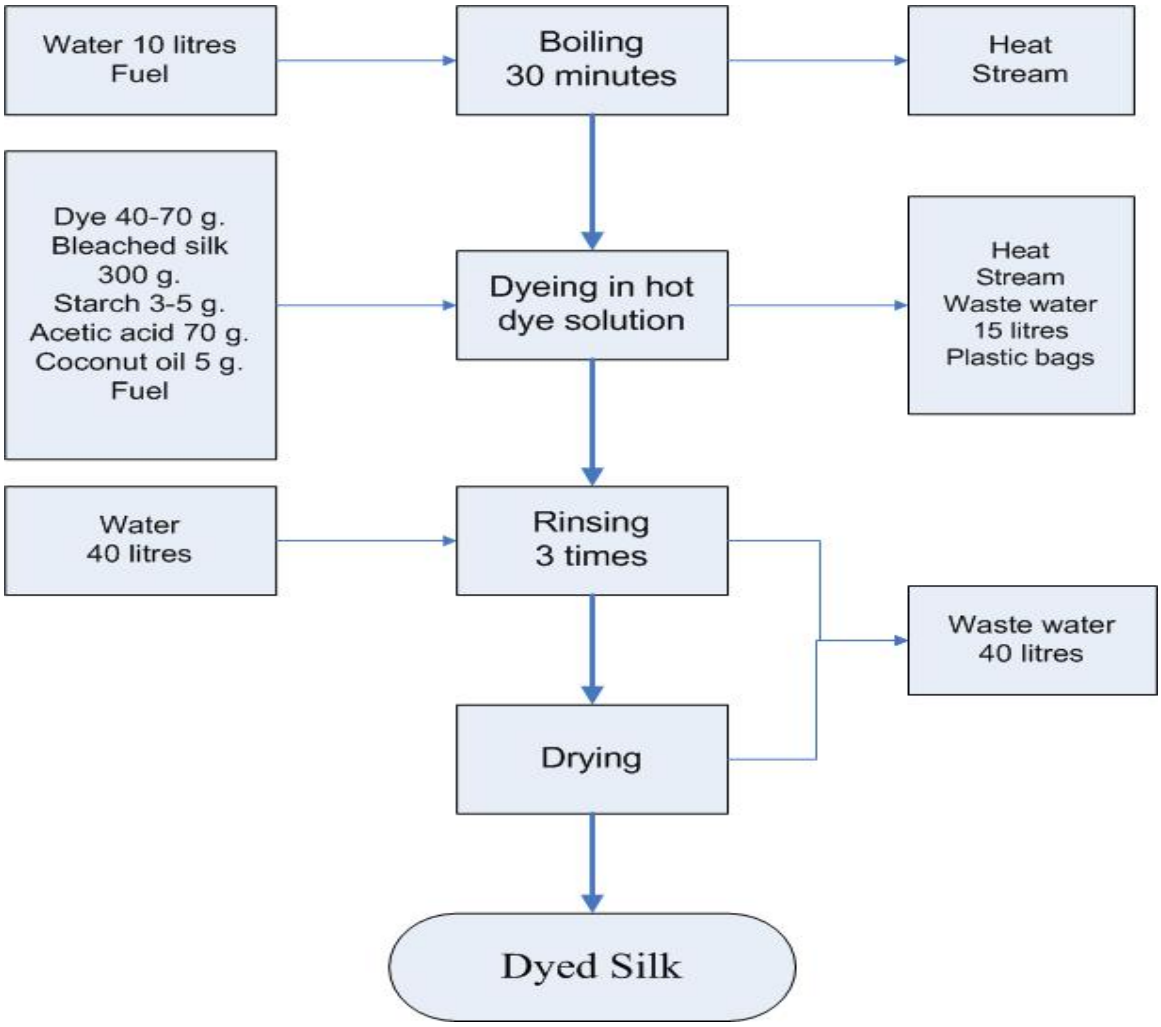

Figure 5.6: Process diagram of dyeing silk thread

(Source: CP auditing data from the first fieldwork, 2004)

b. Pollutants

i. Waste water-related issues

Table 5.8 and 5.9 present that most respondents believed that they experienced no problem from waste water since silk becomes one of the main livelihoods. Moreover, most producers experienced no hazard from waste water. Therefore, all respondents felt that there is no real need for any form of treatment system. It is normal to throw effluent directly onto the ground or to use it to water non-edible plants around the house.

Table 5.8: Impacts of waste water from silk production in Sida

Degree of problem	Percentage of agreement			
	Producers	**Villagers**	**Village leaders**	**TAO**
I. Before silk become the main livelihood of the community				
• No problem	100%	100%	100%	100%
II. Since silk became the main livelihood of the community				
• No problem	100%	89.5%	100%	100%
• Little problem		10.5%		

Table 5.9: Results of survey on silk producers' attitudes and beliefs to local resources and environmental management in Sida

Statement	Average score
There is no impact on surrounding soil and water resources from discharging untreated wastewater from the bleaching and dyeing process	3.67
Local resource and environmental management is the responsibility of local authorities, not the villagers	3.40
Polluters should respond to any environmental impact in the local area caused by any waste from the production process.	4.00
At present, most implemented wastewater treatment systems can effectively treat sewage as the legislative regulation requires	No comment[4]
The use of effective and valuable resources, such as water, chemical dyes, etc., will minimise waste and save production costs	4,20

[4] Due to the lack of knowledge about waste water treatment system and the current implemented treatment facility in villages, all producers cannot give a comment about this issue.

The CP audit of the bleaching and dyeing processes revealed that wastewater amounts to 153 litres discharged in each batch. The total amount of wastewater emitted in a community would therefore be more than 62,424 litres per annum[5].

In terms of sewage analysis, samples were taken from the wastewater from the bleaching and dyeing processes. As mentioned in Section 4.3.5, the samples were examined by different criteria and objectives in two projects, the incomplete data, particularly in pH, BOD and Total Dissolved Solids (TDS) is shown in Table 5.10.

Table 5.10: Results of laboratory analysis of silk effluent in Sida

Sample No.	Sample type	Sample site	Characterization		
			pH	BOD (mg/l)[6]	TDS (mg/l)[6]
1	Dyeing effluent (Blue)	Baan Fhake, Sida			27,675
2	Last rinsing water of dyeing process				9,327
3	Bleaching effluent		9.8	2205	
4	First rinsing water of bleaching process		2*	1026	
5	Second rinsing water of bleaching process		1.9*	900	

In terms of the Thai industrial effluent standard, all sample results exceeded the standard. From Table 5.4, the TDS values of sample 1 and 2 are higher than the standard by a multiple of 9 and 3, respectively. The pH value of samples 3, 4 and 5 were over the 5.5-9.0 range of normal sewage. Furthermore, it is estimated that the BOD values of those samples were higher than the standard by 45 times.

[5] Based on three batch production of 136 households which are SMCE members [6] According to the national standard of industrial effluent, the BOD, COD and TDS in effluent before discharging into the public should less than 20, 120 and 3,000 mg/l, respectively, whilst the pH should be between 5.5 and 9.0.

[6] According to the national standard of industrial effluent, the BOD, COD and TDS in effluent before discharging into the public should less than 20, 120 and 3,000 mg/l, respectively, whilst the pH should be between 5.5 and 9.0.

* The figure of these two samples should be rechecked because the effluent from the bleaching step should have high pH value.

ii. Odours

Most odours come from the bleaching and dyeing process. More than one third of the producers and other residents surveyed said that the odours had become a "*slightly serious*" to a "*serious*" problem. Due to the micro scale of production, good ventilation of bleaching and dyeing areas and lack of community congestion, the problem can possibly be solved naturally by wind flow. The impacts are summarized in Table 5.11.

Table 5.11: Impacts of odours from silk production in Sida

Degree of problem	Percentage of agreement			
	Producers	**Villagers**	**Village leaders**	**TAO**
I. Before silk become the main livelihood of the community				
• No problem	100%	100%	100%	100%
II. Since silk became the main livelihood of the community				
• No problem	60%	63.2%	100%	100%
• Little problem	30%	26.3%		
• Serious problem	10%	10.5%		

iii Solid waste-related issues

Solid waste in most rural villages is managed by burning and landfill. Small quantities of solid waste from silk production, such as, paper and plastic from the packing of silk yarn, chemical substances and dyes plastic packages including silk thread and knots, are usually burned in the bleaching and dyeing stove. Table 5.12 presents that the rubbish in general had become a "*slightly serious*" and "*quite serious*" problem now compared to ten years ago.

Table 5.12: Impacts of solid waste in Sida

Degree of problem	Percentage of agreement			
	Producers	**Villagers**	**Village leaders**	**TAO**
I. Before silk become the main livelihood of the community				
• No problem	90%	100%	100%	100%
• Little problem	10%			
II. Since silk became the main livelihood of the community				
• No problem	70%	100%	33.3%	
• Little problem	20%		66.7%	100%
• Serious problem	10%			

In terms of reuse and recycling, some silk thread and knots were re-spun and reeled again. Indeed, low quality fabric or remnants were reprocessed for new products such as handbags, clothes or gift wrapping to increase value.

5.3.6 Other key factors for sustainable enterprise development in the Sufficiency Economy Philosophy (SEP)

There are many advantages of using the SL framework to find an appropriate way of sustaining livelihoods and alleviating poverty. However, there are some limitations of applying the SL framework within a business perspective in particular micro and small enterprises. The following issues which are not clearly indicated in the SL framework but are key components in the SEP application for enterprise development need to be considered.

a. Technology

Although some technologies have been introduced to increase productivity in traditional silk production, they have significantly affected people's health. To make fabric more attractive and colour fast as well as reducing production time, the chemical substances and dyes were replaced with natural mordant and colour materials. Low cost small packs of chemical dyes, bleaching agents and other substances have become popular at national level as a result of good distribution and marketing by chemical companies. Due to low capital, all entrepreneurs in the villages prefer to buy cheap small packs of these chemical substances to the expensive ones

used in the Pak Thongchai district. The price of the dyes used in the villages is 2 to 5 times cheaper than the dyes used in Pak Thongchai depending on the colour.

The lack of information on the label about the ingredients and the recommended quantity of dye to apply to the silk yarn means that using these cheaper dyes will impact on quality. The fact that greater quantities must be used to achieve the colour the weavers want indicates that these low price dyes are low quality. Table 5.13 shows the consumption quantity of dyes differs, depending on the various dye colours. It was found that an average 1.48 kilogram of silk warp yarn uses between 120 and 400 grams of dye, whilst the average 1.65 kilogram of silk weft threads consumes from approximately 240 to 800 grams of dye.

Moreover, using excess dye leads to the problem of colour fading after washing, which dissuades customers from buying these products. Nevertheless, the group leader has used an intensive acetic acid to solve the problem and has ordered this acid from the factory to distribute to members. As there is a lack of knowledge and awareness of hazardous chemical substances, most producers have had illnesses related to chemical exposure in the bleaching and dyeing processes as shown in Table 5.3. The interview with other residents and producers also reveals that the untreated effluent discharged into the area around houses has not as yet had any significant effect.

Table 5.13: Quantity of dyes used in warp and weft yarns in traditional silk production

Case number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Warp yarn (kilogram)	1.2	1.5	1.5	1.5	2	1.5	1.5	1.4	1.2	1.5
Dyes (gram)	120	180	400	160	120	180	200	180	180	180
Weft yarn (kilogram)	1.6	1	2	2	1.6	1.6	2	2	1.2	1.5
Dyes (gram)	300	500	240	500	800	600	600	300	500	300

In terms of machinery, the introduction of some basic machines, such as winding machines, and iron-frame traditional hand looms, has enhanced weaver capacity. Furthermore, the industrial sewing machine, supported by the Ministry of Labour, has also created new jobs for young members who are interested in producing new types of products.

b. Business management

As silk production is a supplementary job, none of the producers set up a business plan for their product. Production mainly relies on availability of time and silk yarn. Since production shifted to a more commercial basis, the unit of production per batch has increased to a roll of silk. It was found that half of the surveyed producers produce 22.5 yards or 20 metres length per one fabric roll. The capacity of producers varies from approximately 37 metres to 260 metres (42-293 yards) per annum. To produce traditional cloth, such as sarongs, the producer needs to weave only 2 metres in length for one normal sarong. Therefore, they can cut the silk into a piece whenever the weaver wants to sell it during production.

The survey of production cost analysis of a piece of sarong, which is a common product of the group, showed that the average production cost was 3,228 THB (48.18 GBP or 82.77 USD). Figure 5.7 shows that up to 77 per cent of all expenditure were on silk yarn, particularly warp yarn (51 per cent). This is because the producers in both villages do not have enough time to expand their silk cultivating since they have expanded fabric production. As a result, they have now started to order warp yarn from factories and more weft yarns from external silk rearing farmers. However, 80 per cent of villagers still rear silk worm for making weft yarn themselves. From the survey, 7 out of 10 producers stated that their costs were 50 per cent less than if they bought weft yarn externally. The cost of other raw materials and weaving tools and equipment were in second (17 per cent) and third (5 per cent) place, respectively.

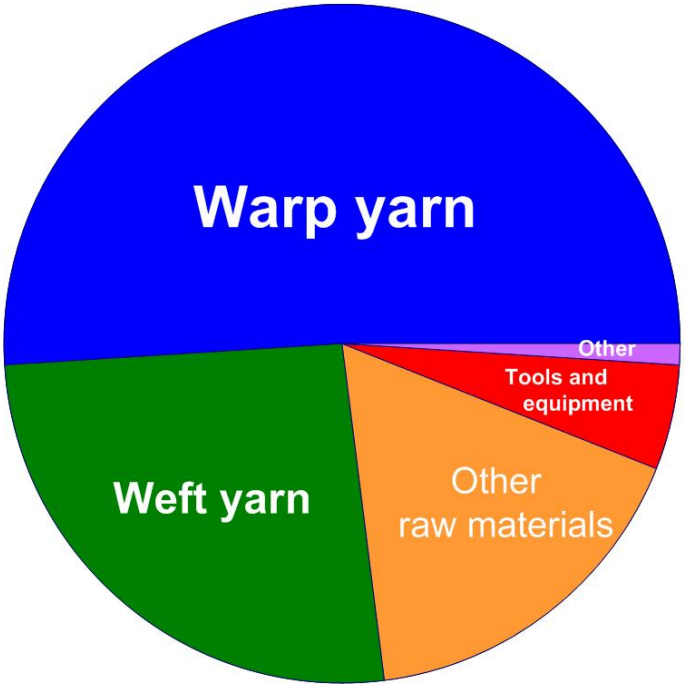

Figure 5.7: Detail of traditional production costs

(Source: Survey data, 2004)

To increase weft yarn productivity, the group has been allowed to use a 4.8 hectare piece of land of Sam Mueng TAO for cultivating more mulberries in recent years. Even though there are some water tanks to provide enough water for mulberry cultivation throughout the year, all weavers believed that the non-rich soil which was brought from the bottom of the village pond[7] and used for mulberry cultivation resulted in the loss of two-third of leaves productivity. Producers still needed to buy weft yarns from other sericulture farmers.

Producing a good quality product is a key policy of the group. To control product quality, all producers use their own judgment to check for quality at first hand. As the centre of silk trading in villages, the committees of the group examine the fabric before confirming the price and accepting the product for sale in the group's shop. Other contributions from the group are: knowledge, market trend, chemical dyes and substances sourcing, warp yarn annual lending scheme, and a low interest loan service

[7] TAO and villagers had dug and integrated 4 natural ponds into a large pond to increase the capacity of collecting rainwater. A large amount of soil from the bottom of pond was used to prepare soil for growing mulberry trees.

from the saving sub-group all of which help the weavers' business perform more competently than other weaving groups in general.

c. Labour management

Because the main livelihood of villagers is rice cultivation, most entrepreneurs usually make silk fabric in the dry season after harvesting and during free time in the rice planting season. People who make silk all year round consist of the elderly who have retired from field work and the young who work in silk production as their main job. Most producers mainly work on key processes, for example, preparing patterns, bleaching and dyeing, and weaving. At the same time, some young female members in the family are responsible for auxiliary tasks that need physical support or are easy to perform like tying a pattern, winding thread, lengthening the warp, etc. Males also help to repair and maintain tools and equipments. As production time usually starts in free time after daily routine activities, time duration of each batch production, depending on the quality of fabric, is less than 60 days.

d. Risk management

There are two main factors, small investment and group cooperation, which reduce production risk in traditional silk production. In developing their subsistent silk weaving to earn some supplementary income, producers rarely invest large amounts of money in this micro scale production. As all silk weavers in villages are members of the group, it is easy to get cooperation and support for strengthening silk trading in villages. Some group policies, such as "*producing good quality products*", "*accept only cash, no credit payment"* and "*one stop services of villages silk business"* and some activities, for example, "*silk yarn lending scheme"* and "*low interest loan service*", have reduced their vulnerability resulting from strong competition and limited cash flow.

e. Product diversification

The main product is Matmi fabric (70 per cent), which is usually used to produce sarongs or formal dress. The fabric can be divided into two grades, premium and standard quality. Other products include clothes and accessories produced from Matmi and plain fabric. The highest quality fabric is weaved for the upper end of the

market. Moreover, to respond to broad market demands, many new commodities like different patterned fabrics, handbags, shirts for men, women's dresses and some accessories are developed and produced.

f. Business ethic

The survey and group discussion revealed that the group has run a business with honesty and fairness with their suppliers, members, and customers. Product quality is an essential factor which shows honesty to stakeholders. Furthermore, its *"no credit payment"* policy, is strengthening the cash flow of suppliers and group members. The profit from group operation has been allocated for community development activities.

5.4 Policies, Institutions and Processes

5.4.1 Key institutions and organizations affecting traditional silk production in Baan Fhake and Non Samran

Key institutions and organizations which were shown by the survey and interviews to influence the community silk business are shown in Table 5.14.

Table 5.14: Key institutions and organizations affecting traditional silk production in Baan Fhake and Non Samran

Organisations	Details
Baan Fhake and Non Samran Silk Weaving Group	The centre of silk business and related non-production activities, such as selling fabric, making clothes, group meetings, receiving ordered raw material, training etc.
Middlemen and vendor	Another important institution which has sold silk threads, silk worms and some chemical substances. Other middlemen have come to buy a large amount of fabric from the group.
Tambon Authority Organisation	A key local authority to which most authority and budget control has been transferred from central government for community development, taxation and maintenance as well as restoring all resources in sub-district area.
Sida Community Development Office	Formerly the main organization which supports the general development of community and the silk group's development in the villages. It has played an important role in supporting the group's activities particularly in marketing and some free distribution channels related to provincial trading fare and the OTOP scheme.
Sida Agricultural Office	Formerly the main organization which supports the general development of agricultural activities in the villages and group's mulberry planting.
Nakhonratchasima Industrial Promotion Centre	An organization that supported the training course in bleaching and dyeing technique and product processing. It also gave new looms and other equipment to the group.
Labour Development Office, Minister of Labour	This organization had provided some courses and equipment for training group members in product processing and making clothes.

A key institution for business is the market. The survey showed that traditional clothing is the principal market driving factor for the business. Unlike Pak Thongchai district, most people in rural areas wear silk not only for special occasions, but for day-to-daywear. Therefore, the main product of subsistence manufacturing is a two-metre piece of Matmi fabric which is used for making a sarong. Because of high competition within the traditional fabric market since the launching of the OTOP policy, the group has been urged to diversify its products. These include developing new patterns of fabric and producing new products such as clothes, scarves, handbags, etc. Old or defective goods are reused to make new products, e.g. handbags, scarves, etc., to reduce production costs. Hence, these various types of product have broadened the market from niche rural market to urban and tourist market.

The structure and key players of the market in Baan Fhake and Non Samran SMCE group are presented in the form of a subsector map shown in Figure 5.8. As there are no product brands, most commodities are collected and sold in the name of the group. 70 percent of individual producers sold the goods both individually and as a group. 90 percent of customers are a mix of retailers and middlemen. As there is no brand attached to the commodities, however, the middlemen are the main customers who buy and then resell them using their own brand. As a result of the growing reputation from the regional silk contest, the group is now being acknowledged by the market. It is easy to sell products at a good price which makes a profit of at least 10 times the production cost. Traditionally festivals after the harvest season and in the dry season are the best sales periods. All commodities are sold to the domestic market via the group's showroom, trading fares, and their family connections outside the villages. The results from group discussions in October 2005 revealed that there is no market problem for group business at present. All fabric was sold and there is a high market demand for group products.

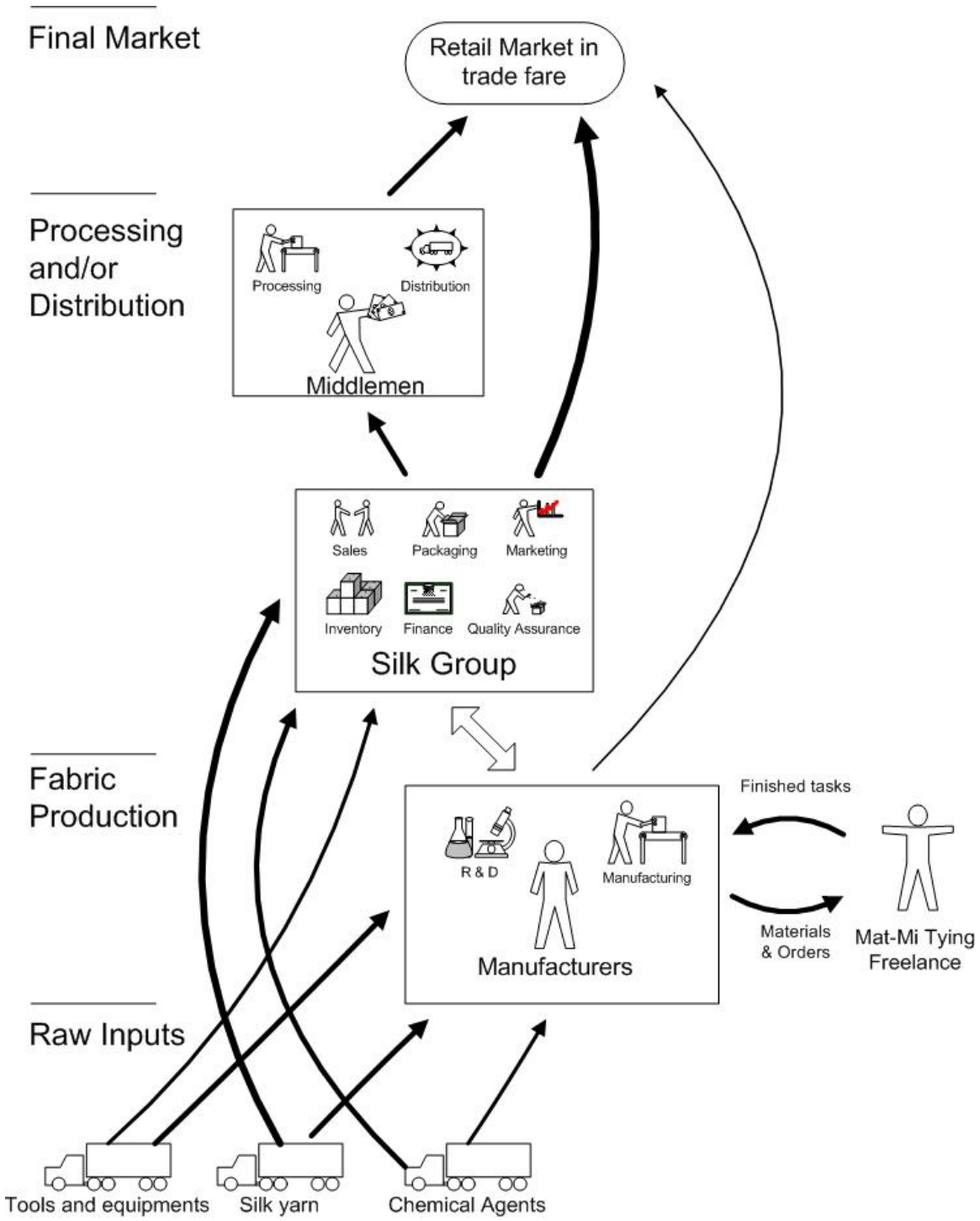

Figure 5.8: Subsector map of silk production in Sida

(Source: Survey data, 2004)

5.4.2 Key policies affecting traditional silk production in Baan Fhake and Non Samran

Due to its classification as a supplementary source of income, there was no apparent policy to promote silk cottage production except sericulture promotion. For over four decades, the craft promotion programme under the patronage of Her Royal Highness the Queen of Thailand, has promoted the development of silk production skills and market silk products via the regional contest and royal arts and crafts retail shops. In order to boost the domestic economy, however, the present government has implemented several policies which have affected the silk cottage industry. Similar to other policy formulations in Thailand, most policies related to the silk cottage industry are developed in a top-down pattern by government offices and academia. Lack of information regarding silk production in the cottage industry has had both direct and indirect effects on local silk business. The key impacting policies on a micro level are briefly presented in 4.2.1 to 4.2.4, whist the other policies have had an effect on a macro level.

a. One Tambon One Product (OTOP) Policy

This policy has been implemented as one of the poverty alleviation and grass roots economic promotion policies since 2002 by the present Thai government. Aiming to upgrade local distinctive products or handicrafts to earn more supplementary income, OTOP has enabled every tambon to identify their potential products for which they have a comparative advantage. Then, the producers were trained in how to manage group operation and improve their products to respond market demand by government offices. To present product quality and access benefits from the government, products need to obtain two standards set up by the government. Firstly, the Community Product Standard (CPS), which is the basic standard of local product produced by the community in the OTOP scheme. The second one is the OTOP star which grades product quality into 1-5 stars. The owner of the product that gets a OTOP 3 to 5 stars will be given the opportunity to be trained in product development, applying for financial support from SMEs Bank or Village funding, and selling in the OTOP or other government trading fares without any charges or at a discounted rate.

As a result, an emerging number of local products produced nationwide resulted in fierce competition. From the interview, all producers agreed that this policy caused a drop in fabric price and the sale amount. However, it has not had a significant effect on the group's business. Due to the group's strong operation and its marketing position and quality of product, the weavers do not have many problems like other new silk weave groups with regard to deficiency of cash flow or lack of market.

b. Village Funding Policy

To enhance the opportunity for the poor to generate their supplementary income, small low interest loans, from 4 to 12 percent per annum (Manager-Online 2006), are allocated to villagers whose creditability has been approved by the Village Funding committee. This has allowed many people who do not weave silk for trading to start to make silk fabric for sale in the OTOP scheme, which has driven the biggest boom of silk production at the grass roots level. The interview and group discussion indicated the consequence of the silk boom has resulted in numerous competitors and led to a decline in sales.

c. Isan Silk Cluster Strategy

Regarding the impact of the free trade on the future of the silk market, the Department of Agricultural Extension launched *"Isan Silk Cluster Strategy"* in order to improve and increase traditional silk thread production in the northeastern region. Sericulture farmers in 19 provinces are currently being encouraged to improve their silk rearing skills and bleaching thread techniques to add value to their products. Moreover, farmer networks have been set up at district and provincial level to strengthen their negotiating power. Some selected farmers' groups would be trained to weave fabric and make various silk products. Nevertheless, some silk producers showed concerns about the standard of silk thread which is not compatible with their production machines or equipment like the thread from the factory. Increasing silk yarn productivity could not have an effect on market price unless quality is also improved as the producers would like.

d. Community Based Enterprise Promotion Strategy

The Community Enterprise Act was enacted in 2005. This has allowed informal enterprises, set up by a group of people in the community with the aim of earning income and enhancing their self-reliance capability, to be promoted and to be registered with the government office. This gives it recognition and protection rights by the law. Furthermore, various support schemes from the government, for example, management and production training, marketing, networking, etc., would be likely to lead to this enterprise becoming a healthy business in the future.

Nevertheless, interviews with the producers concluded that this strategy overlaps with other previous government promotion activities. None of the groups had yet registered with the government offices because of lack of information and new incentives

e. Nakhon Ratchasima Silk Strategy Plan

To be a leader in the silk industry in Thailand and support the Asian fashion hub policy of the previous government, Nakhon Ratchasima province has targeted silk as one of the provincial development strategies since 2003. However, recent plans are focusing on the promotion of the silk industry in the province by increasing numbers of new silk entrepreneurs and sales. Without any plans to solve the marketing problem, most interviewees indicated that they did not gain any benefit from the provincial silk plan.

f. Local Environmental Management and Pollution control

Although there are many regulations and laws about environmental management and pollution control for the industry and community, enforcement is not taken seriously at present. Due to decentralization in recent years, all responsibility for environmental and pollution control has been transferred from the government environmental office to TAO. Lack of awareness, knowledge, manpower and budget as well as the fear of losing supporters in local politics tends to make local authorities wary of monitoring and investing in waste management and treatment systems. Moreover, the procedure needs cooperation from the police in the district to be enforced. The enforcement, hence, has not been effective.

g. Free Trade Silk Thread and Product Policy

According to the ASEAN Free Trade Area (AFTA) Agreement, raw silk and other silk product tariffs among south-east Asian countries will be abolished in 2007. According to the interviews held, illegal raw silk from Vietnam has become very popular among producers who have been looking for thread made from factories at a cheaper price than those from Thai factories since 2001. Insufficient Thai factory raw silk and high demand of silk fabric caused a huge growth in silk thread smuggling along Thailand's border in the north-east and neighboring countries. This led to an uncontrollable fluctuation in the price of smuggled silk. The AFTA Agreement should solve the problem of insufficient raw silk and stabilize prices. However, the loss of identity of Thai silk products and the increased use of chemical substances in the production process are still major concerns. Due to the lack of new styles or innovation in Thai silk products, cheap and diverse silk products from other ASEAN countries could potentially dominate the domestic market.

5.5 Livelihood strategies

Since the late 1970s, some villagers have started to migrate to find work in the cities. Many villagers have gone to other countries to work in the construction sectors and service industry. After working for many years, many return back to settle down and work in the villages. In the meantime, the majority of villagers who remain in the village have made a living in the traditional way of life, agriculture, and relied on a remittance from their children who work in the cities.

5.5.1 Master weavers

Since their retirement from rice planting, most master weavers have turned to silk production as their income generator. Most weavers plant mulberry and rear silk worms themselves to secure their silk yarn stock throughout the year. Some master weavers apply their efforts to weaving only masterpieces to obtain an award in the provincial and regional contests which bring both increased reputation and cash rewards. Nevertheless, some master weavers who have muscle and joint problems need to stop doing some processes and do other tasks that do not require much force.

Family members or other young weavers are an important source of labour support particularly in some more physical tasks such as tying fabric pattern and weaving.

Some concerns in terms of food insecurity were mentioned by the older people. The interviewees suggested that they may need to hire other villagers for rice growing especially when transplanting young rice and harvesting. Because of inadequate social welfare from the government, all older weavers need to save money for their living costs. Only a few people get some supplementary income from their children's remittance, and some interviewees even believed their children would come back to take care of them when they got ill or take them to live with them when they could not subsist by themselves.

5.5.2 Apprentice weavers

If young women, who are the daughters and daughters-in-law of villagers, lose their jobs in the factories and cities from pregnancy or illness, they usually become apprentice weavers in the group. They are trained how to make silk fabric by their families. Furthermore, they have been encouraged by a weaving group to attend training courses held by the extension offices, such as new dyeing techniques, making new products and tailoring. However, many apprentices in villages have moved out to work in the factories due to inadequate regular income from the silk business and the promotion of industrial investment by the provincial authority. The loss of young weavers has affected the group's processing of good productivity. At present, the group has been forced to hire external dressmakers to make dresses and shirts to maintain the group's various types of product.

5.5.3 Family member

All the males in the family take responsibility for rice planting and cattle feeding, whereas females are in charge of all activities in the household. Children are required to help family's work in their free time after school. However, once they reach teenager years, they tend to prefer further studies or working in the factories or cities to farming. This is problematic since all members are needed to gather to work in some labour intensive activities such as transplanting young rice and harvesting for securing food for the family. For the poor, all family workforces need to temporarily

migrate to find a job in other areas in the dry season to earn some living costs and capital before returning home to work on their farms in the rainy season.

5.6 Livelihood outcomes

The desired outcomes of weavers gathered from focus group discussions can be summarised into two categorises: individual and community level.

5.6.1 Individual

- Earning sufficient and regular income to support family's living cost, children's education and debt paying as well as emergency costs.
- Having a good quality of life and assured self-reliance in terms of food production (not only rice)
- Children reunited with parents in order to take care of each other

5.6.2 Community

- Maintaining good relationships with their neighbours and community
- People's attitude should give more priority to moral and ethical issues rather than obsession with money
- Accessing land line telephone service and having good community development

5.6.3 Sustainability

In order to achieve these livelihood outcomes, the focus group discussion was held in November 2005 in order to feed back all the surveyed results from 2004 to the representatives of the group. These weavers were urged to consider the sustainability of their livelihoods and develop strategies to achieve their livelihood outcomes. These sustainability plans were sent to the related local organisations to consider and give suggestions for improvement before making proposals for further support from these organisations in the future. The details of these plans can be summarised as follows:

a. Economic sustainability

As a consequence of the group's business development and the collapse of rice productivity in recent years, silk weaving has played a vital role in supporting villages' economy. Agriculture is still a main source of income generation and food security in the villages. This puts weavers under less pressure to earn income and have high productivity.

Moreover, the group's operation has brought many benefits which enable weavers to reduce production costs, sell their products easily and enhance their financial stability. Nevertheless, high competition in the traditional fabric market and high demand of traditional silk thread inevitably affect the weavers' businesses. It is necessary to make production more efficient to reduce production costs and improve product quality. A marketing strategy, which is the weakest point of all OTOP SMCEs, is also needed to identify the client and develop appropriate plans to achieve the target.

i. Production promotion plan

• *Increasing mulberry productivity in the collapsed mulberry plot* – In order to increase the productivity of traditional silk thread and reduce group members' raw material costs, some technical support in mulberry plantation and soil quality improvement were proposed to the district agricultural promotion office. This plan was approved by a district agricultural officer in November 2005. The district agricultural officer has agreed to provide the leguminous plant seed that can be used for improving soil quality and to ask for further support from the provincial land development office.

• *Training in good practice of bleaching and dyeing processes for high quality dyed silk thread* – Although the group had been trained in good practice of bleaching and dyeing, this knowledge could not be applied because of the low quality, cheaper chemical dyes the group used. Moreover, the weavers had to undertake a number of trials themselves because of lack of instructions of appropriate quantities of chemical dye use on the package label. This led to the problem of colour fading, and inconsistency of dyed yarn in different batches of production. Using several kinds of chemical substances without appropriate self-protection also inevitably affected the weaver's health, particularly in the respiratory system and skin disorders.

The group has developed two plans to improve their product quality. In the short term, it is essential to learn techniques of using these low cost chemical dyes more efficiently and safely. Meanwhile the group is interested in using high quality dye, but it is still difficult to invest a lot of money to stock various colours of these expensive dyes. An initial funding and management system should have been developed to support the improvement of fabric quality and weavers' health in the long term.

Nevertheless, the district agricultural office accepted the short-term plan proposal and offered to arrange a training course by the chemical dyeing company which was due to be held in the village by May 2006.

ii. Market promotion plan

• *"Sam Mueng Silk" brand* –Despite being recognised in terms of product quality by the market, their brand name has never been attached to the product itself. Some interviewees stated that many weavers and middlemen from outside bought their product and sold it in their name. Some fabric was entered for contests and won awards. To present the group's identity and earn more recognition from extending the market, the key group members agreed to attach *"Sam Mueng Silk"* to their product and packaging. As it is derived from the name of the subdistrict, it is believed that this will provide an opportunity to get more support from Sam Mueng TAO. The group was planning to set up an opening event to promote its new brand name and product positioning via the exhibition of new masterpiece, new products and a silk production demonstration. The feedback about this plan from the TAO which is the main supporter is quite positive. However, the group needed to wait until the TAO allocated their supporting budget in April 2006.

• *Product quality* – Key members agreed that the group should target the production of genuine good quality products made from traditional silk thread. At the same time, several masterpieces and new patterns need to be produced to supply the upper end of the market and to apply for contests. Because it sells at a higher price than other weavers' groups, samples and information about how to identify good quality products are required to present to customers every time the group sells its products at the trade fares. These samples would help the new customers to remember and buy a product from the shop easily.

• *Proposing to be a Community Learning Centre (CLC) and OTOP tourism village* – Since the group was unofficially selected to be an informal learning site, a number of groups and tourists have visited the group to learn about full cycle silk production, from mulberry plantation to weaving and processing fabric. This improves the group's reputation and marketing as well as increasing sales of the group to some extent. The proposal to become an official Community Learning Centre and OTOP village should not only attract some financial support for improving community infrastructure and waste management as well as the group's management, but also substantially improve the group's market plan.

• *Network with other sericulture farmers* – Inadequate silk yarn productivity made weavers source yarn from outside the villages. Sometime the weavers had to travel to adjacent districts or provinces to collect enough silk thread for their production capacity. Setting up a network with other sericulture farmers could help them to save time and money to gather sufficient amounts of silk yarn.

b. Social sustainability

Even though the survey shows that social relationships in the villages are in good condition as a kinship society, the continuing emigration of the young generation has made the villages develop into an elder society. From the survey and observation, it was evident that most weavers are in the middle age range at least. Due to lack of capacity to produce food, food insecurity in the future was more concerned by the villagers. Lack of healthy business or value adding activities causes unemployment in the community which makes it difficult for weavers to persuade their young children to work in the villages. At present income from silk weaving provides a major contribution not only for living costs but also for hiring people to produce food for them. All producers agreed that if their silk business continued to be in good condition as it is at present, it would help them to enhance their capacity to support each other and develop the community.

c. Environmental sustainability

Lack of quality water supply in the dry season has been a great cause of concern for all villagers in recent years. In 2005 the villagers decided to sink a borehole outside villages to supply adequate water for rice paddies and to maintain the water level in

the pond. However, groundwater in this area is too saline to use in daily life. Water in the village pond and rain water is still a key source of water supply. To secure water for use in production, key weavers indicated that it is essential to solve the problem of low quality water in the pond. Several methods were implemented by the villagers but none seemed to solve the problem. Nevertheless, the villagers' observation found that water hyacinth planted for remedying water was dying even in November, a period when the pond has plenty of water. It has been proposed to TAO to conduct a water quality analysis to investigate the problem. Even though TAO has planned to invest more money in purchasing chemical agents to treat the water, they also accepted the proposal to ask for technical support in water analysis from the regional environmental office. Meanwhile weavers showed no interest in harvesting more rain water to save water, though they had known about the estimated water required for a whole year's production.

In terms of waste water, despite being informed of the health impact survey results and waste water characteristic analysis, key members stated they did not know how to manage waste water and solid waste. They expected the CLC project would help them to build a central stove and storage tank to collect waste water. In terms of solid waste, landfill may be a solution to chemically contaminated solid waste management instead of burning it in a stove. They also agreed that training in health and safety could enhance awareness and motivate weavers to change risk behaviour. However, it has not been possible to identify any provincial agencies that could support this training.

d. Institutional sustainability

It seems impossible that the group can run this supplementary business without receiving any support from government as it has been initiated and supported by several government agencies for a decade. On the other hand, these support schemes and projects were mostly offered by the state offices. Good relationships with government offices are very important for the growth of the group's business. Although other government offices in the district have agreed with the previously mentioned plans, all supporting budget is now transferred to the TAO for local development in accordance with decentralisation. It seems that the group needs to develop their relationship with the new set of TAO executives to gain more support.

The short and long term plans should be developed and proposed to TAO officially. Furthermore, the growing reputation of the group at district and provincial level could encourage the TAO to give more collaboration.

5.7 Conclusion

Although the silk cottage industry of Baan Fhake and Non Samran silk weaver group has gradually developed over a decade, silk production has become a major source of cash generation for the majority of villagers. Due to the supplementary nature of the occupation and seasonal production, the productivity of silk yarns and fabrics is low which has a lower impact on household financial status and the group's marketing performance. Producing high quality traditional fabric, developing new fabric patterns and constantly participating in silk contests have enhanced the group's market opportunity and recognition by the government extension offices. This has led to a healthy group development and high capability of the group to access support from the district and provincial authorities. Consequently, silk livelihood in villages has grown steadily and made a contribution to the local economy and community development. At present the drawbacks from silk production are not indicated by the villagers, though the result of effluent analysis is considerably higher than the national standard.

Due to the trend towards an ageing society and lack of young labour in villages, farming, the main livelihood of villages, is inevitably affected. Silk livelihood strategy has been developed to maintain and enhance the growth of the group's silk business. It has been found that the strategy for economic sustainability was prioritised to enhance the security of money and food, particularly in older weavers. These include production improvement and market promotion plans. Although silk weavers have developed some economic, environmental and institutional sustainability plans, social issues such as the shortage of young worker and the growth of ageing society in villages which are beyond the group's capability to achieve, are needed to gain collaboration and support from local and central authorities. These topics will be discussed in more detail in Chapter 6.

Chapter 6
Discussion of Results

In this Chapter, the survey findings presented in the previous two chapters are discussed to gain more insight into the causes and effects of the significant findings in terms of silk producers' livelihood in the informal economy. The similarities and differences between informal silk MSEs in Pak Thongchai and SMCE in Sida are examined to understand the effect that different production conditions may have on the livelihood assets of the villages. In order to better understand both types of Thai silk cottage micro business, a comparison of opportunities and constraints relating to business, production and support policies between MSEs and SMCEs is presented.

6.1 The effect of silk production on the SL assets changes

The impact of silk craft production on the villagers' livelihood assets from MSEs and SMCE production have been investigated and analysed by using the time line technique. This technique locates related events relative to the silk livelihood of the village in chronological timeframe. One result from a preliminary survey and focus groups reveals there have been three periods of silk livelihoods in both production sites with different production characteristics. Table 6.1 shows the development of the silk business in each production mode during the previous two decades. It is obvious that the growth of silk industrialisation and silk business in Pak Thongchai has substantially driven the growth of silk manufacturing in villages into market-led production, whilst the development of silk SMCE is mainly driven by government policies.

Table 6.1: Period of Silk Livelihoods in MSEs and SMCE production

Year	MSEs	SMCE
1985-1993	Subcontracting production	Self-consumption production
1994-2003	Business establishment	Villages' SMCE establishment
2004-2006	Current period of production	

As illustrated by the pentagon assets diagram of the SL framework (2001), the perimeter of the pentagon represents maximum access to capitals or assets, whilst the centre point denotes zero access to assets. There is, however, no common scale for measuring the level of access due to its valuable interpretation, as agreed by the study of the development of sustainable agricultural livelihoods in Afghanistan by Pound (2004). A method of scoring livelihood assets was employed in order to assess the overall situation of villages in the pilot project. The survey data were categorised into positive and negative aspects. Then, the result was discussed and weighed into a score for each asset.

The qualitative element was mainly adopted to summarise the score, though the process was based on the quantitative method. The details of the shifting SL assets in MSEs and SMCE in the three main periods of silk cottage business development which are summarised from the survey result in Chapter 4 and 5 are presented in Table 6.2 and 6.3. The trend of shifting of producers' livelihood assets affected by the development of the silk business over the last two decades is presented by the pentagon diagram in Figure 6.1 and 6.2.

Table 6.2: Situation on SL assets in MSEs in the past two decades

Asset	Situation		
	1985-1994	**1995-2003**	**2004-2006**
Human	Production skill	Production, business management skill	Production, business management skill, health impact from silk production and business
Social	Kinship and mutual relationship	Kinship, business competitiveness, money donation	Kinship, shortage of coordination , less money donation
Physical	Basic tools, basic rural houses	Advanced machines and dyehouses, refurbished houses, new cars and motorcycles, luxury appliances, jewellery	Advanced machines, houses, basic appliances, motorcycles, second hand cars
Financial	Savings, debt from farming	Savings, cash flow, debt	Very little or no savings, little cash, debt
Natural	Abundance of land, water and public forests, occasional drought and pollution from upstream factories,	Plenty of water, limited land and public forest, drought, pollution from silk production in villages or upstream production site and sewage overflow	Limited access to land and public water, no public forest, pollution from sewage, odour, drought, less groundwater, solid waste

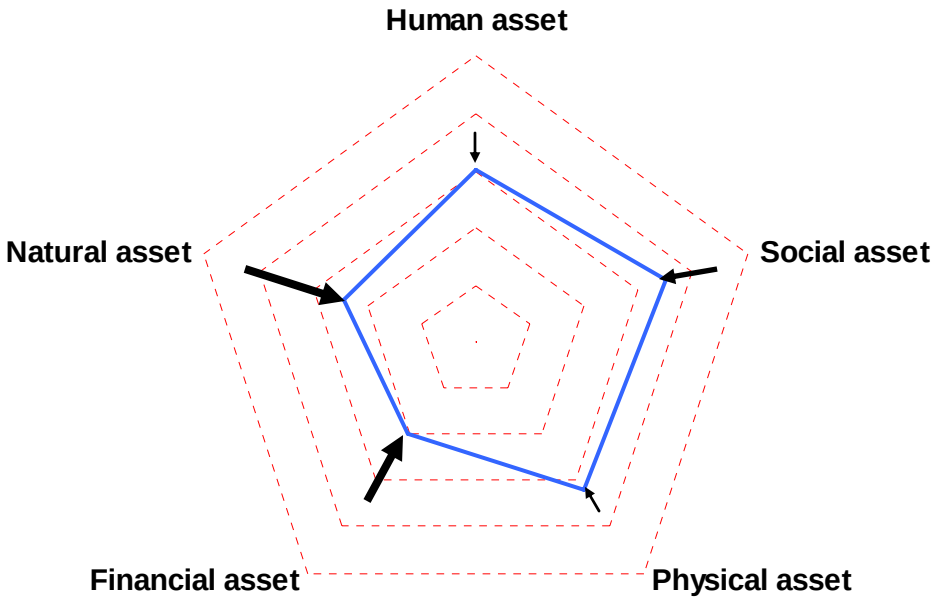

Figure 6.1: Pentagon diagram of the changing of silk MSEs' livelihood assets

(Source: Survey data, 2005)

From Figure 6.1, it is apparent that all assets in MSEs production have been negatively affected. Natural assets were the worst affected, resulting from the deterioration of resource and pollution. The fluctuation of financial asset highlights how vulnerable micro enterprises in the informal sector in the free market are. The emergence of competition in the silk business in villages has had a larger effect on social assets than human assets. As indicated in Section 4.3.3, although physical assets were more improved in the period where agriculture dominated the village's livelihoods, they have been decreased recently due to the shortage of cash flow.

However, it seems that the continuing of silk manufacturing in several silk MSEs under these circumstances probably aims for maintaining their social assets. This is because silk MSEs have earned a large amount of income and increased the social status as a business owner, not waged labour, which can employ workers and contribute some support to the community activities.

Table 6.3: Situation regarding SL assets in SMCE in the past two decades

Asset	Situation		
	1985-1994	**1995-2003**	**2004-2006**
Human	Production skills	Production development and business management skills	Production development, business management, and group management skills
Social	Kinship relationships	Kinship relationships, more monetary donation	Kinship relationships, more group coordination , more monetary donation
Physical	Basic tools, basic rural houses	Basic tools, basic rural houses, basic appliances, more infrastructure, bicycles	Advanced machines, more refurbished houses and household appliances, bicycles, motorcycles, cars
Financial	Petty cash, less savings, debt from farming	Less savings, petty cash, debt from farming and family expenditure	More savings and cash, less or no debt from silk production
Natural	Abundance of land, water and public forests	Plenty of water and public forests, limited land, occasional drought	Limited land, plenty of public forest, public water deterioration, continuing drought, solid waste

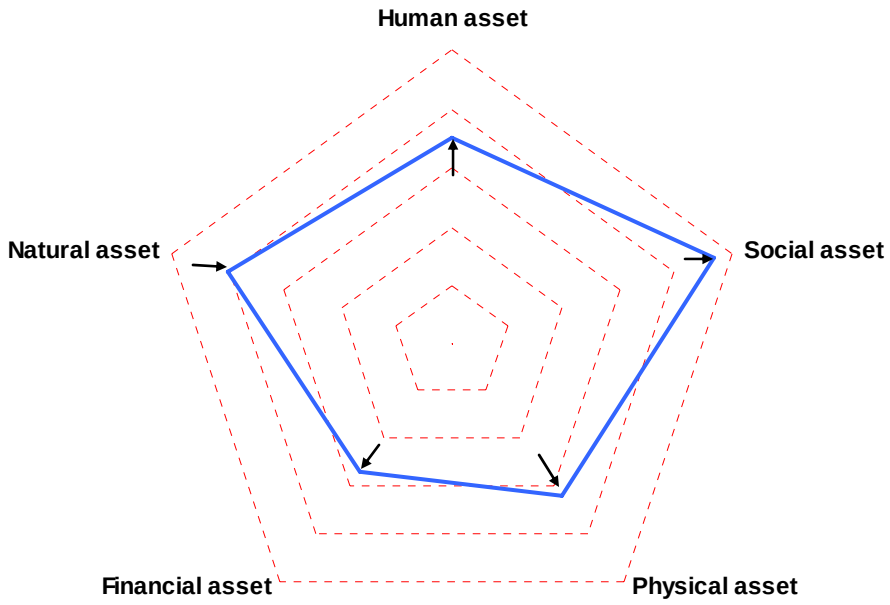

Figure 6.2: Pentagon diagram of the changing of silk SMCE's livelihood assets

(Source: Survey data, 2005)

In contrast to MSE's, most SMCE's assets, as shown in Figure 6.2, have been largely stable. Only natural assets seem to have experienced negative effects due to the community water resource development scheme and drought in recent years.

In order to find out the appropriate method to sustain silk cottage livelihood, further insight is needed into the nature of the change in each asset, particularly for the negative aspects. Key adverse impacts on each of the assets in two production sites are summarised in Table 6.4. Apparently, MSEs have tackled more complex problems than SMCE, especially in terms of human based problems, e.g. financial management, conflict management, health impact from occupational heath and safety, etc. It may be implied that the self-sufficiency of production of the Baan Fhake and Non Samran SMCE may help to constantly maintain the livelihood assets which could increase the sustainability of silk cottage livelihood. Nevertheless, the negative effects on each asset will be examined in the section below.

Table 6.4: Key negative impacts on livelihoods assets

Production	Assets	Key negative impacts
MSEs	Human	Health effects and accidental risks from chemical and pollutant exposure and mismanagement of chemical housekeeping Emigration of young labour to work in the cities and factories
	Social	Conflict regarding impact of pollution , water consumption and civil obedience to local regulation with regard to a weakness of law enforcement
	Financial	Increase of debt and loss of liquid assets
	Natural	Deterioration of water resource quality, complete depletion of woodland in the community and dispersed untreated pollutants from chemical waste in villages and nearby communities
SMCE		Lack of sanitary water in the dry season and untreated wastewater emission around household areas

6.1.1 Human capital

a. Occupational Heath and Safety (OHS)

Since the 1980s the increase in market demand for chemical dyed fabric has seen MSEs and SMCE switch to using chemicals in silk production instead of natural dye and bleaching materials. Despite working with intensive chemicals, it seemed that the health effects from chemical agents, used in bleaching and dyeing processes, on producers and workers is likely to show some significant data about their working behaviours. Due to piece rate or day rate payment, most workers have to work as much as they can to obtain higher income. Lack of awareness of chemical hazards and the nature of the work increase the risk that these manufacturers and freelancers

working in all process lines would have more detrimental health effects, such as musculoskeletal disorders and psychological stress. Repetitive strain injury in the upper and lower back and legs as well as sleep disturbance and anxiety in textile workers was also found in the work-related illness study of Soonthorndhada (1989), Chavalitsakulchai and Shahnavaz (1993); and WHO (1999).

Exposure to dust from silk thread was claimed to be a main cause of respiratory conditions. This seems to relate to chronic obstructive pulmonary disease and asthma that are common diseases in textile workers (Chaloenloet 1999; Lashuay *et al.* 2002; Rahman *et al.* 2001). Furthermore, the symptoms of skin disorders and eye irritation in every process, especially among workers not directly exposed to bleaching and dyeing chemical agents, are quite similar to the contact dermatitis symptoms caused by the solvent, bleach and dyes exposure in textile production (Gawkrodger 2001; Soni and Sheretz 1996). This probably links to the exposure to excess chemical substances left in the dyed thread. It also indicates a lack of development of good practices in bleaching and dyeing processes and poor labour management in MSEs.

Similarly, SMCE production has caused some negative effects on human assets, though the degree of chemical exploitation is not as intensive as that observed in Pak Thongchai. Health impacts from silk production, especially when exposed to chemical substances, have been widely reported. This is related to the study of Phusawang (2001) which observed low price chemical agents used in bleaching and dyeing processes also caused negative health impacts on weavers working in traditional cotton cloth production in the north of Thailand. Meanwhile, a survey of health problems in female weavers in silk production in Nishijin, Japan, found that most weavers had backache, numb and swollen legs, arthritis, eye-fatigue, nearsightedness, nettle rash, stiff shoulders, headaches, sleeplessness, fatigue in the morning and high risk of miscarriage and rheumatism. These symptoms are connected to weaving and the working environment (Kyoto Women's Problem Research Committee, 1969 cited in Hareven 2002).

It was observed during the CP audit, that lack of good housekeeping, improper hazardous waste treatment and poor chemical hazard knowledge may increase the already high risk to manufacturers, their labour forces and communities in both sites if an accident occurs.

b. Skill development

The promotion of skill development by the government seems to increase confusion regarding producer identity. Since they work in the craft production style, most manufacturers and workers are treated as subcontracted *"textile workers"* not *"craftspeople"* as in previous times. Due to the loss of product identity and limited product development, sluggish production skill development seems to be impinging on the revival of MSEs. This was noted by Richards (1999) who observed that the producers were reduced to being cheap labour when middlemen had taken control of marketing and distribution as well as a large share of profits.

The promotion of some costly and complex technologies and production techniques derived from industrial production models, such as using computer programmes to increase producers' skills in tying and designing new patterns, make MSEs focus more on producing industrial products and thus more vulnerable to failures in the mainstream market. With the market recession, most MSEs have shown no interest in this issue. The head of Baan Doo silk weaving group has perceived the value of traditional craft products, though it is vital to produce new household products and furnishings in response to market requirements.

Meanwhile, as a result of SMCE's collective reputation for high quality products, award winning and strong group operation, the group's business has become more successful and has been chosen as one of the silk learning centres in recent years. This helps group members to become aware of learning about new issues that benefit their businesses and production skills, as well as to improve self-esteem to deal with local silk promotion authorities, other silk networks and interested people.

c. Knowledge transfer and young labour recruitment

Over the decades, the continuous emigration of young labour has caused great concern about the collapse of villages. There are two main reasons for this. First, the growing uncertainty of agricultural markets tends to push rural dwellers outside of their traditional production domain. Second, the education system has an effect on young rural people by preparing them for the service and industrial sectors. Parents also tend to encourage their children to pursue their education in order to obtain more secure jobs and higher income in the modern sectors (Coxhead and Plangpraphan

1998; Phongpaichit 1998). Since the young perceive jobs in the factories and services as a regular paid job with better working conditions and attach greater value to the modern lifestyle, they have started to migrate out from the villages. This has occurred in many rural villages in Northern Thailand and Central Vietnam located near the industrial area (Rigg and Nattapoolwat 2001; Thanh *et al. 2005*). The growth of labour demand associated with the promotion of industry at regional level has attracted young people and retained older labour forces, up to 35 years, to work in factories.

On the other hand, the loss of young labourers has also brought some financial benefits to their families. Such remittance makes a substantial contribution to support the financial status of many families. Furthermore, employment in the modern sector has enabled some people to make savings for the time when they are made redundant from these jobs. After the downfall of international migrant labour and the economic crisis in the 1990s, many labourers have moved back to live and invest their savings to make a living in villages (Cohen 2000; Jones and Kittisuksathit 2003). Some of these have been involved in the silk cottage industry in MSEs and to a lesser extent in the SMCE.

With regards to the younger generation, the new curriculum of compulsory education in the past two decades does not include the teaching of knowledge of local livelihoods. In the absence of business development services that could develop local businesses to accommodate their skills, youngsters are forced to seek opportunities elsewhere. Paradoxically, this is likely to become an essential factor that undermines the transferring of silk production knowledge in Pak Thongchai in the future. The consequence of the uncertainty about the future of the local craft industry and the migration of young labourers is also found in developed countries. Hareven (2002) noted that the decline of silk business resulting from the economic recession, has led the Japanese silk traditional industry to face a shortage of skilled young artisans and the loss of this precious national know-how heritage.

In contrast, the efforts of the village primary school and SMCE in Sida have successfully fostered silk knowledge transference to the students, though this may not be continued in their secondary education. Part of the reason for successfully retaining these skills may be the low cost of materials and tools for conducting their special

local curriculum: silk weaving. The silk yarn can be produced in the villages and the basic wooden apparatus can be borrowed or bought to demonstrate in the class. Moreover, almost every household in these villages has these tools, so it is easy for the students to practise silk skills at home.

As discussed in Section 4.3.1 and 5.3.1, the shortage of young workers participating in either MSEs or SMCE has considerably limited silk business development. Due to its proximity, some young labourers in Pak Thongchai, especially in Baan Han and Han Tai villages, live in the villages and work in the factories in the nearby district or in the provincial city. This arrangement gives them the flexibility to switch in and out of the silk business in response to market demands and other opportunities. Due to the division of labour and subcontracting system employed in silk MSEs, youngsters with less production skills have more chance of being hired in the business. In contrast, the young in Sida have to migrate to live and work further afield in other districts or other provinces. Such migration has affected SMCE's business considerably. Since the majority of weavers, in the SMCEs system, are housewives and retired people over 45 years old, these social groups tend to be occupied with other chores and are less inclined to engage in distribution and marketing activities which require them to travel outside the villages. The loss of business opportunities in these activities limits their ability to develop new value added products. Hence, this partly explains the reason why the younger members (in their 40s) take on responsibility for marketing, product distribution and product development.

6.1.2 Social capital

As mentioned in Section 4.3.2, there are conflicts in both intra-community and inter-organisation levels of MSEs', demonstrating that neither producers, nor whole communities, maintain good relationships as in previous times. There have been several attempts to promote cooperation among producers in terms of establishing producers' groups and co-operatives, but most of these initiatives have failed to deliver satisfactory results. From interviews with producers, it appears that the promotion of the group approach to management originates from state, top-down policies which offer free support. However, most producers preferred an entrepreneurial approach and were thus unwilling to adopt a group system of management.

Due to the fierce competition of the silk business at district level, most producers claimed that the performance of group businesses which were based on the state offices'guidelines was sluggish and had a negative effect on the businesses' growth potential. The main activities contributing to MSEs competitiveness, which consist of sourcing and purchasing materials at a reduced rate, group quality control, and allocation of tasks when large orders are received, have proved difficult to set up. The reasons for these failures included insufficient financial capital, production planning and member coordination. Without tangible benefits in sight, group members were reluctant or refused to cooperate in group activities any longer. As a consequence, competition amongst these village MSEs is still as intense as in the past.

Pollutant-related illnesses and disturbances from the discharge of untreated effluent into public drainage have brought about social disruption in the community. Several complaints had been registered to village heads and TAO, but appropriate solutions have not been identified. These will be discussed further in Section 6.3.5. From the other residents' perspective, the failed attempt of the producers to deal with pollution and health problems are often overlooked due to the kinship culture which does not invite conflicts and disputes. With the increase in the social value of obtaining money and higher education, other village institutions, that used to be used for making decisions regarding ethics and seniority, have slowly vanished. As a result, there is no significant incentive for the development and implementation of solutions.

Therefore, enforcement by local authorities becomes the last hope to resolve these problems. But the fear of losing public votes and financial support from silk MSEs has hampered TAOs' attempts to undertake any law enforcement. The frustration which has emerged from losing social institutions and local authority to deal with these problems has diminished rural villages' mutual relationship and traditional value judgment including the ethics of villagers. The interview with Mueang Pak TAO's administration chairman in the second fieldwork stated that:

> *"Since silk production have played an important role in local employment and economy, it is difficult to ban any enterprises that discharged untreated effluent into public drainage from production. These entrepreneurs are key financial contributors in community development activities and have influence over their workers. Moreover, they also were my main political supporters in the previous local election. As only a few villagers complained about the impact of effluent, therefore, it is necessary for me to keep good relationship with them. However, if any group of villagers made a complaint about the waste water, TAO will consider and take an action to solve this problem"*

In contrast, there has been no conflict in terms of market competition and pollution in the SMCE case in Sida due to its small scale of production and the sole dependence on SMCE distribution channels. The SMCE operation has brought multiple benefits to both households and the community. In order to increase supplementary income for the weavers, most are eager to help each other to improve their production. Certain allocations from the annual benefits of SMCE are often given to community development activities every year.

In terms of inter-organisation relationships, the informal status of MSEs has decreased their chances of being recognised by state authorities. Although the implementation of OTOP and related benefits has strengthened the relationship between local government offices and producers, this relationship is mostly superficial and cosmetic. Lack of baseline data of MSEs and misunderstanding of their business objectives have resulted in incompatible silk promotion plans in the annual silk strategy plan and OTOP plan of the province which mainly supports silk production at SMEs and SMCEs levels. Clearly, MSEs have mostly been excluded from any appropriate support for improving their businesses. In order to access government support, several silk MSEs had to register with Nakhon Ratchasima Silk Association, the sole SMEs' representative firm in the province. This absence of a representative body has hidden MSEs' existence and prompted government slackness in promoting silk MSEs.

Being recognised for its outstanding intra-community relationships, Baan Fhake and Non Samran SMCE has attracted cooperation with several external organisations, e.g. silk weavers and silk related networks from other villages and community development promoting agencies in the Sida district. Since having been selected as a silk learning centre, the relationship with other SMCEs and networks has allowed the development of barter trade in other consumer goods, i.e. blanket, clothes, kitchenware, stoves and even refrigerators.

Therefore, the promotion of this new form of transaction, particularly food products and health care, physical work and knowledge transfer services, with nearby communities could be an alternative way to provide the security of villagers' well-being for the impending ageing community. The study of local exchange system development for community self-reliance in 45 Thai communities in three different exchange methods by Phanthasen *et al.* (2004) showed that Local Exchange Trading Systems (LETS) have contributed to the boosting of financial and physical assets and the restoring of healthy human and social assets in those communities. This could lead to the revival of the local community and enhance the efficiency of decentralisation into community.

6.1.3 Physical capital

The increase in income from silk wholesale distribution between 1995 and 2003 has immensely improved the physical assets of both producers and communities. Improving or building new houses and purchasing motorcycles, cars, luxury household appliances or even the acquisition of more land are commonly found in MSEs' communities. This is confirmed by Jones and Kittisuksathit (2003) who reported that the expansion of new consumerist aspirations into rural villages by economic integration, modern transportation and mass media has increased the material demands of people. This is particularly the case for villages from which members have migrated internationally for work, because of the demonstration[1] and emulation[2] effect in consumption aspirations.

[1] Demonstration effects describe the interdependence of consumption behavior among individuals. The change of one' consumption behavior by others, particularly close associates's behaviour. (Refer to the

Another important factor is the rise in the number of silk visits, which prompted TAOs to improve all basic infrastructures in the community. However, the decline of the silk business in recent years has prompted MSEs to liquidate these physical assets into financial assets to invest in their flagging businesses. The group discussions indicated that:

> *"Nowadays we need to sell unnecessary stuffs, such as stereo, microwave, other luxurious appliances, motorcycles or even cars to increase cash flow for business. Furthermore, using mobile phone to call for a meeting or for chatting for a while has been practised less and been replaced by walking or riding bicycle to other workers' or producers' house in the villages. This face to face communication also helps us to strengthen our relationship with other neighbours"*

The observations of the SMCE show a somewhat more stable picture. Since the Baan Fhake and Non Samran silk weaving group was established over a decade ago, silk production has contributed economic support to the majority of villages. Furthermore, the silk weaving group allocates some of its profits to community development. The increasing income promotes weavers to access and invest in all new basic tools of silk production. The steady group performance and good cooperation of silk SMCE makes it attract to many group development support schemes which awarded them support in various ways, such as SMCE office and workshop building, sewing machines, reeling and looms, etc. Due to its growing reputation for award winning products, Baan Fhake and Non Samran SMCE has nearly always been selected to be the main representative of silk SMCE in Sida. This prompted the local TAO to improve and

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definition by J.S. Duesenberry (1952). Income, Savings and the Theory of Consumer Behavior, Cambridge: The Harvard University Press)

[2] Emulation describes the stimulus that makes people to compare themselves in relation to others and feel a sense of superiority over others in the same class by imitating the class above them in order to gain more status for themselves and give the impression of improved standard of living (Refer to the definition by Thorstein Veblen (1899). The Theory of the Leisure Class, New York: Macmillan)

build up a necessary infrastructure in the community, (with the exception of telephone services, which are outside the responsibility of TAO).

6.1.4 Financial capital

Since silk MSEs started operating in Pak Thongchai, the high net profit margin per batch played a role in enhancing producers' saving capability and promoting the expansion of their businesses. This substantial profit inspired whole communities to concentrate on the silk business instead of making a living from other occupations. In order to gain more profit and improve competitiveness, most MSEs established since 2003 have applied for a personal loan from either formal or informal financial sources to expand their businesses beyond the scale their capital could provide Unfortunately, this optimism was short lived as a severe and continuous shrinking of profit ensued from the booming silk MSEs and OTOP silk SMCEs in 2004. In addition, several fraudulent transactions and an absence of a business plan resulted in MSEs facing more difficulty in maintaining cash flow and eventually falling deeply into debt.

The increase in income from silk businesses in the peak time not only provided adequate income for household expenditure, but the chance to possess luxury products such as mobile phones, stereos and several vehicles. Jones and Kittitsuksathit (2003) indicated that the consumerist aspiration had been spread throughout communities by the "*demonstration effect*". Furthermore, the competitive market for personal loans and home appliance lease-to-buy services from financial institutions accelerated the upsurge in consumption of goods and services at household level. This was confirmed by the survey result of national household income and expenditure between 2002 and 2006. It found that the percentage of household debt per total income surged enormously during this period, rising by up to 12.6 per cent between 2002 and 2004 and 6.4 per cent between 2004 and 2006 (NSO 2006a).

Undoubtedly, this effect has challenged villagers' Buddhist principles, such as the concept of self-sufficiency. The loss of the role of the temple as an education centre of the community since the reformation of current education systems caused an ethical weakness in the villages. Thus, the shortage of related business knowledge and the failure of self-sufficient communities have accelerated the vulnerability of MSEs in the uncertainties of a free market economy.

In order to restore their well-being, some other residents have attempted to revive the culture of self-sufficiency to some extent. For example, by growing vegetables and selling unnecessary assets in an attempt to reduce expenditure while investing more in agricultural assets and increasing additional income.

In Sida SMCE, as the rice cultivation usually accounts for a major source of income for villagers around January to March, silk production has also played a significant role in providing cash for families for day-to-day living costs throughout the year in addition to the occasional income from remittances. The SMCE operation has also reduced the financial burdens on the weavers by providing an annual lending silk yarn scheme and low interest loans for its saving sub-group members. Most household debt was incurred as a result of the market fluctuation in rice prices, the collapse of rice productivity induced by drought and paying for children's education.

From observation, it was found that there has been a high level of self-sufficiency in the villages, largely because of the villages' self reliance in terms of foods. As the villages are located outside the irrigation zone and because of the lack of labourers, agricultural productivity was quite low. The aim of most farming activities is to produce for self-consumption, rather than commercially. Since the villages are located in the peripheral areas of the provincial city, mutual relationships and traditional traditions and customs are still strong in this rural agrarian community. In addition, the location disadvantage and irregular income from agricultural livelihoods are likely to hinder the expansion of consumption of unnecessary consumer products compared to the villages in Pak Thongchai. Therefore, most villagers can largely maintain their rural lifestyle, though there have been great changes outside the community.

The degree of financial need of producers has had an effect on the type of produced product. Generally, most weavers who need more cash would prefer to weave normal grades of fabric, which take less production time. Meanwhile the women retiring from agriculture like to weave high grade fabric that can earn higher prices and be sent for award contests. The award winning fabric provides not only special prizes, e.g. money and jewellery, but also more stature outside the community.

6.1.5 Natural capital

According to the results of the attitude survey, the manufacturers in Pak Thongchai were aware of the impact of untreated effluent on public resources and of their responsibility as major polluters for waste management. However, a lack of appropriate waste treatment systems and inadequate support from local authorities in waste management were indicated as significant obstacles. Indeed, field observations carried out in 2005 found that the pollution problems have still not been solved, though the extent of the problem is lower due to the reduction of silk production activities in villages. As mentioned earlier in Section 4.6.3 b, although the feedback from respondents in group discussions regarding the laboratory results of effluent has shown some level of awareness, there have been some hindrances regarding effluent management.

According to other residents surveyed, weak enforcement has encouraged manufacturers to act against environmental regulation by re-emitting their waste into public drainage. However, the key cause of this failure may come from the lack of awareness of the effects of pollution across the spectrum of the stakeholder population in local and district areas. Moreover, lack of know-how about appropriate waste management systems has both prevented the proper treatment of waste and wasted the limited capital of the MSEs. The absence of technical assistance from the relevant bodies and environmental organisations in promoting people's awareness and research and development into suitable wastewater treatment systems has prevented local authorities from enforcing regulations to ban silk production in communities.

At present, even this small number of active dye houses could further exacerbate the local environmental situation. Because of the trend of severe droughts in Thailand in recent years, the low level of water in public sources and the shortage of water supplies could increase the intensity of effluent and odours in the village pond and drains. This would probably lead to a rapid deterioration of water quality which could have a negative impact on human health for those living close to the drains and the pond.

In Baan Fhake and Non Samran SMCE, the major source of potable water is rainwater while village supply water is used for general cleansing. In the past, the deterioration of water quality in the village pond, the sole resource for supply water, has become a regular occurrence in the dry season. The deficiency in environmental management knowledge and technical support from external organisations has meant that other residents and the TAO are forced to solve their urgent environmental problems themselves. Hence, the shortage of sanitary water in the prolonged dry season, a peak time of silk production, has become a major problem for weavers and other livelihoods in the community.

The SMCE group discussion stated that only a short term plan for water management had been developed to resolve the serious shortage of water that occurred between 2004 and 2005. Most weavers thought that the solution to this problem should be initiated by TAO. Therefore, some proposed solutions, for example investigating water optimisation in silk production and reserving more rainwater for family consumption and silk production, had been disregarded.

Without any apparent impact from effluent discharge, the group representatives were not forthcoming in discussions regarding effluent management. Lack of research into the environmental impacts of wastewater from production makes it hard to raise the issue in the consciousness of weavers. However, the group's proposal for developing a 'silk learning centre' is likely to encourage environmental awareness of the SMCE indirectly. If this proposal is accepted, the SMCE and local authority may need to consider the encouragement of other weavers to use the new central dye house and central stove to ensure the long term effectiveness of effluent management.

For a half century, the expanding of silk industry in Pak Thongchai which mostly relies on fuel woods for the production has played a major role in deforestation in the district. At present, all silk producers completely rely on a provision of fire wood from mobile vendors. Consequently, the exploitation has inevitably cost MSEs in term of increased production cost and the uncertainty of wood supply which at times forced them to temporarily halt manufacturing. Table 6.5 presents the energy content of fuel between fuel wood and natural gas used in bleaching and dyeing 50 kg of silk yarn of three different MSEs who were audited by the CP concept. It may imply that using Liquid Petroleum Gas (LPG) probably saves energy more than double of using

fuel wood in a batch of production. However, due to the trend of increasing LPG retail price[3], it is necessary for producers to consider the cost of this type of fuel and of the improvement of wood stove.

On the other hand, although the SMCE in Sida has no problem with fuel woods supply for their micro scale production, the growth of silk production in the future may lead to deforestation as it happened in Pak Thongchai. This probably increases the effect of drought and soil contamination by salt, which is dissolved from the underground rock salt layer, which prompts lower productivity of rice in villages. Nitta (1993) noted that the effect of large scale deforestation and destruction of the environment from the prehistoric industries, such as salt making and iron smelting, has undermined the economic basis of ancient civilisations and led to low productivity of agriculture products in the Northeast at the present time.

[3] The average price of 48 kg of LPG in 2007 is 820 THB (or 17.08 THB/kg) EPPO. (2007). "Retail LPG Prices." Energy Policy and Planning Office (EPPO), Ministry of Energy, Thailand.

Table 6.5: Energy content of fuel used in a batch of bleaching and dyeing 50 kg of silk yarn

Dye House	Fuel type	Amount of fuel used per one batch	Energy content of fuel (Mega Joules Unit)	Fuel cost per unit in 2004	Energy cost per unit
Small enterprise in Doo village	Fuel wood	120 kg	1920 MJ	Less than 1 THB/kg (2,300-2,500 THB per 2500 kg of wood)	= 1 THB/kg x 1/16 MJ/kg = 0.06 THB/MJ
Medium enterprise in Don Khwang village	Fuel wood	286.5 kg	4,584 MJ[4]		
Medium enterprise in Kud Kradi village	48 kg of LPG	30.2 litre	803 MJ[5]	14.5 THB/kg[6]	= 14.5 bath/kg x 1kg/26.62 MJ = 0.29 THB/MJ

6.1.6 Other key factors for sustainable enterprise development in the Sufficiency Economy Philosophy (SEP)

The empirical study revealed that several major factors which although mentioned in the SE concept are not clearly stated in the SL framework. These factors have significantly affected the sustainability of businesses and communities. Due to their complex nature, it is difficult to categorise these factors into the SL framework. However, it is essential to discuss them to gain more understanding about their causes

[4] Net calorific value of one kg of fuel wood is around 16 MJ (ATA. (2004). "Manual for Local Energy Planning in Thailand." Appropriate Technology Association (ATA), Bangkok.)
[5] Net calorific value of one kg is around 50.22 MJ (ATA, Ibid.)
[6] LPG price per kg in 2004 (ATA, Ibid.)

and effects, which could help the development of silk business sustainability in the future. These factors are discussed below.

a. Technol*ogy*

It is apparent that the implementation of exogenous technology to meet market demand has had a considerable impact on the format of traditional silk production, the emergence of informal silk MSEs and the well-being of communities. The change in production format has begun since the MSEs in Pak Thongchai started adopting new technologies from textile industries to increase its productivity for the wholesale market. The introduction of these technologies, e.g. chemicals, and machinery, has led to a decline in the workmanship of local artisans. As the growth in labour division has promoted the development of workers' skill in each production process, it enables many people to learn and work on specific tasks in this complicated livelihood. The need for lengthy physical processes, i.e. bleaching, dyeing and weaving, has meant that men are preferred to perform these types of tasks. This change has completely broken a social belief in Pak Thongchai that silk production is a job for women only.

The development of technology by local people has, nevertheless, struggled because of the absence of information and technical support from government offices and local academia. With low levels of education, all producers and workers have effectively become users of technology and are given no more information beyond instruction of use. A discernible example is chemical agents used in production processes, which are imported by companies in Bangkok. These chemicals have been developed for industrial production use. When villagers started their businesses, they would have come across these chemicals in their previous employers' factories or from the SMEs' subcontract order. Frequently they have been introduced to new chemicals through direct sale at their houses. The instructions and the chemical name have been changed to make it easy to understand and remember. Some producers stated that sometimes they learned which type of agents should be used in each process and how to use them by word of mouth from other producers.

Being recognised as the centre of silk industrial production, it is normal to find many chemical suppliers and retailers in the Pak Thongchai municipality. These substances have usually been sold in the original package from factories, which contain large

numbers of chemicals. Since the expansion of the silk MSEs, however, it is found that these chemicals have been sold in small amounts (by kilogramme unit) to MSEs by some suppliers. Without any label and proper instruction, it is difficult to identify and investigate the chemical and its hazards. In addition, some MSEs stated a concern about the increase of chemical use in bleaching and dyeing with imported silk thread:

> "*The introduction of a cheaper grade of silk thread from Vietnam in 2001 has promoted in increasing amount of type and quantity of chemical used in cleansing process. Since this imported silk thread has had more dirt which stuck deeply in the thread, new strong cleansing substances were used"*

Meanwhile, the distribution of chemical substances for the SMCE weavers is different. The major suppliers, located in Bangkok, have distributed their products in small quantities (between 10-100 grams per pack). Due to their low cost and widespread provision in local areas, these chemicals have become the most popular agents for SMCEs' textile production in the country. Similar to the MSEs case, the distributors of these chemicals have not provided proper information such as instructions for use, ingredients and toxicity. Word of mouth from salespeople and trial and error have become sources of information about good practice in the bleaching and dyeing processes.

The results from CP auditing showed some significant data on dye stuffs and water consumption in the dyeing process in both types of production. Table 6.5 revealed the approximate quantity of water and dye stuff per weight of dyed silk which is the minimum quantity of the dyed silk from the CP audit and the survey data by Kiattikomol and Umpush (2003). It indicated that the SMCEs silk production consumed at least 10 times the amount of dye stuffs and more than 45 percent more water than the MSE's. The quantity of cheap chemical dye and water used in the SMCEs production is different depending on different expected colour and the available size of containers in the household. These different levels of dyestuff consumption may correspond with the absence of dyestuff instructions in the SMCE production as mentioned in the previous paragraph.

Lack of chemical information in both production types have led to an absence of good practice in housekeeping and safe work procedures which could cause more OHS problems of silk producer, workers and their families. These unknown chemicals also hinder local authorities in developing an appropriate local environmental management as well as emergency plans. Hence, local authorities and central government should increase an awareness, careful monitoring and control of the mobility of hazardous chemicals in their responsibility areas in order to reduce any risks in the future.

Table 6.6: Different resource consumption per weight of dyed silk thread in each mode of production

Resources	Silk (gram)	Water (litre)	Dye stuffs (gram)
SMCE	300	138	40-70
MSEs (Self-operating)	300	81.68	2.3
MSEs (Hiring skilled workers)	300	95.10	3.9
Sample in Baan Fhake and Non Samran SMCE[7]	100	62-82	10
Sample in Baan Prasat SMCE[8]	1000	n/a	50

Due to some experience working with machines in silk factories, most simple machineries and tools have been adapted from those apparatus used in the textile industry. For instance, simple spinning and reeling machines and large stoves have been developed to respond to the MSEs' production requirements. Nonetheless, the efficiency of these technologies is quite low and limited in terms of the number of developed models used in manufacturing or selling in the market. This is because of differences in types of raw materials used, limited expertise of craftsmen and lack of formal support in R&D. One example of the effects of raw materials and machine

[7] Data from the survey data of silk production in Baan Fhake and Non Samran SMCE by Kiattikomol and Umpush (2003)
[8] Data from the survey data of silk production in Baan Prasat SMCE by Kiattikomol and Umpush (2003)

efficiency is reeling and spinning machines. These machines have been developed to work with high quality silk yarn, which is the main material used in the factory. Hence, they are incompatible with traditional silk yarn which is another key material in the production at the MSEs and SMCE level.

In the SMCE production, most producers still use traditional tools. Only some machines, supported by government offices, have been introduced into the manufacturing. These machines are the same model as used in plain fabric production in the MSEs. Nevertheless, the rate of use of these machines is considered to be low because of the limited number of machines available. With smaller scale production and more colourful and varied fabric patterns, these tools were deemed to be unsuitable for individual production because of the available time in daily life and higher production costs from electricity. As all machines were located in the group's workshop, it was inconvenient for older producers to carry their work materials and tools in order to work there. Then, these machines were mostly operated for demonstrating the silk process to visitors. Only metal-framed looms have been regularly used by some members of SMCE who are able to come to the SMCE workshop to weave. In order to achieve greater uptake of technology, appropriate technologies are needed which adjust to the traditional processes, the socio-economics of the user and the OHS of ageing users.

b. Business management

Business management skills have been highlighted as a vital factor for the survival of the silk cottage industry, particular in Pak Thongchai. As mentioned in Chapter 4, there has been no access for the informal MSEs to get any support from the government. Without knowledge and experience in business, financial management and production planning, the expansion of production scales for wholesale markets has caused more vulnerability of the MSEs compared to the larger enterprises. The high profit margin in a short period has tempted silk-related workers or inexperienced farmers to start their own silk businesses in order to become wealthy. Thus, the booming of silk MSEs at the village level started in 2002-3. However, these new MSEs have mostly collapsed within a year due to the recession in the wholesale market.

From the interviews, several experienced entrepreneurs indicated that:

> *"Lack of entrepreneurial skill leads these new enterprises to imitate the production of successful manufacturers without improving their business capability. Without any suitable production and marketing plans, these new entrepreneurs have to spend more to produce a roll of fabric and sell product cheaper to attract customer and to maintain their cash flow"*

The focus group discussion showed that fierce competition and lack of cooperation among whole producers in the villages have accelerated the recession of the silk business. Furthermore, the substantial advertising of pro-poor government policy has promoted a large number of new entrepreneurs to produce products first without finding any new markets. Although the state offices have planned to enhance producers' business skills by various training initiatives, limited manpower and budget could not enable these plans to achieve their targets in a genuinely competitive market.

It is evident from the survey that some conflicts occur between the good practice of business management and the socio-economic situation in the MSEs informal sector. Some social factors have enhanced the downfall of the MSEs. On the verge of collapse, silk production has carried on, though it resulted in most MSEs losing their financial capital. Optimistically, they still run their businesses by borrowing from financial sources and using other income such as remittances to support their businesses until they become bankrupt. This may be explained by the result of the attitude survey of producers' perceptions and group discussions about the revival of silk occupation and expected environment in the future:

> *"Our parents were able to make a living from silk production and survived through the previous economic downturns, why would not we? Although the current market is decline, but it will definitely recover in the future. Likewise, the present natural resource deterioration and environment problems should be slowly restored and revitalised themselves, so there was no hurry to solve these problems"*

This result could be implied that it is necessary to improve the MSEs' risk assessment capacity.

In the meantime, the growth of subcontracting production in the MSEs had promoted the informal employment of a large workforce in accordance with division of labour. Most workers were recruited from communities or nearby villages. As Thai rural villages have been developed based on mutual relationships and a kinship culture, it is impossible to control and manage labour under informal employment effectively. Moreover, the status of the silk entrepreneur has become more recognised in the rural villages. Therefore, there was a great attempt to maintain the status of "*capable employer*" and save their good image in rural society. For these reasons, entrepreneurs have been forced by the pleas of the workers to provide petty jobs. This is related to the social value of entrepreneurs as their professional life and personal life are intertwined and thus cannot be separated (Kettunen 2004; Paige and Littrell 2002). In contrast, these values have undermined the advantage of MSEs in production flexibility in a globalised economic setting where survival is contingent.

In the case of the SMCE, since silk production in SMCE has relied on individual capacity and aimed at generating supplementary income, the weavers are mainly responsible for the whole production and management process themselves. Nonetheless the establishment of the producer group has contributed to weavers' production capacity and business management skills. According to the SMCE promotion policy, Baan Fhake-Non Samran SMCE has attracted a number of support schemes from several government offices.

Fortunately, it seems that some support initiatives, such as free silk thread and financial support for the group's silk yarn loan scheme at the beginning of group formation, have played a vital role in strengthening the group's base. Other activities that have enhanced production competitiveness and reduced the financial burden are welcomed by members and tend to encourage the development of group relationships. In addition it is indicated that the key factor of a group's operating success is its leader and administrative committee. The combination of a strong and active leader and administrative team has resulted in the initiation of several new empowerment schemes which have enhanced and strengthened the group's business performance.

This gave an advantage to the Baan Fhake and Non Samran SMCE and allowed it to develop faster than other silk SMCEs in the province.

Interestingly, their constant outstanding performance and reputation has brought some negative impacts in the community. Nearly all related community development state agencies have competed to give support and have asked the group to participate in their schemes. Because most schemes are developed individually by the state officers, they do not usually promote the improvement of business performance as the SMCE required. Sometimes these projects have been very similar in terms of objectives and activities. Furthermore, the SMCE and community have spent a considerable amount of time preparing for the year round silk learning visits from both domestic and international groups. Complaints about time and money waste have been stated in several cases where the support from the sponsor or guests has been inadequate. As a result of these activities there has been a loss of slack time, particularly for the leader and group's administrative team, which has delayed production sometimes by up to three months.

c. Product diversification

Since ancient times, the image of silk has been recognised as a high value garment worn only during ceremonial activities. As a consequence of modernisation in the 1950s the country's fashion trends has shifted from traditional to new western styles. The change of fashion has relegated silk to become the attire for middle aged and old people who want to maintain their social status. Most silk garment design is limited for the niche customer. In response to the growth of tourism, silk fabric also has been produced and developed for souvenir products.

Over the last two decades, the promotion of wearing traditional fabric in government agencies and academia has increased silk fabric consumption, particularly the monochrome plain fabric. Consequently, silk MSEs and SMCEs including SMEs in the North-East region, that have an advantage by using industrial silk yarn at lower production cost, have been promoted and have dominated the domestic market share, especially in the middle and lower end of the market. Whilst the production capacity of silk SMEs in the Bangkok metropolitan areas has been limited by the lack of availability of silk thread for industrial production, a large amount of more expensive

thread has been imported from China and Vietnam. Higher production costs from tariffs on imported silk yarn and labour costs have prompted SMEs to produce only high quality products for the higher end of the domestic market and export. The details of these enterprises and markets are discussed in Section 6.3.6.

However, the old-fashioned image of silk has prevented it from becoming a popular choice for day-to-day wear for the younger generation. Hence, the market for garments is still small, though the retail price has dropped in recent years. At the same time, the on-going recession of tourism since 2002, suffering from the effects of SARS, the bird flu epidemic and tsunami, has shrunk the market demand for souvenir silk products. Furthermore, the effect of the *"no import tariff"* on silk thread from the ASEAN Free Trade Agreement (AFTA), to be implemented in 2010, and the Thai-China FTA would has prolonged the great recession of silk MSEs and SMCEs. The influx of low-priced, new styles of silk clothes from these countries could result in imports gaining a greater share of the middle and low end of the market. In addition, the absence of silk import tariffs would probably provide opportunities for silk SMEs in Bangkok to compete in the middle end of the domestic market.

To regain the market share, product management, e.g. new product development and product differentiation, has been raised as a key factor to sustain the business. One issue raised from the group discussion showed the image of *"handicraft product"* could be used in sales promotion because the MSEs perceive their products to be handicrafts as they are produced using the *"hand weaving"* process. However, the lack of intricacy and uniqueness of its main product, monochrome fabric, makes it similar to the fabric produced by the SME factories. It is hard to persuade the handicraft promotion agencies and customers to recognise and accept its *"handicraft"* image. The flood of OTOP silk fabric, produced by the SMCEs, made the MSE's products lose their dominant status in the market. Furthermore, the rapid imitation of new fabric patterns and the shortage of cash flow have caused the MSEs to be reluctant to invest in product development, which is likely to be a setback for the business.

In response to the downfall of the market, group discussions held in November 2005 revealed that the Baan Doo silk weaving group leader has produced more high quality craft works and new household and decorative products. The group leader thought

that product development was a way to revive the value of the craft and produce unique value added goods that were different from the majority of products in the district. Meanwhile Baan Han silk weaving and batik has eagerly shown their interest in producing home textile products. This coping strategy seems to be confirmed by Parnwell (1993) who suggested the improvement of these main factors, e.g. design and market, entirely different production techniques, etc., in rural cottage industries could help it to take an advantage in the growing demand of traditional craft goods. The study of the business strategy of successful craft retailers in the South-eastern U.S. states by Paige and Littrell (2002) indicated that most business strategies implemented by craft retailers are producing more specialised or unique products. Customer education about products also could create more competitive advantages than offering products at lower prices. This matches with the fact that some pioneer MSEs in Pak Thongchai producing new and varied products are people who have obtained more retail experience in local and national fairs than other MSEs. Market knowledge from the training course is also recognised as another cause of product development.

Concurrently, the SMCE in Sida has launched several kinds of products to add value to the fabric and its remnants. Various dresses and traditional style shirts and other accessory products are processed by many returning and young labourers including the surplus labour from expanding families in the villages. As a result of the stagnation and slow recovery of the industrial sector since the economic crisis, these labourers have become the main group that have been trained and have experience using sewing machines and new product designs, whilst the older ones are more inclined to weave fabrics.

The group discussion stated that the decline in the number of various processed products, e.g. cloth, accessories and purses, was caused by younger members leaving and insufficient supply of weaving fabric. This may be explained by the boom of the industry in the last two years that has attracted a young labour force to work in the factories again. This immigration trend could be confirmed by the survey results of the home labour force by the Thailand National Statistic Office. It found that in 2005, out of the total number of home workers, there were nearly 10 percent less young workers (aged less than 35 years) than in 2002. The percentage of home workers

living out of the municipal area has decreased from 90 percent in 2002 to 69 percent in 2005 (NSO 2005b). However, since the fabric market has improved, the SMCE did not show much enthusiasm for processed products except profitable products such as men's shirts. To tailor this product, they need to hire labourers from nearby villages. The conflict of labour between the silk cottage industry and the industrial sector will be discussed in more detail in Section 6.3.4.

Despite its economic benefits in terms of employment and market expansion, product development has prompted a dilemma in a cultural context. As regards market demand, the development of new products has led to a loss of traditional product identity. The complete change of fabric patterns from traditional to marketable styles makes the MSEs' products look like they are factory made. Due to inconsistent quality, the products cannot be sold for high prices and was not considered to be as high quality as factory produced silk fabric.

The drive of tourist market demand has promoted the diversification of silk products which may have new patterns and different styles or be lower quality than traditional products. In a study of hill tribe handicraft production in Northern Thailand, Cohen (2000) noted that commercial sponsorship by external entrepreneurs has affected the preservation of stylistic authenticity. On the other hand, local craftsmen have become cheap skilled subcontractors due to the supply of product models from foreign entrepreneurs. The study of silk production in Cambodia also found that the flooding of cheap and lesser quality silk products in the market may have affected the preservation of Khmer craftsmanship in terms of its original patterns, production techniques and quality control due to the recession in the silk cottage industry (Dahles and Zwart 2003).

Although it is generally accepted that local craftsmanship has to adapt in order to survive, there is a different perspective on product development from silk manufacturers and weavers in Nishijin, Japan. Hareven (2002) noted that silk producers believed the survival of their craft has depended on the consistency of product design and motif in line with long-standing tradition. The introduction of new technology and new styles and colours in the production has boosted product quality and market demand.

d. Ethics

Over the centuries, Buddhist monasteries have played an important role as centres of community life. As cultural leaders, Buddhist monks have supported villagers spiritually and morally as well as in culture, ritual education, medical care and occupational advice (Tavivat 1998). In return, villagers have patronised the temple in terms of food and finance. The tradition of supporting male relatives to be ordained as monks once in a lifetime also helps to sustain the religious institution in the villages. As a result, people can develop and obtain a high level of awareness of moral and ethical conduct.

As a consequence of economic and social promotion in the previous national development plans, resources have been extracted from rural areas, particularly human resources. The government's pro industrial and services sector policy which neglected the development of the agricultural sector, the main livelihood of rural society, has led to continuing migration of the younger generation. This has undermined rural social structures and cultural and traditional institutions. This also greatly affected the very core of Buddhist values and cultures.

Moreover, the spread of consumerism into villages has severely weakened the community's spirit in sharing and cooperation. As people have become more individualised and competitive with each other in terms of material consumption, the morals and ethics of villagers have become fragile. A good example of this case is that many unpleasant issues in the communities have arisen as a result of wealthy people not complying with local regulations and social norms. The field study found that wealthy people have regularly patronised the community and temple development activities in order to be more accepted in the villages. As the main informal financial supporters of communities and local authorities these rich people have become quite influential. Even though they have not complied with some village regulations or norms, most other residents and the local authority have ignored this. Several producers believed that these problems could be solved if people had more moral discipline.

There have been some attempts to restore village ethics. In order to solve inequity in Baan Doo villages, the young abbot of Bhodhi Sri temple tried to stimulate silk MSEs in villages to set up producer groups and to collect traditional fabric and weaving tools for a local silk museum. This role of *"development monks"* in promoting alternative development to solve the erosion of traditional local Buddhist values against a backdrop of consumerism has been occurring since the beginning of the 1970s (Darlington 2000). With the determination to revive spirituality and a self-sustaining local economy, several successful agricultural communities can regain cooperation among villagers and redevelop their self-reliance in terms of food, natural resources and finance (Tavivat 1998). However, following his continued attempts to solve community problems, the abbot decided to renounce his monk status in December 2005. The loss of this influential leader could have an impact on the sustainability and indeed the viability of Baan Doo village.

In contrast, there were rarely any problems from the absence of business ethics in Sida SMCE. Although there are some customers who buy the fabric directly from the home instead of the group's showroom, the producer sold it at the same price as fabric which is sold at the showroom. The price war, in an attempt to gain more customers, has never been heard of by any of the respondents. Without fear of competition in the group, the producers usually help each other to solve problems in production. Moreover, the strong kinship and rural tradition and customs in this agrarian society have effectively supported the use of moral discipline to conciliate the dispute in the villages. This may imply a high level of ethical practice in the community.

6.2 The effect of silk livelihood on policy changes

6.2.1 The absence of the MSEs promotion policy

Even though craft production has contributed both positively and negatively to MSEs and craftspeople in the informal economy, there are few changes in related government policy. The literature review regarding Thai silk production in general revealed that only two types of production have been mentioned in state and academic documents: the traditional production in cottage industry in rural villages and industrial production in textile factories. The silk MSEs emerging in Pak Thongchai

and other key silk producing districts have been totally neglected by state silk promotion policy making.

As discussed in Section 2.2, the ILO study on the MSEs in Thailand in the late 1990s had stimulated the government to launch several policies to promote the informal economy. However, the informal silk MSEs have not yet been formally registered either as SMEs or SMCEs and therefore do not have access to available support schemes. Because of their limited capital, lack of a certain market, informal employment and unregistered business status, the MSEs have been prevented from becoming formal businesses and therefore cannot access support from state and private SME promotion and development programmes. This forced some micro enterprises to register as SMCEs in order to access the limited support from the government which mainly aims to provide additional income and enhance social cohesion in the communities. Although many government policies have intended to stimulate the grass-roots economy, silk SMEs in the district and -200-.provincial city were the main beneficiaries of the provincial silk strategy plans between 2005 and 2006.

The interview with community development officers in the second phase of field work revealed that the only way for MSEs to benefit from government policies is for them to be registered within the formal economy system. For example, Nakhon Ratchasima Silk Association which was derived from the Pak Thongchai Silk Entrepreneur Club, and the existing SMCEs in the community are recommended by the silk promotion agencies to be intermediate organisations for silk producers. The proposal from the silk association would be considered to get support from the industrial silk production promoting scheme under the provincial silk strategy plan, while the SMCEs' proposal would be processed through the national SMCEs promotion policy.

The recognition of SMCEs by state policy makers has contributed to the development of several policies which support the silk traditional producers more than MSEs in Pak Thongchai. These policies have focussed on increasing raw material yield, promoting the production of high quality goods, developing the OTOP star standard and setting up new national premium standards for traditional silk products, as well as promoting special support schemes for SMCEs development. Nonetheless, major

problems in market-oriented production such as the lack of marketing and business development services and the absence of young people working in silk business management have not been seriously considered in the policies. Hence, the new SMCEs have become more vulnerable to failure in the short period after state support has ended.

It is clear that the policy framework at national level has supported the free trade market system. Although most policies are designed mainly to increase the competitiveness of SMCEs, they have failed to meet producers' requirements due to a lack of comprehensive training strategy plans and trainers with appropriate expertise. As mentioned in Section 5.4.1, the group discussions and the survey results revealed that the SMCEs did not actively implement the marketing strategy. Although at the moment they are able to sell almost all their fabric, without an appropriate marketing strategy there is no guarantee how long they can sustain this good business environment on a long term basis. Without the support from government offices, e.g. free booth provision in trade fairs and the campaign of wearing traditional attires in the state office and academia, it is virtually impossible for the producer to afford the cost of marketing and expanding from local to provincial or national markets.

Furthermore, the unfair trade occurring in the silk business by unscrupulous middlemen and suppliers has adversely impacted on the viability of the silk cottage industry. The loopholes in consumer protection and trade competition laws have led to these suppliers and middlemen becoming market regulators in all business activities which deal with the micro producers. Inevitably, micro producers have to be responsible for the costs incurred by sub-standard raw materials and unfair subcontract and payment methods.

Although silk weaving has been categorised as a fine art and officially selected as part of Thailand's national heritage, policy about the promotion and development of Thai silk artisans is vague. The results from group discussions indicated that the absence of new artisan development has hampered the growth of productivity, the improvement of silk businesses and the development of new products. These could cause stagnation or even loss of the current market, ultimately exacerbating the loss of silk production knowledge and skill in local areas as well.

Hareven (2002) noted that in Japan, where silk weaving is a major national cultural heritage, artisan development has been systematically supported by manufacturers and government. At the individual level, the Living National Treasure title has been awarded to an outstanding master of traditional arts and crafts by the government to preserve skills and techniques in danger of extinction. New technologies and management have been introduced to improve and control product quality as well as restrict competition at the community level since the middle of the 18th Century. Examples of these developments are the establishment of guilds of manufacturers, weavers and wholesalers and an apprenticeship system in weaving in Nishijin, one of the key silk production sites in Kyoto.

The adaptation of the Jacquard techniques, the use of machinery and powerlooms in production lines and the setting up of textile associations in industrial production and trade has promoted the revival of Nishijin's silk industry after the economic recession and the moving of the capital from Kyoto to Tokyo in 1869. Moreover, the establishment of the Nishijin textile centre, where highly skilled craftspeople are employed to demonstrate their works for visitor, has enhanced the preservation and transfer of the knowledge of local silk production to the public (Nishijin Textile Centre n/a). Nevertheless, the current insecurity of the silk business and weaving work e.g. piece rate payment, uncertainty of orders has discouraged the young from continuing this vulnerable livelihood. As a consequence of the changes in modern Japan's economic and social structure, ensuring the survival of traditional expensive products in the declining market is still a challenge (Hareven 2002).

6.3 The effect of silk livelihood on institutions

6.3.1 Gender

The domination of silk businesses in the peripheral villages of Pak Thongchai town has had a great effect on community institutions. According to Tai Lao culture, silk weaving is a women's task. The introduction of mass scale production and percussion looms has allowed the entry of men into the silk cottage industry. Still women constitute the backbone of the industry. Because they contribute a regular and good income to the household, the status of these women has been enhanced compared to

those households where women are not involved in the silk business. According to the survey findings, the majority of women works mainly at home and take charge of most production and business activities because of their role as housewife and the perception that they have more social skills. Meanwhile men prefer working in physical labour activities such as bleaching and dyeing processes, weaving and driving to deliver products to customers. In addition, as a result of participating in training and increased contact with suppliers, customers and visitors, the self-esteem of producers and workers of both genders has improved.

In view of the fact that silk production in the SMCE has contributed an important supplementary income for families, some younger men and boys in primary education have started to help women in some ancillary processes. The promotion of the silk production course in the village school has provided an opportunity for boys to learn these skills more systematically. Furthermore, the girls, now have the opportunity to learn and practise almost the whole process at school and therefore learn the process more quickly than when they were taught purely at home by their mothers.

6.3.2 Age

The empirical study found that silk production has recently become a vital livelihood for middle aged (> 35 year old) and older people in villages. The percentage of producers' aged more than 45 years in Baan Fhake-Non Samran SMCE (80 per cent) is higher than the MSEs in Pak Thongchai (56 per cent). This may be explained by the income generating capability of silk production in each area. As it is a supplementary and non-regular income generating activity in Sida, silk production could not attract young labourers in villages in their pursuit of sufficient income for their more materialistic lifestyles. Although there were market demands for silk garments and processed products, young members who had been responsible for these products moved out to work in the factories. Meanwhile, the regular income provided by the silk cottage industry has attracted more labourers (> 35 year old) and housewives who are unable to get a job in factories.

Due to the shift towards an ageing community, the villagers have begun to confront problems such as the shortage of agricultural labour force, food insecurity, health deterioration and insufficient income for subsistence. The survey results from the Thai

NSO found that nearly one-third of older people in the country had to work to make a living for their family with more than 56 per cent of the elderly worked in agricultural activities, whilst the rest were involved in non-farming activities. Moreover, part-time work at home was the most desirable job for older people (NSO, 2002), which meant that tasks such as silk production presented an attractive alternative occupation for elderly people in the future.

6.3.3 Education

The survey results showed that most silk producers have primary level education or less. Very few acquire junior secondary education (Grade 9). Lack of literacy skills practiced in daily life means that most producers experience difficulty learning new techniques and acquiring knowledge through training. Low self-esteem when communicating with people with a higher level of education was also noticed from the preliminary surveys. There was also a lack of confidence in presenting their needs and giving suggestions for improving training courses, though most producers felt the content of many training courses were not interesting, boring and sometimes hard to understand. At present only a few producers in both production modes, particularly the ones who have higher education or have more experience in business or trading outside their communities, are interested in training or acquiring new skills.

Despite having a low level of education, all producers have shown awareness of the importance of education for their children. Since children's educational attainment has become an important target that parents want to meet, the higher income from silk business has contributed to higher education for their children (Jones and Kittisuksathit 2003; Jongudomkarn and Camfield 2005). From the survey, however, it may be implied that the different level of education of younger generations probably affects the mobility of the young labour force. Even though most parents in Pak Thongchai can support their children's education to university level, most children in Baan Doo and Baan Doo Noak villages prefer to complete compulsory education (Grade 9) and then look for a job in the cities. The interview with respondents found that most children prefer to follow their relatives or friends who work in jewellery factories in other provinces or Bangkok. Because of the low education requirement and high pay, these workers can earn high salaries, obtain luxury products and more

respect from other residents. Thus, most children have waited for job offers from the workers who regularly help the factories to recruit new employees.

Meanwhile, several of the young in Baan Han and Han Tai who are educated to undergraduate level tend to stay with the family and work in the district or nearby areas. It was found that the development of local business activities, e.g. management, marketing and distribution, could motivate the young to work in the village to plug the gaps where their parents lack the necessary expertise. Moreover, due to the location of the two villages close to the provincial town and industrial promotion in the provinces, a variety of jobs in the industrial and service sectors are available. Living with their family could increase the interest of these children in learning more about their parents' livelihood or in gaining further education to get a chance to work in local businesses instead of migrating to work in factories.

Due to its remote location, all students in Baan Fhake and Non Samran who graduate from primary school in the village have to travel to the district town or provincial city for further compulsory education. The interviews revealed that parents are keen to support their children's education as much as possible due to its social value and their economic status. As a result, the children have been forced to move away from their local livelihoods, in both agricultural and non farming activities for the purpose of acquiring higher education.

6.3.4 Young labour force

The migration of the younger generations to seek jobs in the cities is not a new phenomenon in rural societies. However, failure to transfer traditional know-how and local livelihoods to the younger generations has increased concerns about permanent migration of the young. Having heavily promoted the growth of the industrial sector over decades, the Nakhon Ratchasima province now has the largest number of factories in the region (NSO 2006b). Despite promoting the development of the silk industry in the province, it appears that the provincial policy makers have currently not considered the conflict which has emerged in terms of the demand for labour from other industries and silk businesses at the community level. As shown in Figure 6.3, since the estimated number of employment in informal silk MSEs is more than 6,000

workers[9], the shortage of young labourers could seriously undermine the sustainability of the silk cottage industry.

In spite of migrating to work in other areas, there is an expectation that these young labourers will eventually move back. Some MSEs in Baan Doo believed that their children may return to live in the villages again, but not until after the age of 50 to 60. This is because of increased work opportunities and conditions resulting from improved labour laws and the growth of the service sector in big cities. The survey, nevertheless, revealed that some young labourers had moved back to Pak Thongchai to help their family to manage businesses in the blooming period of silk. In these circumstances, the younger generation returns to work in the industrial and service sectors near their houses to secure their families' economic well-being. In contrast, the lack of any commercial and industrial areas nearby in Sida district seems to lead to young workers moving away permanently.

6.3.5 Local authority

Decentralisation has been recommended as a major intervention to enhance participation, improve local governance and reduce poverty from the grassroots level (Scott 2006). However, Jütting *et al.* (2004) stated that weak institutions and political conflicts in this process could cause a negative impact on poverty. The study on the effect of decentralisation on poverty outcomes found that in the countries where there is low income, literacy rate, score in the corruption perception index and government commitment to reform, decentralisation has not demonstrated any pro-poor impacts.

As mentioned in Section 2.3.1, the decentralisation process at the local level in Thailand has been conducted via the establishment of Tambon Authority Organisation (TAO) for a decade. Although the key role of TAO has been to accommodate the well-being of people in every aspect (Office of the Council of State 1994), from the MSEs' point of view, as expressed in group discussions, their TAOs did not pay much attention to the promotion of the local economy, social development and environmental management.

[9] Calculation based on the number of employment in each size of the informal enterprises. Further details presents in Appendix 4.2

It is possible to assume that there are two main reasons that hamper the promotion of the silk cottage industry at village level. First is a weakness of TAO which is clearly seen as an inadequate entity in terms of finance, poor management, and lack of knowledge and vision in community development. Regarding the classification of the TAO, the Thai Department of Provincial Administration has categorised TAOs into five classes in accordance with their annual income. For instance, a class I TAO would have an income of at least 20 million THB per year and be able to recruit 21 permanent officers, whilst a class V TAO may have revenue up to 3 million THB per year and can employ 3 permanent officers. In this research, it is found that all TAOs in the study sites have been classified as class V which means these TAOs have to deal with major constraints in finance and manpower.

Due to limited revenue from taxes and fees, the main source of TAO income is regular annual allocation subsidies from the government. Since the TAO category III, IV and V was 97 percent of all TAOs, these lower income generating TAOs receive a small amount of subsidies (Rajchagool 1999). With this financial constraint, it is difficult for TAO to implement all assigned tasks (Jütting *et al.* 2004; Lao-Araya 2002; Rujjanaseri n/a). The financial support from community development activities and local employment provisions donated by wealthy people in the villages, especially medium and large silk enterprises, have become important economic input sources for TAOs and other residents. Consequently, the patron-client relationship between these elites and TAOs or other residents has developed and led to the elite capture[10] problem (Platteau and Gaspart 2005).

Clear examples of this problem were the conflicts which arose from silk manufacturing, i.e. pollution and business competition, in the community. The study found that TAOs and village heads in Pak Thongchai were reluctant to solve the pollution problems and to become involved with the development of local silk businesses in the long term. The discussions with TAO chairmen revealed they feared losing their political support and financial contributions if they attempted to enforce any regulations against these producers. In the meantime, most other residents had

[10] Elite capture means the capability of the local strong elite who get the benefits from having a better knowledge of the prevailing local conditions and a better ability to enforce rules, monitor behaviour, and verify actions related to interventions

concerns regarding the impact on their kinship or employment status, if they put more pressure on TAO to seriously attempt to solve the problems.

Despite giving power to local people to vote for their village leader and TAO chairman and administrative team, decentralisation is another factor that weakens the social norms and regulations. This is confirmed by Ratchagool (1999) who stated that the TAO has promoted the adversarial politics and conflicts in resource competition among villagers. When the new legal system was introduced, the previous systems of local organization and management based on social, cultural and moral values were replaced. The current preference for physical and infrastructure development of TAO has dwindled social development, in particular education and community ethic promotion, as well as local natural resource management. Moreover, certain key socio-economic problems, e.g. the on-going immigration of young labour, the absence of local job creation promotion, the deterioration of national resources, hazardous waste and pollution management, which may affect the future existence of the community , are still ignored.

Second, there was a lack of awareness and willingness of villagers to participate in the decentralisation process. Due to the lack of knowledge about decentralisation and their doubts regarding the effectiveness of the TAO administration, the villagers have generally not been keen on participation in monitoring the operation of TAO and cooperating in community planning and policy development. In terms of silk MSEs, due to the lack of support from the TAO, almost all the producers have avoided paying business tax to the local authority. Since the TAO lacked both data and revenue from local informal businesses, it was easy for them to intentionally neglect the promotion of these micro enterprises. This may indicate the weakness of decentralisation and of local authorities as well as the vulnerability of village institutions.

In spite of focussing on infrastructure development, the Sam Meung TAO in Sida has occasionally offered support to SMCE development. This is because of the SMCE's contributions to community development and its outstanding reputation at district and provincial level. Inevitably, the TAO has to provide cooperation between the SMCE and external organisations and support for the group's development activities.

Since the entire budget for promoting SMCEs and community development from the government offices at the district level has been transferred to the TAOs (35 per cent of the state's budget in the 2006 fiscal year), the contribution from TAOs to SMCEs' development has become more doubtful. If the current TAO's perception of boosting local business and employment in a sustainable manner does not improve, the collapse of silk MSEs, the economic backbone of the villages, could lead to the decline of local revenue. Moreover, the TAO's increased financial burden combined with the deterioration in natural resources could make it more difficult to deal with the escalating levels of poverty in the community in the future.

6.3.6 Market

From the survey and group discussions, it was possible to observe that the market is a vital factor for the survival of these informal silk micro businesses. To gain more insight into how raw materials can be converted into finished products, the subsector map has been employed to illustrate all important participants and the linkages and relationships between these agents involved in a subsector. It also shows the principal channels of products in accordance with their final markets (Haggblade and Ritchie 1992; Majale and Albu 2001; Salm 2002; Ward and Gilbert 2001).

The key participants in Thai silk fabric production include suppliers, producers, processors, traders, and final markets in both formal and informal sectors. Figure 6.3 presents the flows of the four main channels of fabric produced by key producers and of markets. As mentioned in Section 6.1.6 c, the market for the MSEs and the SMCEs is apparently limited because of the shortage of distribution channels. The major market of MSEs is the wholesaler and middlemen, whilst only a small fraction of products is sold directly to the domestic retail market. In the meantime, the SMCE in Sida prefers direct distribution to its niche market rather than selling fabric to middlemen.

Since the majority of silk producers in Thailand are in SMCEs (around 117,000 producers[11]), the estimated value of market of silk SMCEs is approximately 28 million GBP or 48.1 million USD per annum, the largest market value in the country.

[11] Estimated data in 2003 (Agrifood Consulting International, 2005)

Although the number of the silk MSEs in Pak Thongchai, which were roughly estimated by the district community development official in the first fieldwork in 2004, are much smaller (650 producers), the estimated market value of this informal economy is around 44 percent of market value of SMCEs (12.2 million GBP or 21 million USD per annum) and about the same as the market value of export producers (12.1 million GBP or 20.8 million USD per annum). Details of calculation of the market value are presented in Appendix 5.3. However, this subsector map is not complete due to the absence of data relating to the number of silk SMEs in Pak Thongchai and in other key production sites in the country. Regarding the significant value of domestic market as shown in Figure 6.3, silk wearing traditions and local demand for affordable lower price range silk products are key factors for silk consumption in Thailand. Such a market also exists in India, China and expected soon in Vietnam (International Trade Centre 1999a).

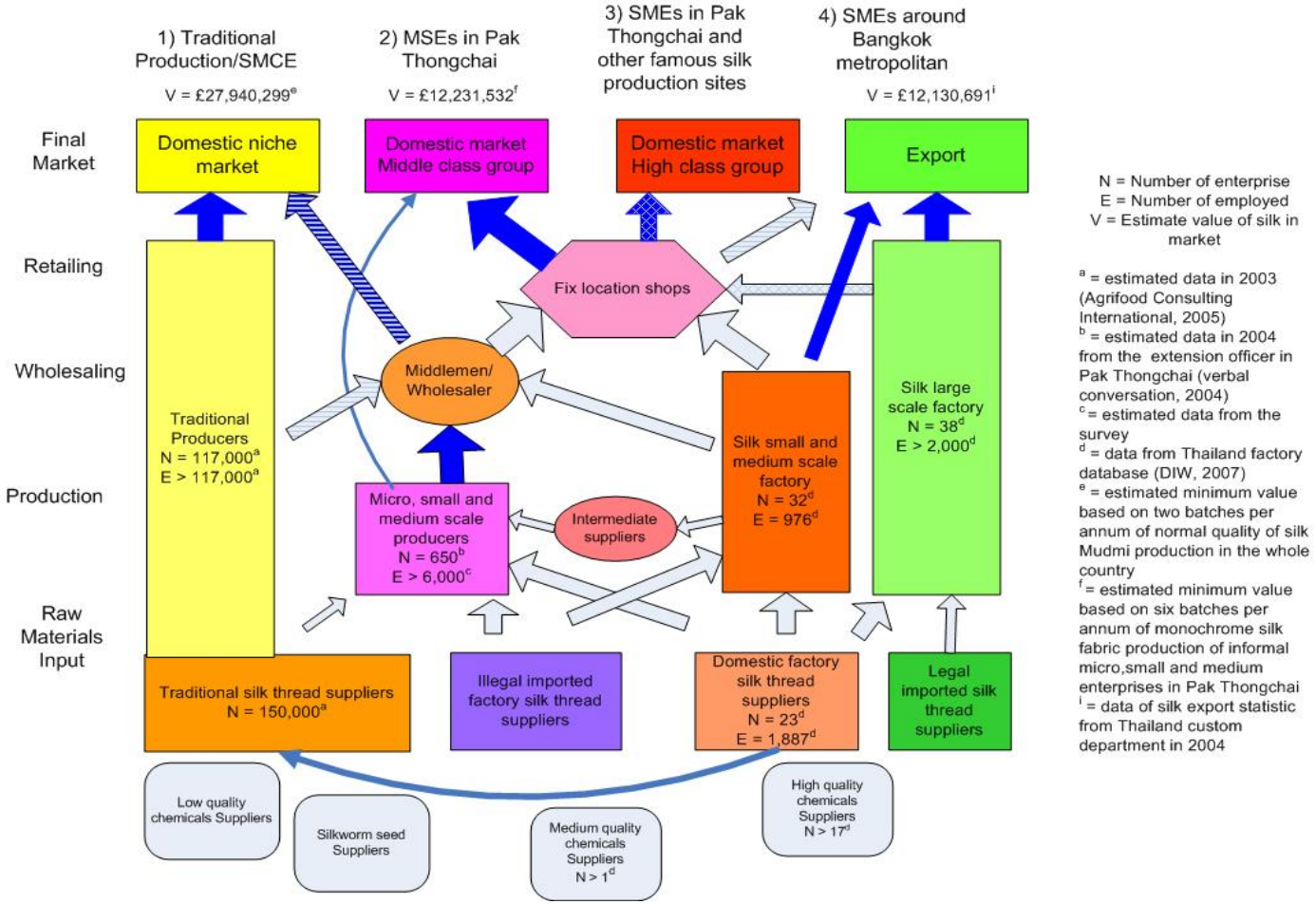

Figure 6.3: Subsector map of Thai silk industry
(Source: Survey data, 2006)

Because of the lack of knowledge and information about the market and customer preferences, the trend towards selling wholesale has had a more devastating effect on MSEs in Pak Thongchai than the SMCE in Sida. Since the implementation of the OTOP and the village funding policies, silk fabric has become over-supplied due to the escalating number of silk producers and the absence of any new markets. Although the OTOP policy has provided more retail markets, the small amount of fabric sale from this market could not provide satisfactory return in response to its high production costs and time constraints.

Moreover, the effect from a series of shocks from epidemics, natural disasters and oil's price surge since 2002, have led to the growth of average inflation from 2.7 per cent in 2004 to 4.5 per cent in 2005. These have directly affected domestic consumption expenditure and the number of tourists (Bank of Thailand 2006). As a result, the reduction in sales of silk garments, accessories and souvenirs, the final processed products of silk fabric, has had a negative effect on the main market of the silk MSEs and the SMCEs since 2005.

Without doubt, the MSE's financial capital has been diminished by the reduction in sales. In these circumstances, the middlemen and SMEs in the formal sector have begun to insist on their chosen price and mode of payment. Suppliers have also totally controlled the price of silk yarns, even for smuggled thread, due to the high demand of MSEs and SMCEs. Without any measures by the government to prevent this unfair trading, the silk MSEs' finances have almost collapsed which has led to the vulnerability of craft production in the villages.

The group discussion on the effect of policies and trends on MSEs showed some significant perceptions about the market and the complacent behaviour of producers. It appeared that most of the MSEs are only interested in current problems, though they have learned about the potential policies and trends that may cause positive and negative impacts in the future. This is because several producers believed that silk livelihood could survive and they would overcome these hardships as their predecessors did. Despite being aware of the current and future trends of market, they did not want to invest their limited capital in business improvement. This could be confirmed by the result of the empirical study in phase II in October and November 2005. In this phase, the survey result, presented in Chapter 4 and 5, was shown to silk

producers in order to stimulate the development of a silk sustainability plan for each silk community in the study sites.

The result of group discussions found that there is no agreement about developing the community' silk business improvement plan in Baan Doo and Baan Doo Noak villages, though they have learned about the problems in their businesses and community. Only the leader of Baan Doo silk handicraft weaving group was interested in and developed the plans, as discussed in Section 4.6.3.a and b. The producer group in Baan Han and Han Tai villages has developed a short term plan for expanding their market, also shown in Section 4.6.3.a. This may imply that the development of MSEs and SMCEs at cottage industry level would require a change in producers' attitudes to the market and business management in the light of changes resulting from globalisation.

Whether the silk businesses in the MSEs survive or not, the changes in types of silk handicraft products in Pak Thongchai raises questions about the meaning of traditional handicraft and the promotion method of Thai handicraft production for a market economy. Parnwell (1993) stated that in order to excel in a market economy, traditional rural cottage industries need to produce a great amount of more marketable and better quality commodities at low cost in a reliable and efficient way. This concept may imply that the promotion of market-oriented production in traditional handicraft products could devalue handicraft products, in a particular art context, to become ordinary manufacturing products. By omitting its advantage in terms of artistic and unique characteristics embodied in the products, it is unlikely for handicraft products to compete with industrial mass produced products under the industrial quality standard regulations in the global free market. Instead, the focus should be more on quality enhancement than quantity.

The asset constraints of MSEs producing mass scale products make them more vulnerable than SMEs in the intensely competitive market. Due to the ineffectiveness of labour management and the lack of consistency in product quality, it is difficult for MSEs to produce a large number of quality products within a short deadline. Consequently, late delivery would lead to a high risk of product refusal or being fined by clients. These incidents not only damage the manufacturer's liquidity, but increase the chance of indebtedness. Hence, the promotion strategy of silk livelihood in the

MSEs needs to consider whether their craft products should compete in the silk handicraft market or in the silk industrial market.

In the meantime, local niche markets for traditional clothes have gradually diminished due to the introduction of new cheap industrial clothes and changing fashion trends amongst the younger generations. Thus, the SMCE may need to rely on external markets, particularly in their own and other provinces. Although the dramatic rise in inflation in 2005 lessened sales in MSEs in Pak Thongchai, the domestic niche market, which is a major market of the SMCE, has been affected slightly. Since access to external markets has mostly been promoted by the state, the consequence of the current political disruption and the shortage of government cash flow between March and April 2006 could affect the government administration's ability to sustain their support of marketing. These factors are likely to impinge on SMCE sales in the forthcoming period.

6.4 The effect of silk livelihood on organisations

6.4.1 The producer group and network establishment

Group working and networking between villages have been important organizational units in agrarian society for many years. Due to labour intensive activities in farming and using traditional technology, people need to help each other to work in the form of groups in order to perform physical tasks, e.g. rice transplanting and harvesting, in time. Sometimes, networking has built up for the exchange of surplus products and services between communities. At present, most self-establishment group working has mainly provided workforce or financial support for community development activities and some social activities, i.e. wedding and funeral ceremonies, but not for individual economic activities.

In order to develop the rural economy and alleviate poverty, the government has launched several development projects by using a group approach since the 1950s. Many groups have been formed to produce, process and sell their agricultural and non-farming products to external markets. However, most such groups have failed. These failed producer groups were mostly initiated by the local extension government officers in a top-down paternalistic pattern. Lack of marketing and business

knowledge and lack of enthusiasm of group organisers (producers and extension officers) are noted as the major factors in the failure of the group approach and the increase of poverty in the communities (Dwight 1994; Vongkul 2003). The promotion of this same unsuccessful group approach format by the state extension officials has discouraged villagers from working together in groups. This ineffective group formation has been mentioned by successful weaving groups, e.g. Prae Pan and Pan Mai groups, including MSEs in Baan Doo and Doo Noak villages (Vejayachai 2001).

In Pak Thongchai, the resources support for group work in the community has recently changed. Due to their silk businesses and their improved economic status, most silk producers prefer providing support in the form of finance rather than labour. These producers have become more isolated in the community. The conflicts from the fierce competition in the silk market and pollution from silk production have adversely affected social capital in the communities. There have been many attempts to promote the formation of silk producer groups and co-operatives by the state extension officials, however, the incompatible administration of these groups with the mass market-oriented production of MSEs has been addressed. Insufficient finance and lack of group managerial skills led to the inability to initiate essential group activities, e.g. setting up silk yarn or dyestuff funds, marketing plan development, etc. The failure of the group approach in silk MSEs has prompted more vulnerability in terms of producers' finance, production capacity, trust and enthusiasm towards the group approach.

However, the group approach in Baan Fhake and Non Samran villages seems to have improved individual income and relationships in the community, particularly in the silk weaving group. This is because the promotion of economic activities, via the silk SMCE, cooperatives shop, by the government has encouraged villagers to work together regularly throughout the year and to build up a network with other SMCEs. Even thought the annual state support is inadequate, these schemes have enabled the healthy growth of villagers' micro scaled production. Without any strong market driven force, the SMCE has continuously developed to operate every stage of the silk business, from production to distribution. The participatory management group approach also enhances individual human resource development and strengthens social capital in the community.

6.5 Opportunities and Constraints

In order to promote the sustainability of silk enterprises in the informal sector, it is essential to analyse the opportunities and constraints of these enterprises which are affected by business and manufacturing processes and related policy. Key opportunities and constraints data were summarised from the preliminary survey and group discussions. These data were categorised into micro and macro levels and are shown in Table 6.6.

It seems that the silk SMCE in Sida has more advantages than MSEs in Pak Thongchai in several respects. In terms of production, the SMCE has obtained self-reliance capacity in raw materials, i.e. silk yarn, fuel wood and water. Using traditional tools could reduce production costs and help skilled producers to maintain their product quality easily. Doing business as a group provides producers with benefits in terms of finance, raw material sourcing, marketing, business skills training and product development. Furthermore, the launch of various state programmes, e.g., the SMCE promotion, sericultural promotion and new silk trademark standard, contributed direct support for the long term comprehensive growth of the SMCE.

Meanwhile the expansion in production scale of the informal silk MSEs in Pak Thongchai caused the loss of self-reliance in key resources, e.g. silk thread, fuel wood or even water, used in silk production. The complete dependence on external suppliers for raw materials has greatly increased production costs. Lack of product uniqueness and the preference for the wholesale market led to the categorisation of their products as low quality factory silk, not handicrafts. Since MSEs originated in the form of entrepreneurship, it is hard for them to cooperate and work as a group like the SMCEs in this highly competitive market. The slump in product prices, the limited market distribution and the shortage of their own product quality standards have undermined MSEs' competence to compete with silk SMEs. Furthermore, being unable to access the government's enterprise development schemes and inappropriate policies have made these enterprises more vulnerable to the free market.

Table 6.7: Opportunities and Constraints of MSEs and SMCE

Issues	Producer	Opportunities		Constraints	
		Micro	**Macro**	**Micro**	**Macro**
Business Processes					
a. Raw material	MSEs	Greater amount of high quality traditional and factory silk thread	- Increase in the amount of imported and traditional silk thread - Decrease in price of every type of silk thread		Uncertainty of climate in recent years may affect the fluctuation of silk yield and price
	SMCE			Increase the price of silk worm pupas	
b. Marketing	MSEs			- Decrease in sales of products - Decrease in fabric price - Lack of awareness of training and knowledge of market - Lack of access to market information sources	- Strong competition in market with various imported fabrics - Lack of marketing network/cluster that can manage or support MSEs on price setting and marketing
	SMCE	- Increase in sales of products - Having more awareness of market training and knowledge transfer	- Being promoted as a district representative in every festival and OTOP fare	- Lack of access to new sources of market information - Lack of young labour in making processed products and developing market plans	- Strong competition in traditional market

Issues	Producer	Opportunities		Constraints	
		Micro	Macro	Micro	Macro
c. Managerial skill	MSEs			- Low literacy skill impedes the access to and the application of information - No apparent business plan and management	- Lack of the development of training course for MSEs - Lack of continuous monitoring and support of organisation after training
	SMCE		Being supported in SMCE management skill by several government offices	Lack of young weavers working on group management	- Lack of the development of training courses for individual weaver's management - Lack of continuous monitoring and support of organisation after training
d. Standardisa-tion	MSEs	New trademark will increase market particularly for souvenir and household decorative products	New national trade mark will promote the classic and normal grade of genuine silk product for MSEs' and the premium and classic grade of SMCE's products	No impact on price setting and increased negotiating power with middlemen	Lack of the certification of an acceptable standard that middlemen and producers can use for distinguishing high quality products
	SMCE	All awards and OTOP stars certification force groups to maintain and improve their product quality and price negotiating power			

Issues	Producer	Opportunities		Constraints	
		Micro	**Macro**	**Micro**	**Macro**
e. Finance	MSEs			Shortage of cash and unable to gain high profit margins from high interest loan from informal sources	Lack of low interest loans for non-farm MSEs in the formal economy
	SMCE	New saving schemes for groups and annual silk loans relieve the financial burden of members	Low interest financial support would be launched by the new SMCE promotion scheme	Shortage of group's cash may occur after the finish of current interest free loans from government offices	
Manufacturing					
a. Technology	MSEs			Low literacy skill impedes the access to information and the application of technology and some technical knowledge	Lack of the development of appropriate technology and technical knowledge for promoting MSE's production, enhancing quality control and for reducing health and safety impacts from silk production of the older weavers in SMCE
	SMCE	Low technology forces weavers to work delicately in every step which effectively controls the quantity and quality of group's product			
b. Product development	MSEs			- No incentive to take high risk to develop new products that have no market and easy to be duplicated by rivals	Lack of various techniques and appropriate knowledge of training courses and market support make enterprises more likely to imitate products in market

Issues	Producer	Opportunities		Constraints	
		Micro	Macro	Micro	Macro
b. Product development (continue)	MSEs			- Low literacy skill impedes the understanding of the training course and the application of knowledge	
	SMCE	Incentive from winning awards at local and regional levels stimulate weavers to create new patterns of fabrics		- Lack of young labour working on product development - Successful fabric market hampers weavers to produce a new product	Lack of various technique of training courses leads to the similar type of products in market
c. Environ-ment and health and safety	MSEs			- Low literacy skill impedes the access to and the application of information - Lack of fuel wood and quality water increases production cost	- Lack of information and knowledge transfer on environment and health and safety in work place - Lack of monitoring and enforcement to control the selling of non traceable chemicals and environmental management as well as pollutant emission in rural areas
	SMCE	Small size of production has less effected on resource depletion		Lack of awareness of chemical hazards and injury from working cause weavers get some illnesses and lose their working capacity	

Issues	Producer	Opportunities		Constraints	
		Micro	Macro	Micro	Macro
Policy	MSEs			- No support policy to promote MSEs from TAO - Very few MSEs' requirements are supported by state policy	- Lack of national policies that promote the development of MSEs in the informal economy - Being excluded from provincial silk strategy plan - Lack of budget and man power to push for policy to achieve target efficiently
	SMCE		New SMCE promoting act would provide all essential support for SMCE development	- Decentralisation hampers the development of SMCEs due to TAO's priority in the development of infrastructure	- Being excluded from provincial silk strategy plan - Lack of budget and man power to push for policy to achieve target efficiently

6.6 Cultural tourism and marketing promotion

According to the economic sustainability plans of both case studies, as mentioned in Section 4.6.3.b and 5.6.3.a, the development of cultural tourism and learning centres in villages has been proposed to promote the market opportunities of producer groups in Baan Doo-Doo Noak and Baan Fhake-Non Samran. The study of the OTOP policy and Provincial Silk Strategy found that these plans have good potential to be supported. Being categorized as one of the OTOP products, the *"OTOP Village"* scheme, which focused on enhanced cultural tourism via visiting and learning how to manufacture OTOP goods, has been introduced and promoted to increase alternative markets for producers and promote the local economy since 2004 (Office of Tourism Development 2005).

In the meantime, the *"Silk Road"* tourism project in Provincial Silk Strategy, which is expected to be launched in 2007, has been developed to encourage tourists to travel to the outstanding OTOP silk production sites around the northeastern region. Silk production sites in Sida and Pak Thongchai have been selected to be among the destinations on the route of the *"Silk Road"* (The Province Cluster of Lower Northeastern Region 2006). Both production sites have also been proposed to be part of the OTOP tourism village scheme by their district authorities. Furthermore, these two areas have been selected to be one of the silk learning sites of non-formal education and lifelong learning for other producer groups.

It is expected that the promotion of tourism and group visits could revive community awareness of preserving their traditional identity, developing products for retail markets, improving group work, keeping the community environment clean and tidy and promoting the local economy. However, this plan may expose the village livelihoods to unforeseen risks. Given that the main theme of cultural tourism is about experience and appreciation of the local arts, heritage and traditions, the drive of the tourist market is likely to impact on the traditional identity of products and lead to a shift to produce the craft on a mass scale in response to trends and demands of this new market. Parnwell (1993) pointed out that the products for tourist markets have become cheaper and lower in quality, standard and traditional relevance. Nevertheless, this modified product cannot always succeed in the market place.

In northern Thailand, producers in some craft producing villages were subcontracted to produce a large quantity of products unrelated to their cultural background by foreign entrepreneurs. This complete reliance on the export market led to these producers being squeezed out by the fluctuation in demand for local crafts on the world market caused by the recent flooding of cheap products globally (Cohen 2000).

It is, hence, crucial for producers to monitor and evaluate the ratios of this new and local market in order to reduce the risk of relying solely on one market. The production of tourist goods and services, e.g. primary and secondary products, events, transport, facilities, etc., are needed to achieve tourist satisfaction. Human capital in local areas needs to be recruited and also requires training in the provision of services (Russo and Borg 2002). As the number of tourists in this niche category is not large and this activity provides only supplementary income, a whole community should assess their capacity and set up the extent of services they can provide for tourism in order to invest the limited input effectively in the long term. Because the changes in silk manufacturing in Pak Thongchai may be mismatched with tourist expectations, the adaptation of livelihoods in this rapidly urban peripheral area should be emphasised and tourists need to be informed of this in advance.

6.7 Conclusion

Since silk production has shifted to be a market-oriented production, it has had positive and negative effects on local livelihoods. As silk becomes the main livelihood in Pak Thongchai, the villages' economies have fluctuated due to their integration with regional and national markets. The boom of silk MSEs and the recent decline of the market has not only put the producers' finances at greater risk, but also exacerbated the decline in other livelihood assets of the village. Concurrently, the SMCE in Sida, producing silk for supplementary income, has not been affected as greatly by the downfall of the mainstream market. The small scale of quality fabric production and group support systems have strengthened and promoted the increase of several livelihood assets in the communities, but not the natural assets.

Due to the lack of policy support, MSEs have had to compete with other producers in the formal sector that receive support from the government. The free market system tends to weaken MSEs and as a result they fall under the control of middlemen and

suppliers. In contrast, the SMCE in Sida has enjoyed much support from government offices for over a decade. The group's strong management has increased their negotiating power with wholesalers and state organisations. However, the support of silk livelihood by local authorities, especially TAO, is relatively small in comparison with their interest in developing tangible objectives. The budget transfer from provincial office into TAO in 2006 may damage the growth of silk MSEs and SMCEs in communities in the future unless TAO changes the way of promoting community development in social and economic contexts.

Silk commercialisation has become a key empowerment tool for women in rural areas since they can contribute cash in the period before harvesting. The introduction of industrial style of production and changes in social norms and attitudes has encouraged men and outsiders to participate more in silk manufacturing. Nonetheless, the higher educational attainment of children and the promotion of industrial growth of Nakhon Ratchasima province have heightened the problem of labour shortage in rural villages.

Opportunities and constraints affecting each individual business need to be analysed to gain more insight into the business environment. To survive and grow in the free market environment, it is vital for silk MSEs and SMCEs to obtain government support in production, business management and marketing as much as possible. Because of the absence of a market regulatory body and sufficient regulations and measures to support and monitor fair trading, the boom of silk production from OTOP and grassroots economic stimulation policies has forced silk producers to manage and cope with the business risks from increasing purchasing power of customers by themselves.

In order to reduce serious market competition within villages and strengthen producer's production capability, the ethics and Buddhist principle with regard to SEP has provided significant advantages in social cohesion and group operating, particularly in the SMCE in Sida. In contrast, "*weakened ethics*" of MSEs in Pak Thongchai have exacerbated the conflicts in the communities occurred by silk manufacturing and silk business competition. Under these circumstances, it is difficult for them to cooperate and develop the solution for these conflicts.

The strong competitiveness of SMCE in Sida, developed from a number of government support schemes, has gained the group greater advantage over other silk SMCEs in the province or even silk MSEs in Pak Thongchai. This may imply that these advantages, such as the abundance of livelihood assets and good cooperation in marketing, production and group management are key factors for the success of silk micro businesses at the grassroots level. Marketing support by the government is indeed vital to allow these remote producers to be able to access new markets and learn about marketing their products. The promotion of cultural tourism can also enhance silk businesses and local economies as well as the preservation of traditional culture.

Chapter 7
Conceptual Framework Appraisal

This chapter assesses the application of three key methodological frameworks: the Sufficiency Economy Philosophy (SEP), the SL framework and the CP concept, in the research. In order to gain more understanding of the sustainability of the Thai silk cottage industry, the feasibility and application of the combination of local (SEP) and international sustainability tools (SL and CP) is examined. The recommendation of attuning these methodologies with silk MSEs and SMCEs will be suggested in Section 7.2. Furthermore, the advantages and constraints of each methodological framework in Thai silk cottage industry are explored in Section 7.3.

7.1 Three conceptual methodologies in the Thai silk cottage industry: Feasibility and Application

Since the ultimate goal of the SEP, SL framework and CP concepts targets resource optimisation and sustainability, the combining of these methodologies to explore the sustainable strategy for Thai silk cottage industry has been presented. The survey and discussion results presented in Chapters 4, 5 and 6, illustrate the development of and trends in silk livelihood at the grassroots level. This is because each methodology provides essential complementary data that might be missed if only one methodology is employed.

Figure 7.1 illustrates the complementary nature of each methodology in the study of sustainability. Data related to production and business management was provided by the study of the nine factors shown in the SEP box (c.f. Section 3.4.2 of Chapter 3), combined with the CP audit. The data concerning the development of the silk cottage industry and its impacts on communities' economy, society and environment are provided by the SEP. The CP material balance audited material consumption and pollution resulting from the bleaching and dyeing processes. The results of this audit could provide more insight into the efficiency of silk manufacturing, as well as technological, environmental and occupational, health and safety issues. In the meantime, examining the SL framework could present background data related to the

economic, social and environmental effects of silk MSEs and SMCE on livelihood assets. To classify data in accordance with its related context, Table 7.1 summarises four data categories: economy, society, environment and production, derived from employing three integrated methodologies.

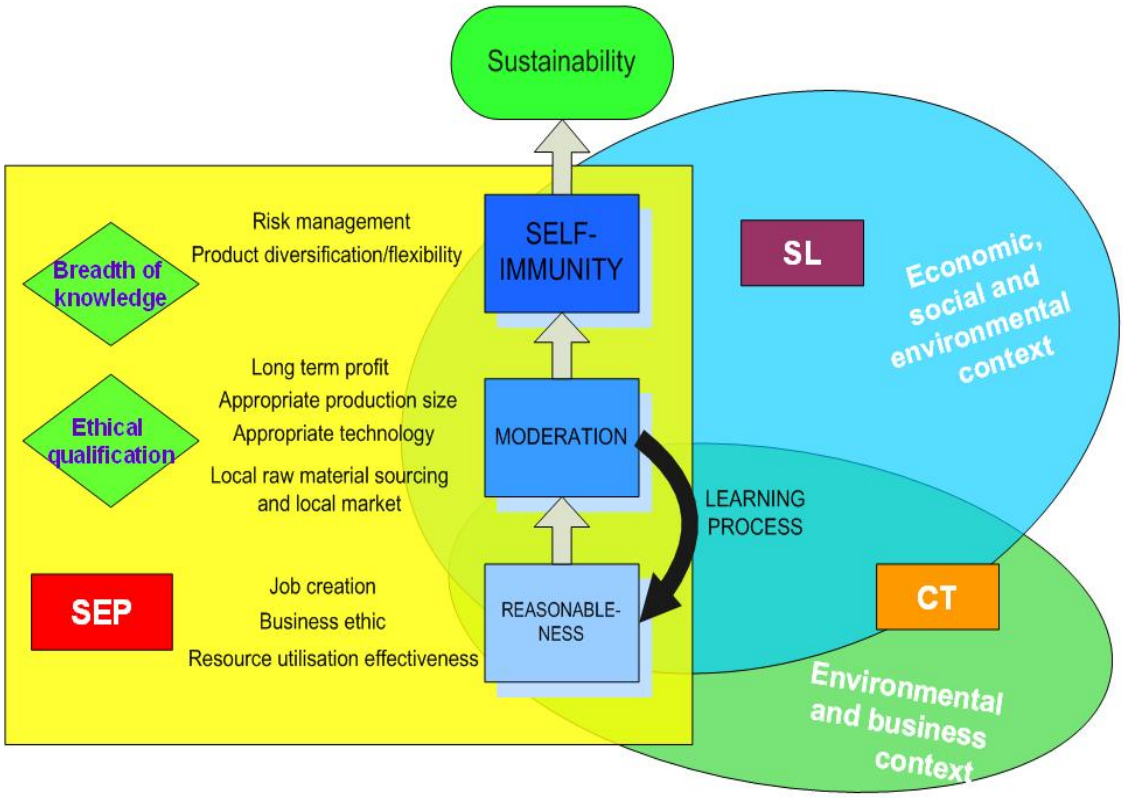

Figure 7.1: The complementary nature of three integrated methodologies in the study of the sustainability of the Thai silk cottage industry

(Source: Data Analysis, 2006)

Table 7.1: Scope of the content of the study derived from employing three methodologies

Content	SEP	SL framework	CP concept
Economic context			
- Finance assets	✓	✓	✓
- Physical assets	✓	✓	
- Business performance	✓		✓
- Derived impacts on community		✓	
- Influencing factors and trends affecting the silk business	✓	✓	✓
Social context			
- Social capital	✓	✓	
- Business Ethics	✓		
- Human skill development		✓	✓
- Derived impacts on community		✓	
- Influencing factor and trend affecting social capital		✓	
Environmental context			
- Natural resource consumption		✓	✓
- Pollutants, waste and waste management			✓
- Derived impacts on community			
- Influencing factors and trends affecting the local environment		✓	✓
		✓	✓

Content	SEP	SL framework	CP concept
Production context			
- Input material	✓		✓
- Employment	✓	✓	✓
- Technology	✓		✓
- Waste			✓
- Production efficiency	✓		✓
- Management efficiency	✓		✓
- Product Diversification	✓		✓
- Occupational health and safety			✓
- Influencing factors and trends affecting silk production		✓	✓

From the empirical study, civil society in Thailand is weak, which means all sectors are heavily dependent on government support. It is difficult for silk MSEs and SMCE to develop any plans to achieve their livelihood outcomes, despite the fact that they are aware of the effect of the silk cottage industry and external factors related to silk production on livelihood assets. Since all these micro and small producers has been excluded from the provincial silk strategy, they need to develop coping and adaptive strategies. Although there were many attempts to stimulate the implementation of the third step of the SEP, which is clearly focused on developing a contingency plan to reduce the unwelcome impacts from any risks, most silk producers particularly in the informal sector are not interested in this process. To foster the long term development of the Thai silk cottage industry, several issues need to be considered to improve the application of these integrated methodologies. The details of these recommendations will be discussed in the next section.

7.2 Recommendations for the use of three integrated methodologies

To achieve the livelihood outcomes of silk producers at MSEs and SMCEs level, the self learning process is an essential means for producers and communities to achieve their targets. However, the empirical study found that there are some obstacles in fostering this process in Thai communities. Most producers seemed to be confused and did not show much interest in developing plans to solve problems, though they have learned more about the impacts of silk livelihood, the business situation and future trends. It is necessary to consider the following factors: data interpretation and synthesis and empowerment.

7.2.1 Data interpretation and synthesis

It is evident from the group discussions that there was a gap in understanding of the technical and/or complex data from the survey. This data included the laboratory results related to waste water, efficient consumption of chemicals used in the bleaching and dyeing processes, marketing, etc. Lack of complete understanding of this data did not improve silk producers' awareness of the severity of the current situation. As a result, producers were unwilling to develop strategies to cope with the problems.

An example of this limited understanding is the data from the BOD and COD analysis. Although the producers had learned how high these levels were in their effluent and public pond compared to the maximum level of the national industrial effluent standard, they could not fully understand the extent of the impact. The absence of appropriate benchmarks and indicators, such as the BOD of unpolluted river water in developed countries of less than 5 mg O_2 per litre during a period of five days and the impact of effluent on the presence of local indicator species, e.g. invertebrates and plants (Moss 1998), there is little awareness of environmental problems in the villages.

The limited understanding is also evident in the feedback given in the one-day CP workshops for promoting the efficient use of chemicals in silk production, held by the 11^{th} REO in 2003. Even though there were attempts to demonstrate how to optimise the use of chemicals and water in the bleaching and dyeing processes, most silk MSEs were dissatisfied with the colour of the dyed silk yarn and perceived that the

optimisation concept was inconvenient and time-consuming. This may be explained by the unsuccessful outcome of the bleaching and dyeing demonstration caused by time constraints[1]. Therefore, it is necessary to reconsider the workshop schedule in terms of time allocation for training in bleaching and dyeing methods. It is also necessary to ensure that relevant workers in these processes are targeted and selected for the training programme.

Marketing is another pivotal issue that most silk producers seemed not to pay attention to as they could not identify the link between the present situation and influential external factors, i.e. trends, shocks and policies, related to the silk business in the future. For example, the lack of awareness of the amount of fabric which was sold to the silk SMEs in Pak Thongchai in recent years may potentially prolong MSEs' low price of wholesale fabric and further decrease sales in the coming years. The tools that illustrate market structure and the inter-relationship between each of the key actors and external factors, such as subsector analysis and value chain analysis, could help silk MSEs and SMCEs to gain more insight into the complex relationships in the market than the popular tools currently implemented by the extension offices and researchers i.e. SWOT analysis or marketing mix concept[2]. Furthermore, these tools help to pinpoint the leverage point that prompts the greatest effect for the intervention (Agrifood Consulting International 2005; Albu and Scott 2001; Tallontire *et a*l. 2001).

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[1] The demonstration held in the afternoon session of training, which made the demonstrator to shorten the time of bleaching and dyeing processes. Moreover, the dyed silk yarn which was presented under fluorescent light did not show the greater quality of dyed thread compared to the usual processes they employed (verbal communication with the 11 th REO official and silk producers in Pak Thongchai)

[2] Marketing mix concept is the implementation and specification of the 4 Ps to describe the strategic position of a product in the marketplace. These 4Ps include product, price, place, and promotion (Reference Borden, N. H. (1964), "The Concept of the Marketing Mix", Journal of Advertising Research, June, Vol. 4, pp. 2-7. Available in Schwartz G. Science in Marketing. John Wiley & Sons, NY 386-97).

7.2.2 Empowerment

Although decentralisation has been implemented over a decade, most major plans and policies for community development are still developed by the government. These top-down policies have maintained control over resource management, e.g. finance, laws, information, which has led to weaknesses in the civil sector.

a. Effective Groups and networking

In order to restore these resources and management power at grassroots level, group and networking approaches have become an effective empowerment tool in Thailand. These approaches are also indicated as a key step in inter-community trading for communities according to the application of the SEP in the agricultural sector (UNEP 2007). This can be seen from the development of successful communities, which are well known for their capabilities in developing and implementing plans for increased self-reliance, where strong manufacturing and savings groups have played a vital role in supporting this achievement (Kaewthep 2001; Kannasutra 2001; Petchprasert 2001a; Vongkul 2003).

It is evident from the survey that group and networking approaches have empowered villagers in Baan Fhake and Non Samran villages not only in terms of improved quality of life, but also regarding increased access to support from local authorities for implementing their group's development plans. However, these approaches are hard to perform in the communities where there is a low level of social assets, i.e. trust and mutual relationship. NESDB (2005b) noted that the social assets of over half of the total number of communities in Thailand are damaged by the intrusion of capitalism into the villages. The failure of the group approach in both silk MSEs'communities in Pak Thongchai supports this finding.

b. Finance

Since silk production has become a major livelihood in the villages in Pak Thongchai, finance is now an important factor in securing their businesses' growth. As a result of the expansion of production scale beyond their capacity, loss of self-reliance in raw materials and production as well as dependence on the wholesale market, silk MSEs require a large amount of capital to operate. Although there has been an attempt to set

up a saving co-operative by silk MSEs in Baan Doo and Doo Noak villages, the money they invested was insufficient to cover the borrowing needs of all of the members. Therefore, mortgages from banks and loans from informal financial providers are ways of accessing financial support. The consequences of the market recession in the past five years have caused the MSEs to become more vulnerable to poverty.

c. Young workers

As most silk producers are middle aged and have difficulty in acquiring new skills, it is hard to improve their managerial skills and business knowledge. Furthermore, lack of information about the market and fashion trends increases the problems of the business even more. The recruitment of young workers could provide more opportunities for business growth. The survey findings reveal that young workers in the SMCE in Sida and some MSEs in Pak Thongchai have contributed to the new production lines (silk clothes and accessories) and the expansion of retail sales.

d. Business mentors

As they live in rural or peri-urban area and mostly have primary level education, it is very difficult for silk producers to access key silk related data and information, e.g. market trends, technology, trade policy, and so on. It is also hard for them to understand and implement appropriate measures to improve their business and production performances by themselves. Hence, finding advisors or mentors from external organisations in nearby areas could become a crucial factor in the development of the MSEs and SMCEs.

From the interview with the marketing manager of Silk Net it was clear that several thriving SMCEs, i.e. North Eastern Sericulture and Silk Development Network (Silk Net), Isan Handicraft and Woman Development Network and Natural Conservation Rice Mill Club, have shown their ability to undertake and develop business by themselves. This is also substantiated by the literature review. This is largely because they have developed a ‘good partnership’ with such groups as local government offices, NGOs or other successful networks which provides not only helpful information about how to develop business management skills and knowledge but also advice on the running a business (Kaewthep 2001; Vejayachai 2001).

Therefore, in order to strengthen the silk cottage industry and restore social assets in Thailand, it is essential to empower silk producers via group or networking approaches. Nevertheless, the promotion of group or networking approaches should be adjusted to the need of producers, especially in MSEs. From the survey, it seems that the conventional group or networking approaches which are promoted by the extension offices are probably not suitable for MSEs due to silk's status as the main source of income and the highly competitive market. To promote these approaches in MSEs, it is necessary to set up activities which increase cooperation among producers and foster business growth, e.g. financial support and marketing development. Moreover, encouraging younger people to work in the silk cottage industry and using business mentors could revitalise the business and sustain community development in the long term.

7.3 Opportunities from applying each methodology in the research

In this section, the three methodologies employed in this research were evaluated in terms of the opportunities they provide to improve effectiveness in promoting sustainability of livelihoods in the informal sector. Given that the SEP was used as the theoretical framework in this research, the use of SL and CP concepts in terms of clarifying the SEP application in practical way is discussed.

7.3.1 Opportunity from applying the SEP

As discussed in Chapter 2, the SEP has not had any specific procedure for Rural Non-Farm Activities (RNFA), though many research projects in Thailand have analysed and transcribed some practices of business enterprises operating in the framework of SEP. This study, in contrast, has employed the SEP as the principal framework for collecting data, particularly in the business context, and for developing a business plan for informal silk production. It revealed several interesting issues in applying the SEP as follows.

The comparative study between the silk weaving group which has applied the SEP in their businesses (the silk SMCE in Sida) and the groups that have not applied the SEP (silk MSEs in Pak Thongchai) finds that the SMCE seems to grow healthier and more sustainable than MSEs in economic and social terms. This could be explained by the

increase in self-reliance and resilience of household and community which is the goal of the SEP application. The increase of liquidity from silk weaving, which is reliant on local raw materials and skills has strongly supported the way of life in agriculture. Moreover, working as a group in the form of the silk SMCE has played a vital role in fostering their members' capabilities of self-reliance in silk yarn production, of silk production skills and financial improvement as well as of increasing negotiation power with supporting agencies. These factors have enabled group members to produce high quality products and various types of value added products that permitted the silk SMCE to succeed in marketing and sales.

If the SMCE could maintain their strong growth within the SEP thinking, the contributions from silk livelihoods could greatly promote the development of other economic activities in the villages or nearby communities. Examples of successful groups operating in this format include Mai Riang community, Kud Chum community and In Paeng Network. The In Paeng network struggled with poverty and debt as a result of cultivating commercial cash crops. However, it finally managed to restore food security, produce basic consumer products, provide services at community level and set up the SMCEs to sell their surplus products within communities and networks (Kaewthep 2001; Ronnarong 2004; UNDP 2007).

In addition, the diversification of savings sub-group activities, which is initiated by the SMCE, could lead to the development of a social safety net and economic activities in villages, e.g. funeral services, medical care, child delivery. This has been successfully achieved by the Klong Pliah, Na Vah and Nam Khao savings groups (Petchprasert 2001a; UNESCO PROAP 2001). Vejayachai (2001) stated that some of Mae Ying group's profit was used to support social exclusion groups in the community through subsistence grants for elderly people and education funds for poor students. This approach can increase and strengthen cooperation and mutual relationships in the communities.

Rather than focusing on maximising profit, the SEP proposes a different business mindset from that which relies heavily on conventional approaches. As the SEP considers the balance between the growth and efficiency of business and the security and stability of livelihoods, this concept could increase the awareness of micro enterprises to run their businesses and build up their resilient capability for reducing

impacts from any risk and shocks. It could help producers in the informal economy to avoid poverty and debt as well as improve their self-admiration and good relationship with communities.

As the SEP firstly focuses on development at the individual or household levels, then shift to the community level, it is clear for the practitioner to implement and assess the impact of livelihood strategies developed from the SEP on a key actor at each stage. On the other hand, there are some difficulties to assess the impact of livelihood in the SL framework. For example, the evaluation of social and environmental impact of silk production found that silk producers experienced less negative effects compared to other residents who suffered from health problems from subcontracting jobs and pollution from the production. Therefore, it is hard to gauge and decide which data from different representatives should be chosen for analysis.

There is a potential to apply the SEP with other types of cottage industries in different social contexts. Although the SEP principle is derived from Buddhist philosophy and concentrates more on individual's improvement, it still aims for a universal understanding of ethics that underlie all cultures or religions. Several studies have showed that ethics has played an important role in reducing conflict, enhancing stewardship of local natural resource, engendering participatory decision making and encouraging people's attitude and behaviour towards good citizenship (Beerube and Villeneuve 2002; Gobster and Rickenbach 2004; Holland *et a*l. 2004; Malavisi n/d).

Moreover, the SEP focuses on the promotion of community unity and network arrangement in order to secure household's livelihoods, strengthen local livelihood capitals, reduce conflicts and increase the negotiation capability with external organisations. Working together as a community creates the possibility for attracting external support to facilitate a range of community-based projects, such as natural resource management and local development schemes (Blaikie 2006; Gibson and Marks 1995; Li 2002; Pomeroy 1995)

For example, the study of rattan and bamboo craft in Thailand found that this sector is the main income generating livelihood for almost all households and provide full time job in Ngoc Dong craft village and satellite households in nearby villages since it has been integrated in domestic and world markets. However, the shortage of raw materials due to overexploitation and deforestation in local areas made the micro-

enterprises to further procure materials from neighbouring province or even country. The air and water pollution from the production were affecting the whole community.

Lastly, the SEP also emphasises the producer to create a contingency plan to reduce the undesired impacts from the shocks and uncertainties in the future. This could reduce the vulnerability of the micro and small businesses that are integrated into the global market and help these producers to resilient their livelihoods in a short time.

7.3.2 Opportunities from applying the SL framework

The SL framework was implemented in order to understand the effects on livelihood assets of silk producers from silk production and how these assets have changed within three different periods according to the different stages of silk business development in the villages. These include: the period of subcontracting production (1985-1994); establishing their own businesses (1995-2003); and the current business situation (2004-2006).

Due to the complexity of rural livelihoods, the SL framework becomes a valuable tool to systematically evaluate the basic assets of people's livelihoods and assess the impact of internal and external factors on the livelihoods. An understanding of the holistic picture regarding the current situation and the relationship between the assets and the present and future effects from these factors can help people to develop appropriate strategies in order to achieve the livelihood outcomes (DFID 2001).

From this study, it is found that the SL framework analysis plays a significant role in providing practical details regarding implementation of the three major steps in the SEP: moderation, reasonableness and self-immunity. In order to identify the *"moderation"* of livelihood outcomes in accordance with the SEP, producers need to assess their assets and understand changes in both quantitative and qualitative terms in a particular period of time.

An understanding of the vulnerability context, PIPs and their impacts on livelihood assets can increase people's learning capability or *"reasonableness"* to develop appropriate livelihood strategies to achieve the expected outcomes. Pound (2004) noted that the combination of several methodological approaches for data gathering and data analysis in both qualitative and quantitative methods has provided an explicit insight into the causes and effects of each livelihood strategy.

In addition to developing the *"self-immunity"* system for preventing and absorbing adversity impacts from any shocks that may occur in the future, the SL framework has included the analysis of all stakeholders, institutions, social relationships and processes related to livelihoods, the relationship and impact of these factors on people's ability to increase assets and access related activities (Bebbington 1999; Ellis, 2000 cited in Hobley 2001).

By focusing on strengthening people's capability to solve their own problems and developing contingency plans (Moser 1998), the target of the SL framework is indeed similar to that of the SEP. The multidimensional and multidisciplinary basis of the SL framework allows other organisations, such as local authorities, academia, and policy makers, to identify the entry points and develop a participatory plan and policy that would enhance people's capability to access assets and conduct their livelihood in sustainable way. This makes the SL framework to be employed in a large number of the livelihood development projects by a range of international organisations.

7.3.3 Opportunities from applying the CP concept

The CP practice in the informal silk MSEs and SMCE has provided some significant baseline data of resource management and consumption as well as waste treatment management in Thai rural areas. The preliminary audit results in the bleaching and dyeing processes of this study found that there are a number of improper issues in both production and management including inefficient manufacturing, chemical mismanagement, illegal and untraceable aspects of the chemical supply chain, and inappropriate waste-to-energy technologies which need to be improved.

Although the CP concept cannot by itself decrease the environmental impacts to acceptable levels, it could raise environmental awareness amongst informal enterprises and encourage them to improve their manufacturing effectiveness. This is supported by the survey results regarding the attitudes towards the environment of producers, workers and villagers. The result showed that both SMCE and MSEs tend to agree with the Polluter Pays Principle and the CP concept, although they do not know how to implement resource efficiency improvements.

As operating in micro and small scale production, resource saving which result on the reduction of emerging wastes should be prioritised in the silk cottage industry where

there is no appropriate waste treatment system available in local areas. The data on waste production can help local authorities and villagers to make a decision on the development of appropriate waste treatment systems whether it should be an on-site or centralized system for the whole community.

At the macro level, there have been studies relating to CP application options in the Thai textile industry sector for over a decade (Mizuno, 1999). Since 1997, the initiation of the CP internship programme, operated by the cooperation between the Cleaner Technology Advancement Program (CTAP), Thailand National Metal and Materials Technology Center and a number of nationwide universities, has encouraged university students to learn and find out about appropriate CP applications in various industrial sectors (CTAP 2002). As a consequence, the number of people who acquire CP knowledge and therefore propagate good practices and CP options in several nationwide industries, including the textile sector, has increased. It is likely that these CP audit procedures in textile SMEs will be adapted to assess production lines and identify good practice and CP options for improving silk manufacturing at the grassroots level.

In recent years, the application of the CP concept in silk production in SMEs at a community level has been studied in the renowned Matmi production sites in Khon Kaen and Maha Sarakham province. In 2004, the *"The Pollution Prevention Technology Handbook for Community Product: Fabric and Textile"* was published to give a brief overview of the methodology and study results. The appropriate CP options and good practices from case studies have been categorized into four areas: dye house improvement, health and safety promotion, resource consumption efficiency and pollutant emission reduction (Thailand Institute of Scientific and Technological Research 2004).

Owing to its advantage in input-output investigation, the CP concept can be applied to any types of local cottage industries or even in farming sector. Recently, the growth of the subcontracting and home-based work system from the SMEs and large enterprises in the cities has shifted environmental burden to the formal and informal MSEs that operate the cottage industry, such as rattan and bamboo craft household enterprise in Vietnam (Thanh *et a*l. 2005) and silk industry in India (Weeks 2002), in peri-urban and rural areas.

Due to the lack of good natural resource management, hazardous movement control and waste treatment facilities, resource overexploitation, health risk from chemical exposure and pollution has currently increased to substantial level. Local authorities and environmental related promoting agencies could employ the CP to estimate the amount of natural resource and chemicals used in the production as well as emerging waste from cottage industry in the communities. The data could stimulate the government to recognise the impact of these informal enterprises and improve environmental and health and safety policies and laws. The policies, laws and financial supports from the government can help local authorities to develop appropriate environmental management and health and safety plans which have less effect on local economy.

7.4 Constraints to applying each methodology in the research

7.4.1 Constraints to applying the SEP

The survey result in Chapter 4, 5 and 6 shows that the business model of silk SMCE in Sida, which is more similar to the SEP, can lead to healthy business outcome. Meanwhile, the development of informal silk MSEs in Pak Thongchai in more *"capitalistic"* way has contributed to increasing vulnerability and levels of poverty. In an effort to understand silk MSEs' ways of thought and approach, group discussions on the potential value of applying the SEP were explored. The result of these discussions identifies three main factors which impede large proportions of MSEs from making the type of adjustment necessary to survive in business in the long term. These factors which affect the *"moderation"* and *"reasonableness"* of producers to improve their business competitiveness include: producers' perception about the SEP, informal employment, and lack of cooperation and trust.

a. Silk producers' perception

From the group discussions, producers' perception becomes a major obstacle in applying the SEP in their businesses. Most silk producers in Pak Thongchai perceived that the SEP was a concept of self-sufficient management which was only associated with agricultural livelihoods, not the silk business. They believed that it is hard to implement this concept in their current businesses due to the loss of profit from the

downturn in prices and lack of adequate capital. In addition, the impacts from reducing scale of production or halting production could widely affect the economic and social well-being of their workers.

Since the silk cottage industry has relied on workers' ability, it is essential for MSEs to have a good relationship with their workers. Silk producers have to continue their fabric production in order to create jobs for workers and prevent losing face because they are no longer successful enterprises. This is confirmed by the statement from a group leader of Baan Han silk weaving and batik, which expressed clearly this concern:

> *"To implement the SEP is impossible under current circumstances. If I decided to stop or curtail fabric production, all the older women working in the group will be unemployed and cannot find any jobs to make a living for themselves and their family"*

On the other hand, a group leader of Baan Doo silk weaving group talked about the factors maintaining MSEs to produce silk and why silk MSEs are unable to practice the SEP.

> *"Since silk business provides an opportunity 'to get high profit within a few months', this drove villagers, who are mostly in debt, to produce silk fabric over their assets capacity though there is no a certain market to support. This less physical and indoor economic activity also keeps MSEs to continue business without doing other livelihoods, which may force them to leave their families, to supplement income. Moreover, with low literacy skills, most villagers prefer learning by practice to otherways of learning. This implies villagers are unable to access written information or data and therefore are unlikely to change to new and better ways of doing business.*

> *At present, it is difficult to apply the SEP with silk business. Because of the absence of a certain market, the weaving group was not be able to set its moderation and even regulations to control the cooperation of group's member. Lack of knowledge has affected people's reasonableness which impede the ability to develop a contingency plan to reduce any risks"*

An optimistic view that the silk market would recover that was expressed in the discussions is apparent evidence to keep several MSEs running their businesses without any improvement and become too indebted to maintain their businesses. As a result, there are only a very small number of the informal small and medium silk enterprises at present. The group discussion found that most surviving producers have deliberately not made any effort to improve their situation. They insisted that receiving financial and marketing support from external organisations would be the last option to revitalise their businesses. It seemed that under these circumstances most silk MSEs have been able to develop only coping strategies to solve short term problems. This may imply that there is some confusion in terms of business mindset of these rural entrepreneurs who run non-farm businesses that are heavily based on local assets. Although most MSEs' mindset aims for maximising profit, lack of knowledge in business management and the market makes their business conduct similar to gambling. Therefore, it is hard to encourage the SEP application when people do not know their "*moderation*".

b. Informal employment

Some MSEs also asserted that it is difficult to control the efficiency of production. Due to the informal nature of employment, workers, in particular those who work in the bleaching and dyeing processes, were difficult to control, even though they performed poorly and wasted large amounts of materials. Since there is a shortage of these workers, they can suddenly quit and move to work with new manufacturers if they feel unhappy or are pressurised by their current employer.

In contrast, many good workers also cause the problems to the management of the business. Due to their close relationship in the communities, it becomes difficult for

MSEs to cease their production in order to continue to provide jobs for these workers, which may mean selling their product at loss.

c. Lack of cooperation and trust

Although several initiatives which developed from the cooperation of silk MSEs failed, cooperation in the form of groups or networks is absolutely necessary to solve the price war and marketing problems as well as attract external sources of support. This also facilitates the acquisition and sharing of their production and managerial experiences which could enhance business management.

Since there was a lack of trust among producers and a lack of confidence in the new mindset, it is vital to have a good example or leader who has been accepted by other silk MSEs and villagers and is determined to work on group or network development and apply the SEP in the business. The leader should strengthen relationships with other groups and external organisations which could promote the learning process, business cooperation and access to support schemes.

Without any strong group or network leader in the early phase of group establishment, the cooperation would never succeed. This can be seen in several thriving SMCEs and networks where the leaders have played a vital role in the group's development in both physical and spiritual terms. Strong leaders gain respect from local people and have been selected as local scholars by national academia. These leaders include Prayong Ronnarong (Mai Riang Advisor), Pai Soisraklang (Pioneer in integrated farming in Buri Ram province), Yoo Suntornthai (Pioneer in integrated farming in Surin province), etc. (Bangkok Post 2004; Ramon Magsaysay Award Foundation 2004; Sustainable Community Development for Well Being Foundation n/a-a; Sustainable Community Development for Well Being Foundation n/a-b). The differences in terms of silk businesses' performance and problem solving effectiveness between the MSEs in Pak Thongchai and the silk SMCE in Sida are good examples of the importance of group cooperation and leadership.

From the above issues, it shows that the major constraint of the SEP is the lack of the scope of obtaining knowledge and defining and measuring moderation, reasonableness, self-immunity that help producers to find their suitable level of 'moderation' and be able to adjust their business strategies. The absence of

knowledge on variables affecting the business and environmental management and learning process development forced most producers to be passively accepted all consequences from business mismanagement, the market, and unhelpful government policies.

In addition, an inability to assess business situation and a social-oriented informal labour management has exacerbated the viability of silk cottage business. As a result, the loss of livelihood assets limited producers to use the reasonableness which led to the adverse impacts on the community and an inability to change or improve their approach to tackle problems. Because of these constraints, the SEP has not been mobilised for use for problem solving in the informal silk business.

Nevertheless, several case studies applying the SEP in farming shows that all successful farmers had faced limited livelihood assets problems in the past (Sustainable Community Development for Well Being Foundation n/a-a; Sustainable Community Development for Well Being Foundation n/a-b; UNDP 2007). These are currently able to show great resilience in their livelihood assets and develop their farming vigorously. It can be implied that the perception and mindset of people on modern farming and business management can hamper the effective application of SEP.

7.4.2 Constraints to applying the SL framework

The empirical research found that there are some constraints in applying the SL approach to the micro and small Thai silk manufacturing context. These obstacles can be divided into three issues; missing components in livelihood assets, disregarded issues in PIPs box and hindrances in fieldwork

a. Missing components in livelihood assets

According to the literature review of the previous SL approach study, it is found that most of the studies were related to agricultural activities, which are the major livelihoods of the poor. There has been very little discussion of the enterprise context, especially in the informal sector, in the SL framework. In the formal sector, the study of Sustainable Local Enterprise (SLE) Networks and Sustainable Local Businesses (SLB) has suggested the application of the SL framework as a means to improve

livelihoods of the poor and create social and environmental values (Wheeler *et al.* 2003). In order to encourage the shift of traditional enterprises in the community and become a SLE, it is essential for the businesses to improve in seven key areas. These include entrepreneurship, business management and technical skills, sustainable development mindset, innovative partnership/or network arrangement, financial access and good governance and regulation environment.

Some key successful factors of the SLE also match with the essential components for revitalising Thai silk business. From the empirical fieldwork in the Thai silk cottage industry, it is found that there are three key missing components in two livelihood assets; human capital and social capital, which are indeed needed for the growth of the informal silk MSEs. These missing elements are;

- Entrepreneurial skill
- Ethics and;
- Business group and network approaches.

i. Entrepreneurial skill

According to the survey an absence of entrepreneurial skills in human asset e.g. innovation and flexibility, led to the failure of silk MSEs in Pak Thongchai. Since the silk business has flourished and become the main source of income of producers and workers in recent years, most entrepreneurs who formerly subsisted by farming, do not seem to be interested in acquiring new skills about business and production management to improve their business performance. Furthermore, it is difficult for manufacturers to implement tough measures to manage their workers and control product quality due to a high level of mutual relationships in rural society and informal employment. As a consequence of poor labour management and lack of innovative skills, flexibility in terms of curtailing production or producing new products has been lessened, despite the fact that the silk market became oversupplied. This led to the collapse of the majority of silk MSEs in Pak Thongchai.

ii. Ethics

In Buddhism, the ethics issue is one of the main factors in promoting social inclusion, but has not been highlighted in the social asset. Regarding the SEP, ethics are essential for ensuring people conduct their lives in a self-sufficient way without any harm to individuals, society and environment, particularly people or institutions in influential positions. Moreover, this criterion includes perseverance and integrity to keep their good practices, though there were many obstacles to prevent the accomplishment of outcomes (NESDB 2003a). The revival of this issue in communities, where social capital is low, could contribute to the effectiveness of a community's conflict reduction, e.g. pollution management and competition to access limited public resources. It could help to rebuild trust and cooperation in the communities which will improve not only livelihoods, but the dignity of the whole village.

Prayukwong (2005) indicated that one of the key components of several successful SMCEs is having strong ethical leaders who commit themselves to developing and running the group. Moreover, this characteristic can empower an individual to be an agent of social change attracting more cooperation from *"good friends"*, i.e. the group's members and other groups/or nearby networks, who share their experiences and useful information or support each other in skill development and business management (Sen 1997). In the business context, an ethical business is likely to focus on operating for long term benefit and show more responsibility to its suppliers, workers and customers. This harmonises with one of the key indicators of success of the SLE, a sustainable development mindset which contains a *"triple bottom line"* approach. This could help local enterprises not only to promote economic growth, but also to create more values, e.g. social inclusion, poverty reduction and environmental recovery at the same time (Wheeler *et.a*l., 2003).

iii. Business group and network approaches

Appropriate business group and network approaches must be highlighted as a key criterion in social asset for the livelihoods of MSEs and SMCEs. Due to the deficiency of financial support, business development services and market accessibility, the micro enterprise is mostly based on limited resources in local areas.

Since the silk cottage industry in Pak Thongchai flourished, there has been strong competition between MSEs in terms of both market and skilled workers. The cooperation among silk producers has lessened and is now limited to issues involving family concerns and community development.

In order to access legalization and continuing recognition by government and other social organisations, it is essential for these informal enterprises to develop strong business groups and networks (Bebbington 1999). As being integrated into domestic and international markets, therefore, it is vital for the enterprises to access technical, managerial and financial support in administrating the group and developing networking capability from the external organisations in order to respond appropriately to a rapidly changing business environment. (North and Cameron 2000) This is substantiated by the study by Wheeler (2003) who indicated that several successful SLE networks have been strongly supported by NGOs, the private sector, financial sources, and government.

The study, however, found that most MSEs showed a high awareness of the importance and the benefits of cooperation in the form of groups and networks. But the failure of numerous previous silk groups and cooperatives has indicated the lack of appropriate group and network promotion by extension agencies. This issue requires further study to develop a suitable format of group and network formation which supports the viability of informal enterprises and the shifting status of informal enterprises into formal enterprises. Consequently, the growth of the formal sector in villages could promote not only the development of local economy, but also social and environmental management in communities.

c. Disregarded issues in PIPs box

This research reveals that there are four factors in PIPs box which enable the growth and survival of business yet they are not greatly emphasised in the general SL framework. These factors consist of;

- Technology
- Market
- Decentralisation and;

• The capability to transform products into assets, such as barter trade

This corresponds with Dorward *et.al.* (2003) who stated that the lack of market, institutions and technology concepts in the SL approach analysis would affect the effectiveness and scope of this analysis to develop comprehensive strategies for achieving long term well-being. It is necessary to clearly place these factors in the SL framework, particularly in the PIPs box, if the livelihoods are related to the business.

i. Technology

Technology has significantly contributed to the economic returns and competitiveness of both SMCEs and MSEs. The empirical results showed the manifestly negative and positive effects of technological changes in silk production in their livelihood assets and communities. The adoption of technology not only increases productivity and specialisation of production, but reduces the number of individuals or families becoming involved in silk manufacturing and enables many silk workers to be entrepreneurs. This correlated to Albu and Scot (2001) who stated that technological capabilities are crucial for MSEs to generate and manage technological changes to sustain livelihoods. They also suggested technological capabilities should be placed at the centre of the analysis of people's livelihood assets. Dorward *et a*l. (2003) argued that the different roles and impacts of technological change are related to not only livelihood assets, but also the PIPs box.

There are some arguments about the role of technological capabilities in Thai silk production. According to Gunter (1999), it is noted that technology generally consists of at least four inter-related elements: technique (machine and tools), knowledge (skills and know-how), organisation (systems, support structures, practices) and product (specification, design). Over five decades, all technology used to increase productivity and produce marketable products in Thai silk MSEs has been imported from industrialised countries and been directly adopted. Only a few new technologies, such as stove and chemical substances, have been developed by local skilled workers and private companies in Bangkok in recent years.

Given the fact that there has been limited support in technological development and transfer in the textile sector from local institutions and government offices, most of the support is aimed at promoting productivity of the SMEs or large companies, As

almost all members of informal silk MSEs only have a primary level education and therefore find it difficult to access the necessary knowledge and information, they are unable to identify and understand the problems and find appropriate coping strategies themselves.

It is, therefore, difficult to use a technology strategy to promote sustainable development in Thai silk cottage enterprises. The implementation of a different level of technology has explicitly affected livelihood. Investment in advanced tools means the MSEs in Pak Thongchai have to produce more goods to earn sufficient income for the businesses, which may increase financial vulnerability and market pressure. Concurrently, low level technology employed in silk traditional production can reduce the financial burden, promote the diversification of local livelihoods and prevent the oversupply of productivity. Due to inadequate income from silk production and the small niche market, the traditional weavers in Sida need to rely on diversified livelihood strategies. Hence, it is not necessary for weavers to invest in advanced technology to maintain their limited assets. This technological adaptive strategy is also found in other artisan occupations like small scale fisheries in developing countries (Allison and Ellis 2001).

ii. Market

The market is another essential factor for business to maximise its return and survive in the marketplace. Like other activities of poor farmers in any free market, silk MSEs and SMCEs have struggled to access the market and have suffered as a result of the predominant bargaining power of middlemen and suppliers. Moreover, most informal enterprises have rarely received long term marketing support from silk promoting organisations and national policy. Although the SL framework has referred to the market as an institution in the PIPs box, the role of private sector activity and relationships is not really addressed (Hobley 2001).

Albu and Scott (2001) and Dorward *et al.* (2003) suggested that it is essential to recognise and analyse private sector structure, function and market characteristics in the PIPs box. Subsector analysis is a valuable analytic tool for gaining insight into market structures and dynamics. The application of the subsector approach in sorghum beer and rattan furniture small enterprises in Botswana and Indonesia

identified potential leverage interventions to improve opportunities and reduce constraints of the MSEs development (Boomgard *et al.* 1992). Meanwhile, value chain analysis can enhance the understanding of market relationships, the effect of market and responsible business practice on small scale tea and cocoa producer in Kenya and Indonesia (Tallontire *et al.* 2001).

iii. Decentralisation

As a result of the decentralisation in Thailand since 1997, TAO has become the most powerful organisation in community development. Being assigned for all local development tasks in recent years has caused immense pressure on TAO's operation due to its limited budget, manpower and expertise. It seems that the building and maintenance of infrastructure has been prioritised. In the short term, tasks of this nature are easier to operate and potentially bring some benefits such as election votes in return. In the mean time, other complicated development activities, especially the promotion of informal economic activities and natural and waste management, are occasionally overlooked because of lack of base line data and know how. Sometimes attempts to solve the latter issues are likely to cause conflict with powerful people in the community, which may lead to the loss of TAO's popularity. Therefore, the impact of decentralisation and local authorities on the growth of local enterprise needs to be carefully examined.

iv. Barter trade

The alternative transaction approaches e.g barter trade, have shown some constructive signs in Thai rural villages. Although previous barter trade activites between silk SMCEs and visitors from other SMCEs did not reduce the producers' production costs, they have saved cash by avoiding buying ho usehold and other service products. As a result, financial and physical assets have been positively affected. This sort of trade may increase food security for silk MSEs and SMCEs in what is fast becoming an ageing society. This is because of diminishing agricultural livelihoods and available labour force in this sector. The main clients have lived in rural areas and are involved in the agricultural sector. Furthermore, the growth of LETS in 40 pilot communities around the country, of which several agricultural communities are

located in the Northeast region, demonstrates the possibility of the development of the LETS network between silk producers and nearby communities.

d. Obstacles in fieldwork

Some key factors of the SLE success also match the essential components for revitalizing Thai silk business. From the empirical fieldwork, it is found that there are three major hindrances that led to some degree of confusion on the analysis of livelihood framework and the development of livelihood strategy for silk MSEs and SMCE. These obstacles can be found in the process of;

- Data collection
- Data analysis and interpretation and;
- Livelihood strategy development and support.

i. Data collection

From the fieldwork observation, some constraints in the data collection process in the Thai silk cottage industry were diagnosed. Due to the multidimensional character of the investigation, there is a high demand for detailed information. It is inevitable that there will be some obstacles in the data collection process. Due to time, human power and cost constraints, it is difficult to collect such detailed information in a short time without causing disturbance to respondents particularly during working time. Some respondents expressed irritation and loss of concentration which may have contributed to the ambiguity of responses. This caused the interviewer and respondents to lose more time in order to verify this information. Moreover, the captured data is specific to a particular point in time. This correlated with Brugere and Lingard (2001) who stated that since the participatory appraisal and the survey did not occur in the same year, the situation and the degree of problems had dynamically changed which resulted in the complexity of analysis and planning for sustainable livelihood strategies.

Other concern was the reliability of gathered information and sources of information. As silk production is a major informal non-farming activity in communities, it is hard for the researcher to access producers and related data in the communities for cross checking. Without trust, almost all producers would not give complete and/or correct

information that may adversely affect their business advantage and image. Other information sources, such as home workers and local authorities and government offices, were reticent to respond to the question about the negative impact on livelihoods. This is partly because of fear of manufacturers and also because it is culturally unacceptable to discuss negative issues with strangers.

ii. Data analysis and interpretation

In order to assess the impact of silk production on livelihood assets, there are some ambiguities about whose assets should be analysed, silk producers or the community. Due to the use of subcontracting silk jobs to home workers, some negative effects from the silk cottage industry, e.g. health risks from production and pollutions, were dispersed into the whole community. This is consistent with the fieldwork experience of Oxfam SL projects by Neefjes (n/d) and the question from the DFID seminar (Allen and Sattaur 2001) which indicated that the actors who should be included and considered in the core picture of SL framework is not really clear. Giampietro and Singh (2006 cited in Brown 2006) stated that the power to decide relevant variables and the identity of the storyteller can cause adverse effect if the developed policy was based on unrelated and inappropriate variables. In addition to make such decision, the processes, incentives and constraints, and feedback measure to rectify the decision for capturing the complexity of the system are needed.

There were many attempts to quantify the surveyed data and score assets pentagon diagram for visualising the changing propotions of the assets. Pound (2004) used quantitative and qualitative data to weigh between positive and negative impacts in each asset. The Livelihood Asset-Status Tracking (LAST) tool was developed by combining and converting qualitative and quantitative assessment in order to monitor those asset changes over time of large numbers of households. The main concept of this tool is the combination of livelihood assets analytic requirements of the professional and locally recognizable means of assessment. However, this method still developed gradually (Bond *et a*l. 2003).

iii. Livelihood strategy development and support

In order to successfully encourage the development of livelihood strategy, economic, social, environmental and institutional sustainability are needed to clarify the local

context. Timeframes should be critically considered due to the dynamic changes of all components in SL framework. For example, the development of social, environmental and institutional sustainability in rural villages, where local livelihoods are dominated by the silk cottage industry, may not include the need and rights of younger generation. This is because there are no younger people left in the villages in order to pursue higher education or find economically secure jobs in the cities. Most strategies, hence, were developed to deal with business problems in the short term due to the lack of knowledge and resources as well as uncertainty of support from the government.

Scoones (1998) stated that the development and planning of policy or process implementation, which based on SL approach, need to make negotiation between different outcome possibilities from different people's point of views. It is, however, difficult in reality because of the problem of defining and measuring assets. Since the linkage and trade-offs between assets of each social actors are unclear, it is easy for the local elites and local authorities to take over the participatory negotiation and exclude others to access assets (Beall 1997; 2002; Fox 1997; Thin 2000 cited in Toner 2003). Furthermore, the unchanged development approach of supporting agencies, from centralised top-down to asset-based approach, may hinder the supports to stimulate the implementation of the plans.

7.4.3 Constraints to applying the CP concept

According to the attitude survey results in Chapters 4 and 5, all producers indicated the need for local authorities' and other organizations' support, though they accepted their responsibility for local resource and environmental management. This is because this issue is extremely complicated and it is difficult to find affordable solutions. Since there has been no obvious impact from silk effluent on SMCE production like the one in Pak Thongchai, it is difficult to raise producers' awareness of wastewater management issues. It may be implied that either awareness of silk production impact on local environment or knowledge on resource and environmental assessment for silk producers are required.

In the field research, applying CP concept may only be able to audit the production line. This is because the lack of data record on resource consumption and on used raw

materials as well as different production processes in each producer. The bleaching and dyeing processes of these micro and small producers occurred irregularly and sometimes discontinued at intervals particularly in SMCE. Furthermore, the processes in Pak Thongchai were mostly operated by informal workers, who are daily waged labourers and not pay attention to resource use. Only a few numbers of producers who work with the workers know the details of used material in the production. With less willingness to provide information and lack of knowledge on used materials, therefore, it is difficult to gather the entire data from these workers in time, though the producers had allowed the research team to explore the production processes.

The certain need of end-of-pipe technology for solving pollution problem in Pak Thongchai can impede the interest of enterprises in CP concept. As the police can impose charges and force closures of the business that failed to comply with environmental laws by discharging untreated effluent, the CP concept were not much implemented after the CP training in the villages due to its focus on improving production process. This is related to the experience of the UNIDO/UNEP National Cleaner Production Centres which found CP projects become less useful to the enterprises since they cannot provide an entire solution to their environmental problems (Magarinos 2001).

Meanwhile, a lack of CP expertise and environmental management knowledge and staff working in the local authorities make the promotion of CP at community level with regard to the National Master Plan on Clean Technology and the development of appropriate local environmental management and hazardous control plan become very difficult. Under these circumstances, the promotion of CP application in the cottage industry is needed to not only focus on scientific and technical aspects but also address social, cultural and political problems in both resource consumption and technical issue (M. Lakhani cited in Schnitzer and Ulgiati 2007).

In terms of CP knowledge transfer, there are several case studies of CP application in Thai industrial sectors have been disseminated in the form of a series of good practice publications by government and private sectors. Mostly these good practices have been developed from industrial production in the factories. Although the application of CP in some manufacturing activities at community level, i.e., food processing and textiles, has been investigated, most CP options suggested in the CP handbook for

textiles production at community level are based on manufacturing at factory scale, not at micro scale production. Moreover, all published documents can provide only brief detail about the CP options and the general method of CP application due to the agreement on the protection of enterprises' intellectual property and the limited size of the publications. As the content is brief and general, it is hard for most producers to understand and implement the CP practices as presented in the handbook by themselves.

7.5 Recommendations for improvement of the application of each methodology in the research

7.5.1 Recommendations for improvement of applying the SEP

In order to achieve the sustainability of silk production in the informal sector, it is vital to effectively develop human resources at every level in the villages. The details of human resource development and the following suggestions have been discussed extensively in Section 6.5 of Chapter 6. Promoting leadership is needed to strengthen the group's negotiating power as well as to gain cooperation from other producers and villagers in line with Thai rural social norms. Furthermore, as improving self-learning capability is the ultimate goal of the SEP, silk producers should be enabled to perform self-assessment and adjust the way they manage their businesses in order to support their families and communities in both the short and long term.

To enhance the accessibility of essential information and knowledge for the silk cottage industry, silk business development services centres should be set up in key production sites. These centres could enable silk producers to easily access information and knowledge, such as list of suppliers, silk producers and major silk related supporting organisations, the price of raw materials and fabrics, silk production related news and government policy, etc. Furthermore, the advisory service would improve the understanding of this knowledge which increases business performance of micro-small silk producers. As they are an interactive one stop service, these centres can develop to be a centre point for exchanging information between producers, the market and policy makers. Because of the lack of government officers, local institutions or NGOs should be used as assistants or consultants in field

work. The training system needs to be reformed in terms of content, delivery and evaluation and monitoring of trainees to increase the effectiveness.

Since there have been a few case studies that have applied the SEP in MSEs and SMCEs, the study of successful case studies operating in the SEP should be promoted. The synthesis of practical procedures from these examples, the development of a SEP self-assessment kit for micro-small business and the SEP Training course as well as site visiting in successful cases could promote micro and small businesses to change their perception of the SEP application in terms of their own businesses. With a new mindset, they may have more enthusiasm to learn how to operate and develop their enterprises in a sustainable manner. Meanwhile, the moderation and reasonableness of each thriving case studies should be investigated in order to explore the practical process of defining and measuring these subjective components.

In communities where there is a lack of cooperation and trust, restoration of social cohesion is probably the first priority. Finding or developing good and strong natural leaders who are interested in working for community development is crucially needed. Setting up incentive schemes which strengthen people's livelihood assets, e.g. savings or social welfare groups may encourage the group participation from villagers. The successful of the basic needs responded groups could rebuild trust among the community and foster the development of group that capture the nature of complexity, such as business group. Finally, policy making should be developed through participatory methods to ensure there is adequate support provision in terms of manpower and budget, as well as appropriate approaches and targets which are accepted by all stakeholders in community.

7.5.2 Recommendation for improvement of applying the SL framework

To investigate and understand more of the complexity of livelihoods of MSEs and SMCEs, the SL framework needs to consider other socio-economic related factors to make it more compatible with the changing business environment. Improving business efficiency via marketing, production and management is an essential issue for these informal enterprises. Moreover, this socio-cultural based livelihood is necessarily dependant on social capital and relationships with key actors in order to

achieve accessibility to the market, other resources and organisations. Figure 7.3, which is adapted from Figure 3.2, shows the suggested elements, structures and processes and their positions in the SL framework for Thai silk cottage industry.

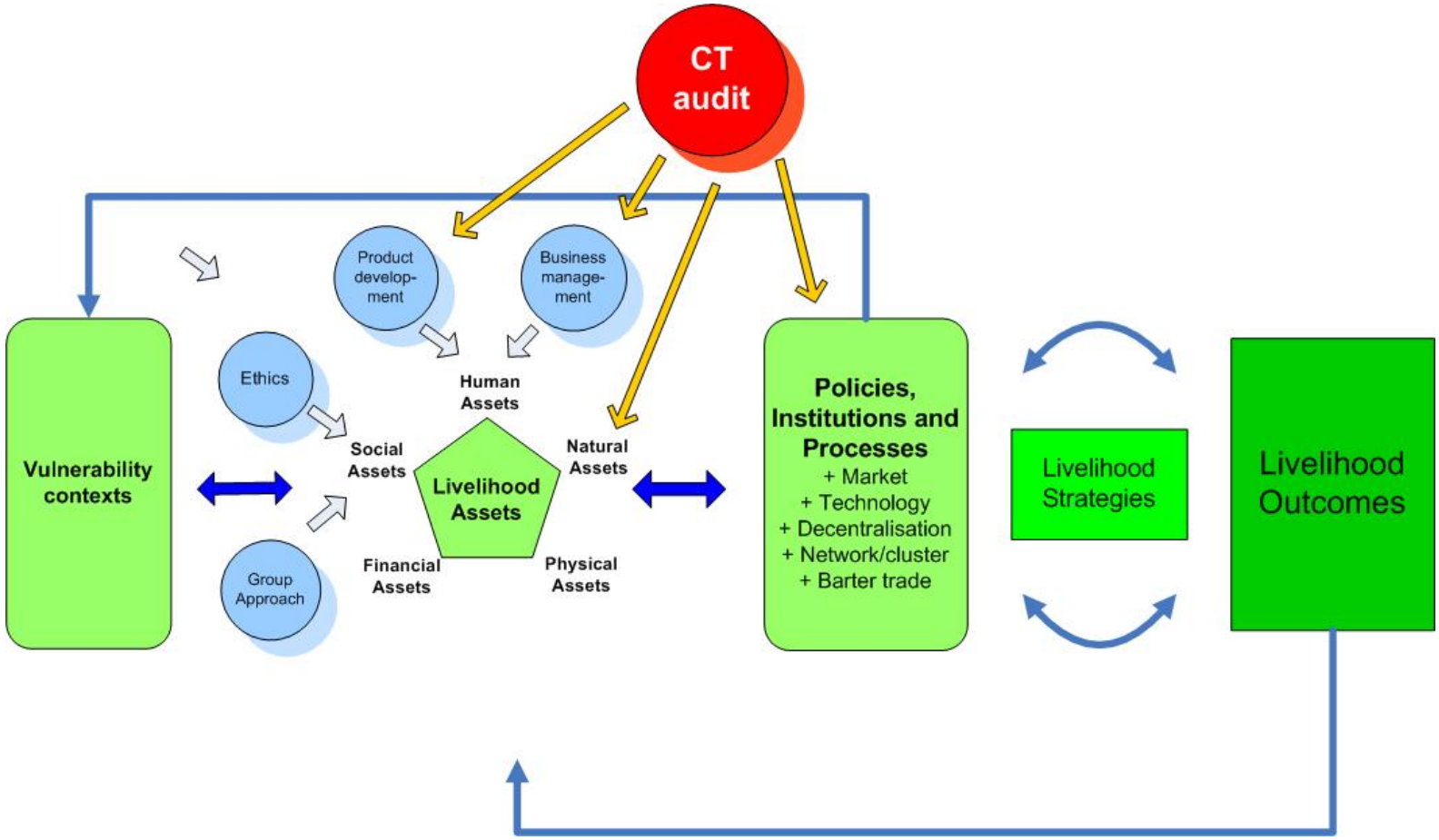


Figure 7.3: The Sustainable Livelihood Framework for Thai Silk MSEs and SMCEs

(Source: Data Analysis, 2006)

From Figure 7.3 there are four issues in two livelihood assets that need to be considered in order to develop a sustainable silk cottage industry. First, human capital should add more criteria in terms of both manufacturers and workers. Relating to manufacturers, entrepreneurship skills, in particular business and financial management, and knowledge in product development and occupational health and safety (OHS) should be acquired. In the meantime, it is necessary for informal workers to be trained in OHS and attitudes to work in order to increase the efficiency and quality of assigned tasks which will enable them to maintain their employment. However, self-assessment of both silk manufacturers and workers is the most important learning target. When deciding whether silk should be a main source of income or not, the enterprises and workers should be able to assess and adapt their strategies to match with new business changes.

In terms of social assets, the improvement of ethics and group and network management is likely to help trust building which leads, not only to increased cooperation and sharing activities, but also to reduce conflict in business competition and resource consumption. Activities by local religious organisations in which encourage people's day-to-day moral practices and strengthen awareness in the community should be used as an indicator. In addition, some groups' and networks' activities which result in the increase in level of members' cooperation and incentives for promoting community development or strengthening the growth of group and networks could probably count as criteria of social assets.

At the same time, there are some key institutions and processes in the PIPs box which enhance or inhibit the growth and survival of silk MSEs and SMCEs. Private and government sectors should focus on these institutions and processes and facilitate their development. These include market, technology, network or cluster arrangement and decentralisation.

To understand the competitive position of MSEs and SMCEs and the interaction between market participants, the subsector analysis or value chain approach can be a significant tool for investigating the Thai silk fabric market map. It is found that there are some studies on subsector analysis and value chain approaches in the Thai silk industry, particularly on silk yarn producers. The identification of market maps, value chains, competitiveness and constraints, as well as the opportunities for leverage

intervention points of the formal sericulture were reported (Haggblade and Ritchie (1992); Agrifood Consulting International (2005)). Nonetheless, fabric production which is largely in the informal sector has been overlooked.

There are some difficulties in applying these approaches because of the complex and informal nature of a cottage industry such as silk manufacturing, especially in terms of cost and time of data collection. This is due to the lack of secondary data and the fact that there are several market players. In order to find appropriate leverage intervention points for promoting the sustainable growth of the silk MSEs and SMCEs, therefore, it is suggested that the developing agencies and government sector conduct more extensive research into the life cycle of the silk business.

Section 6.1.6.a. of Chapter 6 discusses the fact that changes in technology have affected not only production efficiency and business competitiveness, but also the deterioration of natural resources, human health and lifestyle change in rural communities. Unlike other non-farming activities, most technology implemented in the Thai silk cottage industry is adopted from external sources and only some have been adapted to match with the scale of local production. The dynamic of market demand and the weak monitoring and enforcement of chemical and machinery safety related regulations have contributed directly to the introduction of new technologies into the production site. In this context, technology is probably not the kind of asset that technological capabilities should be placing at the heart of the livelihood assets pentagon framework as Albu and Scott (2001) suggested. Since the development of technology capabilities by local stakeholders was low due to education and information constraints, technology should be one of the institutions as well as market context as indicated by Dorward (2003).

Limited livelihood assets of the entrepreneur and lack of supporting technological facilities, organisations and policy for rural non-farm livelihoods have impeded the development of technological capabilities of the community. To improve the technological learning process, the base-line data that assists the identification of an entry point for problem solving is needed. It is essential to assess technologies and related factors at micro level, e.g. natural resources, human health, production efficiency, machinery or product innovation, etc., to analyse and develop suitable technological capabilities promotion measures, Furthermore, the examination of local

technological promoting structures, agencies and policies, to find constraints and opportunities to empower community's technological capabilities, would help to gain insight into improving technological development and transfer at meso- and macro levels. In this research, the CP concept has been employed to investigate the efficiency of silk production, which impacts on business competitiveness and livelihood assets of producers, workers and community. The detail of the CP implementation is discussed in the next section.

The establishment of network or cluster systems with other silk thread suppliers and processors could increase the effectiveness of business management and product development. It may help silk producers to learn more about market trends and gain bargaining power in product trading. Several ongoing policies, such as the North Eastern Silk Strategy and Textile Cluster in nearby provinces, are likely to facilitate the setting up of silk networks at both provincial and regional level. In the north eastern region, more than 10,000 households have been associated with their local sustainable agricultural networks (Pinprathip n/a). Since the main customers of silk products live in local areas, the development of relationships with other agricultural networks and the use of barter trade could provide both a new market channel and an alternative food security source. This also enhances fair trade and linkage with other agricultural and rural economic activities networks that could help silk producers to obtain desired goods and services at a reasonable price, as well as to learn lessons from each other. However, to promote widespread information exchange systems about products and time available need to be developed and disseminated to potential target groups.

Recently, decentralisation has had a significant effect on livelihood assets in the communities. Due to constraints on local authorities and the TAO's chairmen's reticence to promoting local business MSEs and SMCEs have rarely received support. In order to reduce villages' problems which result from the silk cottage industry, a number of initiative schemes from participation stakeholders could help to evaluate the effectiveness of TAOs' work in promoting community development in the long term. The development of necessary management skills and awareness of the sustainable development concept among the local authorities' administrative team could also be used as an indicator to assess the impact of this crucial process.

7.5.3. Recommendations for improvement of applying the CP concept

Unlike the previous promotion at SME level, the government offices are required to implement more plans in order to promote the CP application for silk MSEs and SMCE production in line with their different business drives and socio-economic factors. As these silk enterprises are in the informal economy, producers and workers are vulnerable to all risks from production and business failure. There is hardly any support in the form of a social safety net from government.

The results described in Section 6.5.2 of Chapter 6 show that some social factors are likely to potentially apply to solving these problems and promoting CP application. As social cohesion is a key target for solving communities' problems, strong kinship, mutual relationship and ethics are key factors for strengthening cooperation in villages. Increased awareness of inadequate social security welfare and the health impacts of occupational health and safety and discharged pollutants, could also improve community cooperation and their willingness to solve the problem together.

With a participatory plan, this unified community can easily access effective support from local TAOs and government offices. In order to increase producers' motivation and the accomplishment of CP promotion programmes, therefore, it is vital to promote community participation in monitoring and assessing implementation of the programmes. Most villagers' in Thailand have primary level education and limited literacy skills, therefore it is necessary to facilitate knowledge transfer and increase understanding of these CP issues by organizing a programme of participatory workshops.

Despite having higher awareness of the effects of pollutants, MSEs in Pak Thongchai do not understand how dangerous the effects of each waste actually are on people's health and local environment. They also have little knowledge as to the exact scale of contamination pollutant in their villages. The SMCE in Sida had an even lower awareness of the environmental effects of silk effluent and have no knowledge about wastewater treatment. It is, therefore, imperative to get advisory support from external institutions, i.e. local academia and community health promotion centres, to increase producers' awareness in both production sites of the hazards of chemicals and pollutants. The growth of knowledge and awareness about the impact of chemicals and pollutants on health and safety of the community will enhance

producers'willingness to learn and implement waste management or the CP application in production.

To promote the CP application in the silk cottage industry, the CP study pilot project, following the model of the CP internship programme of CTAP, should be implemented in the villages with the collaboration of silk producers, bleaching and dyeing workers, local academia, textile experts and local authorities. The aims of this study are to identify the good practice of production and health and safety practice including an appropriate waste treatment system for the community. Due to a strong *"demonstration effect"* culture at grassroots level, the learning package developed from the successful case studies will be quickly accepted by other producers and informal workers. As the case studies are located in the villages, it is easy for other producers to visit and ask for some suggestions from the producers or workers who participate in the pilot project. This type of approach is likely to not only suit the way of life in rural areas, but also create a local CP mentor or expert at community level.

Most of the bleaching and dyeing tasks in Pak Thongchai are carried out by workers who are informally hired and paid daily. These key people should be targeted by the CP training programmes in order to find CP options. The group discussion revealed that resource inefficiency has been caused by these workers, due to the manufacturers' demand for labourers, job insecurity and intermittent employment. This leads to a lack of incentive to perform their jobs effectively. Hence, some measures, i.e. registration and skill development, and social welfare incentives for these workers need to be promoted by local authorities, MSEs and government offices, to increase business competitiveness and reduce waste generation.

Since CP auditing requires extensive data from both production and business management, data concerning costs and number of resources needs to be provided for the auditing team to run through in a short time. However, hardly any of the villagers do financial and production accounting. To investigate this unrecorded data, an assistant is strongly required. A student and a lecturer from local academia can significantly contribute to the technical and managerial support of this pilot project. Meanwhile the local and provincial authorities should provide financial support. The silk MSEs and the community which are the main researchers in the project would receive the study results and consider what they should do to improve the business

and the environment. It is expected that this pilot project would promote the development of appropriate CP options for the silk cottage industry, human resources and cooperation between silk producers and institutions.

The process of CP application promotion is shown in Figure 7.4. The good practice of silk production and the CP application training course are targeted for producers and workers. Material and production cost accounts and checking list of CP option application are needed to develop and train the producers to regularly record and analyse the result themselves. It may be possible to apply and transfer this training course and kit to other silk SMCEs in the region. At the same time, the local authorities will be able to use the data to plan for the management of local resources, such as water and silviculture or biomass energy source, and waste. When informed about the safety data sheet or the labeling of chemical containers used in the area, local TAO will be able to enable producers and workers to reduce health and safety risks from working with chemicals and to develop an emergency response plan to deal with chemical accidents.

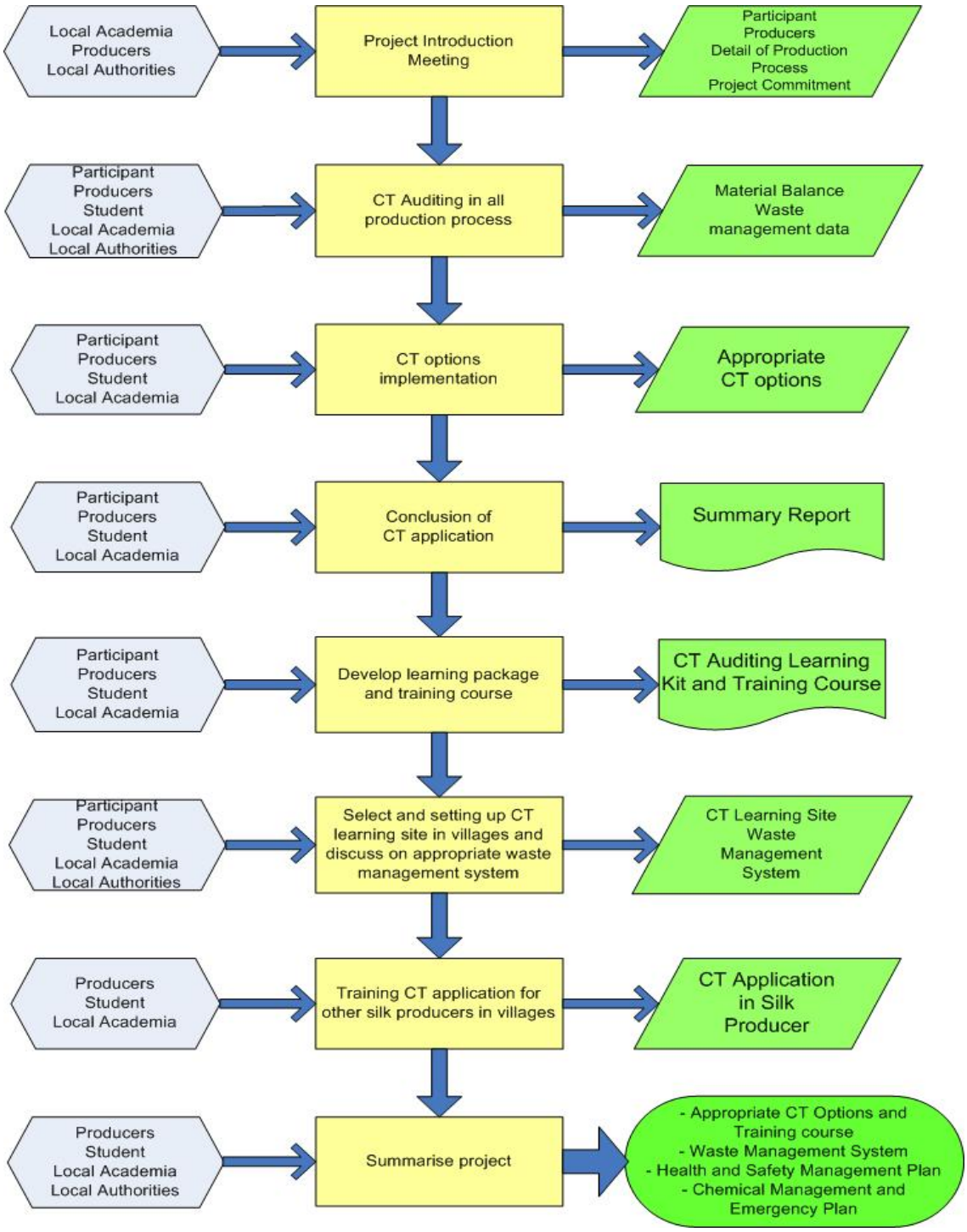


Figure 7.4: The Promotion Process of CP application in Silk Production at village level

(Source: Data Analysis, 2006)

7.6 Conclusion

In order to identify and develop the sustainability of the silk cottage industry in Thailand, three methods were employed: the SEP, the SL approach and the CP concept. Even though it was found that these methods can complement each other in terms of strengthening business management and competitiveness and increase the resilience of livelihood assets, there are limited numbers of case studies applying the SL framework and the CP concept in this business in particular at MSEs and SMCEs levels.

Since the ultimate target is the development of the community's dynamic learning process, it is vital to increase people's ability to identify the cause of their problems and awareness of their own problem-solving capability in order to successfully solve these problems themselves. Nevertheless, the application of three integrated concepts in this research revealed that there are some obstacles, such as data interpretation and synthesis and lack of empowerment, in fostering the problem-solving ability in Thai communities. Good alliances and supportive mechanisms by local authorities and community development agencies that adjust their perception and role in community development are required in order to provide useful information, give advice, help in conflict resolution and promote self-learning.

According to the study result of silk SMCE in Sida and the contribution of SEP in several successful communities which use the SEP in their communities' development, it seems that the SEP has a potential to be a key framework for promoting sustainability of silk cottage industry. But the theoretical nature of the SEP makes it difficult to practically implement the SEP in the business sector. Due to the success in promoting sufficiency agriculture via the SEP model for farming, it is necessary to develop practical guidelines for RNFA. These guidelines should focus on the mindset of producers, enhance the ability to identify key issues and the relationship with other influencing parameters as well as to improve cooperation among MSEs.

In terms of the application of the SL approach in business, some aspects have not been addressed and are mentioned less in the framework. For example, entrepreneur skills, ethics, and group arrangement have been overlooked in livelihood assets.

Technology, market, network or cluster establishment and alternative transaction approaches and decentralisation are also not discussed significantly in the PIP boxes, though they remain important factors to support the survival of the business. The need for numerous and detailed data caused some concerns about the validity of data due to the lack of baseline data at SMCE and MSEs level and time and cost constraints in field work.

Meanwhile the contribution of the CP concept is helping not only the investigation of producers' capabilities in business and production management but is also a valuable tool for promoting awareness and establishing cooperation between community and academia in solving problem derived from silk production. However, the CP audit undertaking requires technical support from local academia and commitment from producers and workers to disclose relevant and accurate data. To accomplish effective data investigation in this rural community, the social factor is the highest element to be considered. Participatory methods and good governance concepts should be employed at every step from working group establishment to planning the contingency plan. It is crucial that local authorities play an integral role in promoting appropriate regulations and policies which facilitate the effective implementation of CP options.

The next chapter gives a summary of this study. Recommendation for further application and study will also be discussed in detail.

Chapter 8
Conclusion and Recommendation

Silk plays an important role in both economic and social aspects of Thai rural society. For decades, silk weaving has been promoted as a source of alternative income of the rural communities. This study attempts to explore the impact of the transformation of the silk cottage industry on Thai rural livelihoods in order to develop ways in which this occupation can become sustainable. In this chapter, the data from Chapter 1 to Chapter 7 is summarised. Significant data comparing the two different styles of production: traditional and modern, is discussed in detail. Furthermore, the research contribution is discussed in terms of exploring the possibility of applying three methods in developing the sustainability of the craft cottage industry at the MSE and SMCE level. Future research issues related to this project are also discussed with a view to improving the growth of Thai silk micro business in the community in the long term.

8.1 Research summary

Silk has become one of the vital livelihoods of Thai modern agricultural society, particularly in the Isan region. Due to the decrease in agricultural product prices, farming is mostly conducted for self-consumption or to earn a small income. As a result, other non-farm rural activities such as silk weaving and other handicrafts have become increasingly important as a source of income.

Since the end of World War II, silk production in the Isan region has shifted gradually from self-consumption to a more commercial scale. The introduction of new technologies and tools has pushed manufacturing forward from traditional to modern style production. With its proximity to the provincial city, silk production in the Pak Thongchai district, Nakhon Ratchasima province has been developed into the largest silk manufacturing and trading hub in the country, whilst the others still produce in the traditional style. Since Thailand's economy boomed in the early 1990s, a number of entrepreneurs in Pak Thongchai municipality have become SMEs. The production

of silk has become the main livelihood of the majority of the population in the district rather than agriculture.

However, the key site of silk production has moved from factory to household level since the economic collapse in 1997. Due to the shift to the informal sector, the consequences of the manufacture of silk at the village level have not only affected the economy, but the social and physical environment of the community. To date there has been limited research on the impact of these fundamental changes.

Having been promoted in provincial, regional and national plans and policies since 2002, the silk cottage industry has only been considered as a tool for boosting the local economy. The strategy plan in the first phase has just focused on increasing product sales and numbers of producers. Without any plan to solve existing social and environmental problems, questions of sustainability in terms of the silk cottage industry need to be addressed.

In order to investigate ways in which micro scale silk production can be sustained, three key concepts were applied to achieve the objective of the study. Firstly, the Sufficiency Economy Philosophy (SEP) was applied to investigate the sustainability of this industry. Secondly, the SL concept was employed to help the study cover all factors influencing community livelihoods. Thirdly, the CP concept was also applied to audit the input and output of materials used in silk manufacturing and to study attitudes of MSEs to economic and environmental management.

The questionnaires were designed to collect baseline data of silk production, informal MSEs and a formal SMCE, and the perceived and actual effects of silk production on economic, social, health and safety and environmental aspects from relevant stakeholders in both modern and traditional styles of production. The attitudes and perceptions of producers to these aspects were studied. In-depth interviews were conducted with other silk related stakeholders to gather data in detail. In addition, focus group discussions were held to collect information about the strengths and weaknesses of group production using the SWOT analysis technique. All data collected in the first phase was analysed in the second phase within the framework of SL and SEP.

The initial empirical survey was conducted into two phases. First, the investigation about the silk cottage industry and its impact was undertaken in 8 villages at Pak Thongchai and Sida between February and April 2004. The results revealed significant data relating to market-led production (modern style production) and subsistence production (traditional style production), respectively. Second, the silk livelihood strategies in both types of production were investigated and developed between October and November 2005.

The field study showed that the growth of silk production at the grassroots level has significantly contributed to the well-being and employment of rural people, particularly middle aged and elderly women. Since silk production can earn some petty cash for daily expenditure, it has reduced the financial burden of villagers when they are not undertaking their main livelihood, farming. Due to the fact that it is indoor work, these labourers are be able to produce silk fabric at home and do not need to temporarily migrate to seek jobs in cities. This strengthens family relationships and social cohesion in the community.

It emerged that three external key factors, technology, marketing and group or network formation have played a vital role on the development of different types of silk enterprises. A clear example is the growth of the informal MSEs in Pak Thongchai. Since Pak Thongchai has been the centre of silk trading and industrial production, the former silk workers in small, medium and large scale silk factories have had more opportunity to learn about and access technology and marketing. The introduction of new machinery, chemical agents and division of labour in the production process, has enabled unskilled villagers to become silk manufacturers and workers. Moreover, being integrated into the same silk market as SMEs, the MSEs have started to produce silk fabric all year round and on a mass scale for wholesale in the 1980-90s. These changes led silk production to become the main source of income of villagers and a significant driver for boosting the local economy.

Agriculture, on the other hand, has been reduced in terms of production scale to subsistence level. Some farmers have sublet their lands to the poor and share some part of the productivity instead of the rent. The high and regular income from silk business has led to a significant change in people's livelihoods and lifestyles in peri-urban villages.

The boom in silk MSEs in villages followed the launch of government local economic stimulating measures in 2002. Despite the promotion of group establishment, producers and workers with work experience in the private sector prefer to become informal MSEs. Without formal recognition by the government, these MSEs have not received appropriate support for the development of competitive capability. Since 2004, the emergence of numerous new silk MSEs and SMCEs encouraged by government schemes has led to overproduction of the main product (monochrome fabric), and fierce competition in the market. Furthermore, the economic recession exacerbated by avian flu, tsunami and increases in oil prices resulted in the steady decline of silk fabric prices and a shrunken market. The ongoing drought and flooding in recent years and the complete control of the silk thread market by factories resulted in unpredictable increases in the price of silk yarns. To date, these factors have seriously undermined the chances of survival of newly established silk informal MSEs businesses. Furthermore, the long established informal MSEs, even though they have more financial assets, have struggled to survive and many are on the brink of collapse.

Consequently, several livelihood assets have been traded off in the recent upsurge of silk production in communities. The huge increase in the amount of non-degradable and hazardous waste resulting from silk production and changing lifestyles has deteriorated and polluted the local environment. Occupation Health and Safety (OHS) problems derived from excessive chemical exposure and unsuitable working conditions also resulted in an increase in health risks and conflict amongst villagers. This may be because of lack of knowledge and awareness of chemicals and pollution coupled with inappropriate and inadequate waste management systems. The informal status of businesses has prevented manufacturers from accessing and receiving government support to develop their management skills and health awareness.

In contrast, the situation of the Baan Fhake and Non Samran silk weaving SMCE in Sida, which is more self-reliant in raw materials and labour, was able to deal with the fluctuations in the silk business in recent years. Due to its remote location, it is difficult for villagers to access large scale markets and suitable technology. Other socio-economic factors, e.g. farming and domestic workload, lack of available cash, etc., have limited growth in silk productivity. As a result, silk manufacturing has

become an important supplementary occupation of villagers, and the establishment of a producer group or SMCE promoted by the state has increased producers' opportunities to access markets and technology as well as management skills. The strong administration of the Baan Fhake and Non Samran silk weaving SMCE has helped individual weavers to develop their production skills and focus on producing good quality traditional patterned products. The group's operation has prevented price wars in the community and provided more social benefits and welfare to members and villagers. Continuing support in production, management and marketing development from local authorities and silk promoting agencies in the district have significantly contributed to the success of the SMCE at present.

The problems resulting from silk manufacturing in the SMCE are pollution, the depletion of natural resources and OHS contexts. The absence of knowledge and awareness of chemical hazards and waste management has resulted in increased health and safety risks in the community. Since lack of water resources has been a major problem in the villages, the contamination of untreated effluent from silk production could escalate the degree of water shortage and the deterioration of local water resources in the future. From the review of the state-related silk promotion policies, it is revealed that the goal of these policies is to develop the SMCEs to be SMEs and set up a silk cluster to promote silk production from sericulture to silk product development (Small and Micro Community Enterprise Promotion Act, B.E.2548 (2005); The Competitiveness Development Strategy of North East Region: Executive Summary). Without any support for resolving these problems from external organisations, the expansion of production scale has inevitably exacerbated the situation. Moreover, the SMCEs are likely to face the same key problems of marketing and business management, which undermine the livelihood assets of silk MSEs in Pak Thongchai.

In conclusion, it seems that the development of the Thai silk cottage industry, which mostly operates in the informal sector, is likely to benefit micro producers and communities in the long term as a supplementary occupation rather than as a main source of income. Since the livelihood strategies of silk SMCEs are more diverse than the MSEs, the effects from external factors, i.e. shocks, seasonality, trends and policies, on villagers' livelihood assets are diminished which enable the livelihood

assets to be more resilient in the short term. In order to ensure the sustainability of the silk cottage industry, therefore, the livelihood outcome of enterprises and communities should be identified to stimulate villagers' learning capability in self-assessment and develop appropriate strategies in response to achieving the target.

The strategies developed by the Baan Fhake and Non Samran silk weaving SMCE emphasise maintaining and improving the local water resource and increasing productivity by improving self-reliance on silk thread. Marketing strategies, i.e. quality control of products, brand development and silk learning centre promotion, are created to ensure the constant growth of the silk business in the community. Although the SMCE have received good support from local silk promotion agencies, this support focuses on short term benefits. Long-term plans and strategies should be considered to enable the SMCE to deal with potential problems, e.g. labour shortage, food insecurity, gradual disappearance of niche markets, and chemical hazards from production.

The migration of the young to the cities has had a considerable impact on the future survival of these agricultural villages. Not only are people's livelihood assets vulnerable, but also the market of this traditional product could be diminished. Since perceived silk value is transferred via the local culture and tradition, the weakened culture and the lack of new customers have inevitably led to shrinkage in the SMCE's main market. The increased health risks resulting from lack of chemical management and the expansion of the scale of silk production will probably increase pressure on villagers and TAO in terms of the future development of the local economy, social welfare and natural resources.

However, the prospering silk industry in Pak Thongchai over the last 50 years has changed the main livelihood in the peri-urban villages. Making a living in the silk industry has become the sole source of income for most villagers. These changes have resulted in people working individually which has in turn had a negative impact on community cohesion. Furthermore, the adoption of silk industry production has caused producers to cease production of silk thread themselves in favour of importing it entirely from external sites. The silk MSEs have followed the production approaches of the silk industry in Pak Thongchai which has led to the general perception that their products have been devalued, i.e. they are producing industrial

type products rather than handicrafts. Subcontracting orders and wholesale distribution have caused producers and weavers to become informal workers in the silk industry, rather than artisans. The lack of production skills transfer to young labourers is likely to cause silk production in the villages to cease in the coming decades. The loss of self-reliance capability in food production also increases the financial burden and food insecurity in the community.

Because of overproduction and the switch to industrial-style products, silk MSEs have been urged to exploit their livelihood assets in order to compete with silk factories. Since its market distribution relies completely on middlemen, it is difficult for the MSEs to manage and control financial assets effectively. Limited livelihood assets and weak cooperation among the MSEs in the villages means that most MSEs are reluctant to invest or develop any plans to improve business performance. They believed that the wholesale market is the only distribution channel that will ensure the survival of the business and create jobs for their workers. In order to retain current business, the MSEs have little interest in cooperating with each other to gain more negotiating power with suppliers and middlemen. In these circumstances, the survival of current silk MSEs in Pak Thongchai has been in doubt. Nevertheless, only one silk group leader, who frequently had the opportunity to access market information and some free government support e.g. business knowledge training and free access to the retail market (fair), has shown some initiatives in producing new silk products for the retail market. From this it may be concluded that support from government and other organisations is indeed necessary to promote the MSE's capabilities to overcome their obstacles.

Since the informal silk MSEs have contributed both positive and negative impacts onthe communities' livelihoods, it is vital that the local authorities and government should start to consider and clarify what type and extent of support they should provide for promoting the sustainability of the informal silk MSEs. Unfair trade with suppliers and middlemen, hazardous waste and pollution management, the promotion of silk marketing and production efficiency and other measures for resolving conflict resulting from silk production should be taken into account to develop the sustainability of the community. Moreover, a more ethical approach and improved social cohesion within the community could help considerably the authorities to

strengthen the development of silk livelihood and community. Regular meetings with all stakeholders in the informal silk cottage industry of Pak Thongchai could help in data gathering, assessment, monitoring and improving plans and strategies in response to the achievement of sustaining silk MSEs in the long term.

The informal status of the MSEs has impeded producers and other related silk promoting firms to assess business performance and develop appropriate plans and strategies for improving business. It is essential that enterprises and workers are encouraged to regularly record data in production, business management and material input and output. Moreover, other external factors which affect production and business, i.e. national and regional silk strategies, Free Trade Agreement policy, natural disasters, provincial development plans, etc., are required to further investigate and monitor the effects on the MSEs' existence. In order to obtain comprehensive data, it is therefore necessary to implement multidisciplinary methods to collect, analyse and develop solutions from the complex and sensitive information of this informal livelihood.

In terms of methodological findings, this study found that the SEP and the SL framework can identify the data at both micro and macro level. In terms of micro level, the information about individuals: family, livelihood, economic status, social status and relationships with community, lifestyle, etc., were investigated and linked to find the cause and effect of an individual's decisions and actions. The macro information provided a holistic picture of results from individuals' actions at the community level and other factors that affect and potentially impact on an individual's life and livelihood in the future. These include trends, seasonality, shocks, policies, institutions, processes and structures. Meanwhile, the CP concepts can help to find out the detail about the input and output occurring in the production process. These data will increase understanding of production, business management, employment, technology, natural resources consumption, waste and pollution. Data collected and analysed using these three concepts can help stakeholders in the silk cottage industry to develop appropriate solutions and strategies to sustain their livelihood and community development in the long term.

Some constraints emerged when applying these three methods during the study. The shortage of secondary data, the need for plentiful data in both quantitative and

qualitative contexts, the complexity of this informal livelihood and the local culture and dialect meant that more time, money, local assistants and key informants were needed to access the data. Since the silk MSEs have operated without paying tax, it is hard to obtain precise and valid data from producers. Some sensitive data and negative issues, e.g. impacts and conflicts resulting from silk production and actions taken to deal with these problems, were difficult to access from workers, villagers, local authorities and government offices due to the influence of silk producers and kinship culture. The establishment of awareness, commitment and trust among all actors involved is vital to create participatory plans for developing silk livelihood sustainability. Some technical data derived from the CP audit required expert support from local academia and a strong commitment about data disclosure from manufacturers and workers.

According to the SEP, the increase in self-reliance and self-immunity to reduce potential impacts are the ultimate goals. The feedback of data and study results should be sent back to the MSEs and stakeholders in the silk cottage industry. These data could help stakeholders to consider and identify appropriate strategies to promote their firms and community as well as developing networks and relationships with new alliances.

8.2 The contribution of the study

This research was uncovered that the silk cottage industry operated by the informal MSEs and SMCEs in rural areas of Thailand is a complex livelihood which flourishes within a specific social and cultural context. The introduction of technology such as chemical agents and machinery has led to a boom in the business while introducing new problems in terms of pollution and chemical mismanagement. Due to lack of understanding of this complex livelihood, the promotion of silk micro and small businesses by development agencies and private sectors has unexpectedly resulted in increased long term vulnerability for the villagers. In order to achieve the sustainability of this traditional craft at grassroots level, it is vital to use appropriate approaches and tools that enhance comprehension and develop learning process capability for silk enterprises and community development support agencies.

This thesis makes the case that the employment of the SEP, the SL framework and the CP concept can provide comprehensive data in economic, social, environmental, production and business contexts. These approaches can analyse the linkages between key influencing factors and people's assets which leads to the identification of the entry point for problem-solving. Moreover, the SEP implementation has contributed significantly to the development of the learning process and sustainable mindset of producers. The learning process based on self-assessment capability and the promotion of ethical and social responsibility of producers and community is the most vital step for the development of informal firms and the empowerment of community in developing countries. Due to inadequate and inappropriate support from state developing agencies, community initiatives for solving local problems and strengthening people's livelihoods are the ultimate target of the livelihood's sustainability. The SEP also indicated that strong social assets, i.e. good relationships with other silk groups, food networks or even developing agencies, could intensify the degree of livelihood assets recovery and enhance communities' ability to set up contingency plans to absorb any unexpected shocks and thereby prevent damage.

The SEP was selected as a core concept for the national development strategy by the present Thai government in November 2006, which implies that the SEP should reduce the economic, social and environmental vulnerability of the poor. In this study, the suggestions from methodological finding could help the development of a guideline for the SEP application to promote MSEs' and SMCEs' development in Thailand. As the reduction of poverty is an important goal of development programmes in developing countries, therefore, this research methodology and model could provide useful lessons on how to approach other development projects, particularly the promotion of rural business in the informal sector. Producers in other traditional craft and non-farm economic activities that use chemicals in production and/or are integrated into the wider market, their communities and related developing agencies and policymakers could apply these approaches to identify appropriate entry points for achieving their targets.

8.3 Future research

The findings of this study suggest that there are several substantial issues that should be investigated further in greater detail. Further research could enhance the MSEs' and stakeholders' capability to consider and find suitable solutions for sustaining their silk livelihood and their communities. The detail of the proposed research topics and their possible contribution to the development of silk MSEs and SMCEs are as follows.

According to the state's perception, there are two types of silk production: traditional production aimed at earning supplementary income (SMCEs) and industrial production for domestic and export markets (SMEs). There has thus been no appropriate policy supporting silk fabric production in the MSEs and SMCEs in previous silk promotion policies. Although the current policies, e.g. OTOP, North East Region Silk Strategy and the SMCEs Promotion, have promoted the growth of silk fabric production at SMCE level, the promoted market targets e.g. nationwide or export markets have caused numerous problems in terms of the MSEs' and SMCE's livelihood assets as described in Chapters 4, 5 and 6. The study of silk market, e.g. market target (local or national) and size of market (retail or wholesale), could help the producers to understand and choose the right market they want to access in order to gain their return and profit in the long term. This decision could lead producers and stakeholders to compatibly develop the related contexts, for example, product, manufacturing, transaction and distribution, network and cluster, and management, with their capabilities and facilities.

Since silk has been used in various ways in response to different cultures around the world, product market development, excluding local markets, requires producers to have knowledge in pattern and functional designs. Although the MSEs' target is the domestic market, a number of key factors have hampered the competitiveness of the MSEs compared to the SMEs and the SMCEs. These include: the absence of a product's traditional identity pattern or handicraft characteristic, the adoption of industrial standardisation for evaluating product quality and lack of promotion to young customers who lack knowledge about silk and how to care for it. It was also

found that only a few MSEs have attempted to develop new products, though product design courses have been provided for the MSEs.

Research into new standards for SMCEs' and MSEs' products, which emphasise their strength and distinguish its value from industrially produced silk products (e.g. handicraft identity) could increase the understanding and appreciation of the customer for these products. This could provide more opportunity to gain a greater share of the urban and tourist market. The limited perception of producers should be addressed to identify suitable methods to promote product development of the micro enterprise. In addition, a study of market structure and demand could help producers to prevent the overproduction of silk fabric which could lead to a drop in silk fabric price in the future.

The expansion of production scale forced the MSEs and workers to lose self-reliance in terms of silk thread production and technology development capability. As a result of unfamiliar technologies, particularly chemical substances, and lack of information and instructions provided by sellers the MSEs and communities are unaware of the undesirable effects of reckless implementation. Research into chemical management and Corporate Social Responsibility of chemical suppliers could reduce problems regarding health and safety resulting from production and pollution exposure as well as lack of risk management and hazardous waste management by producers and local authorities.

In terms of hazardous waste management, the appropriate technology and the technological capability of silk producers and local authorities are essentially addressed in order to find the suitable waste treatment system. However, due to high investment and requirement of good maintenance of the waste treatment system, research into optimising chemical consumption and minimising waste could help producers to solve the problems in shorter time. A further study on the promotion of using the CP concept in silk production at MSEs and SMCEs level could help to reduce waste and energy consumption in production. The effective CP technical auditing and consulting system and a CP training programme as well as the appropriate co-operation between local academia, workers and the producers need to be identified and developed. Moreover, the perception and progressive strategy development of local authorities and government offices in supporting the growth of

the informal sector and sustainable community development should be investigated. This could stimulate these organisations to consider and develop strategies to reduce undesirable impacts from production in the informal sector.

Regarding employment in Thai rural villages, RNFA such as silk production, are likely to become more substantial in this increasingly aging society. Research into the promotion of businesses developed from local expertise, which create jobs for middle aged and older people should be prioritised. The possibility of recruiting young labourers in local, informal, economic activities in the form of social enterprises should be investigated in order to improve management and marketing of the thriving SMCEs. Moreover, factors which develop the management efficiency and flexibility of these micro culture-based businesses and their contributions to community development should be identified. These include: social welfare for informal workers; business ethics; and local environmental promotion. As a consequence, the survival of rural villages will be more likely in terms of economic and social aspects.

A study of the improvement of financial assets of silk producers is vital to boost the revival of this high cost silk manufacturing business. This includes suitable financial management, the establishment of group saving schemes for local silk MSEs and appropriate financial loan support, such as short loan schemes and silk yarn funds. These financial schemes are likely to foster mechanisms which may thwart overproduction of silk products. To minimise financial risks, appropriate forms of transaction and the development of regulations and laws for these informal silk MSEs and SMCEs should be considered to increase fairness in trade and prevent fraud.

The growth of self-sufficient agricultural villages in the north east region could currently provide an alternative product distribution channel and business transaction. As silk fabric is still a popular ceremonial cloth in the region, research into barter trade with other silk farmer groups and food producer groups may provide solutions for reducing production costs and improving food security. The development of appropriate forms of craft souvenir networks or silk clusters with other MSEs and SMCEs should be investigated to identify potential alliances and new distribution channels that could strengthen production capability and regain bargaining power with middlemen in their mainstream market.

The effect of cultural tourism and the silk learning centre promotion scheme should be investigated further. Due to its positive effects, there is a potential to develop this scheme as a potential tool for boosting local authorities and silk producers' awareness and responsibility in social and local environmental development contexts. In addition, traditional silk patterns and styles should be studied and used as a fundamental identity for silk product development in order to conserve valuable local knowledge and skills.

The impact of previous and current silk promotion and community development plans and policies at local and national levels should be reviewed in detail to identify the entry points for minimising undesirable effects and developing relevant participatory informal silk production promotion plans and policies. According to the goal of the SMCE promotion policy, this registered enterprise will eventually be promoted by the government to become the new SME. Nevertheless, the empirical findings showed that this target may not match with the community livelihood strategies and local facilities. The revision of the advantages and disadvantages of the current informal and formal status of these silk businesses may help silk promotion and community development agencies to create participatory plans and policies which are more compatible with local livelihood strategies and outcomes.

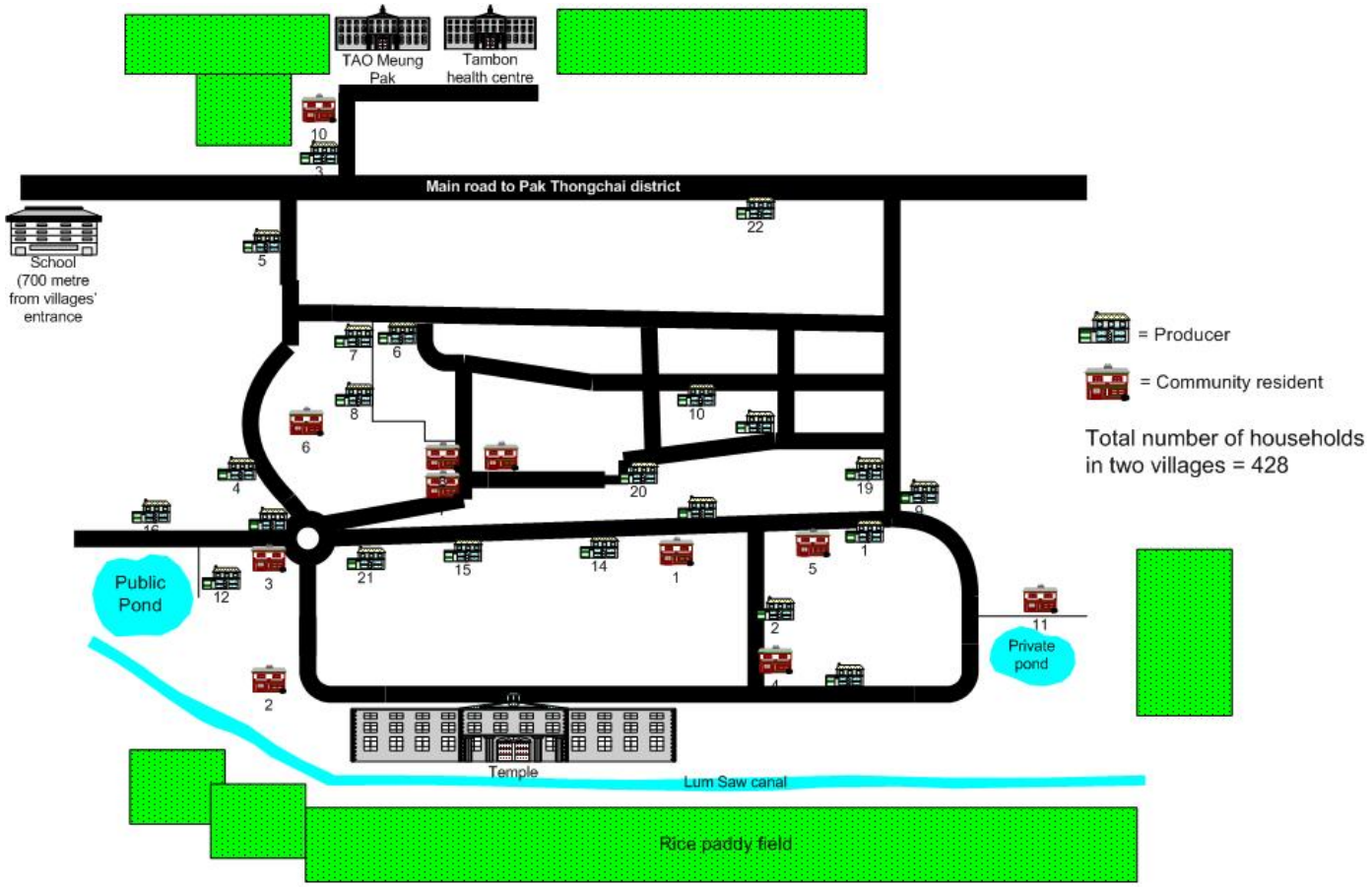
To achieve the sustainability of silk micro enterprise, research into improvement of the self-sufficiency learning process is necessary. As silk activities in MSEs and SMCEs appear to be on a rapid decline due to the age of producers and the loss of new users, a study into the development of self assessment, monitoring and adaptation capability within the framework of the SEP and the SL could enhance people's learning process. The resilience of micro enterprise should be studied further in order to understand and improve their ability to adapt in response to any circumstances and maintain their diversified livelihood strategies for sustaining livelihood outcomes.

Research into the application of these integrated methodologies or of each improved methodology in other micro businesses (farm and non-farm activities) that link to market-based economy and use large amounts of chemicals or have a lot of wastes from production could help the development of appropriate sustainable livelihood strategies for this type of enterprise.

As the SEP could increase self-reliance and resilience of people and the community, it should be investigated in other livelihoods which situated in different social contexts, cultures or even countries. Regarding the different degrees of problems in different social actors, the process of data representative selection and analysis in the SL approach should be examined more in order to ensure the most vulnerable group in the community is not excluded. These processes should consider the issue of saving cost and time consumption in data gathering process as well. The research in improving the CP application in rural MSEs by using social and political factors may enhance the efficiency of local resource use and waste management.

Appendices

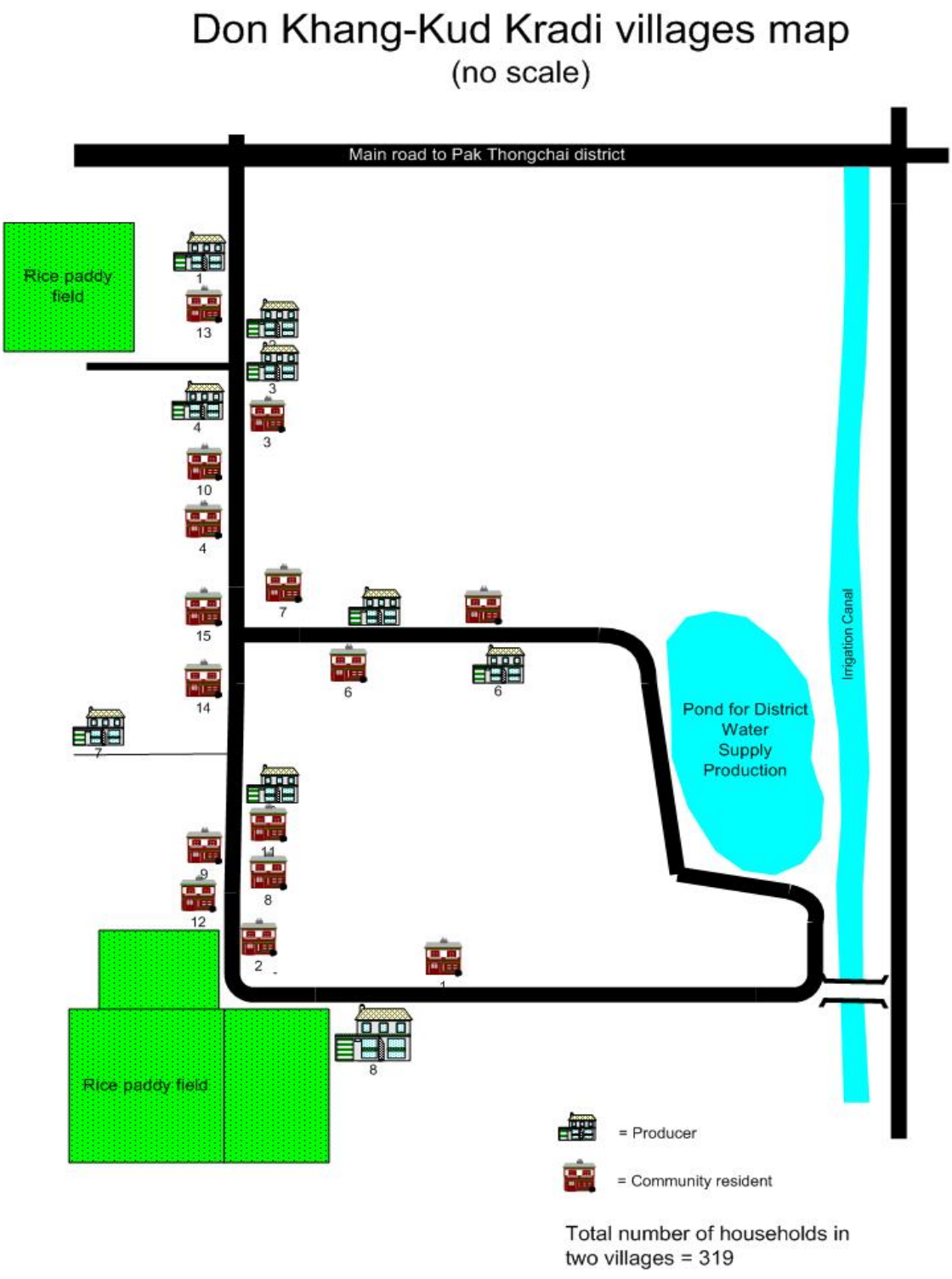
Appendix 1: Map of respondents in study sites



Doo and Doo Noak villages map (no scale)

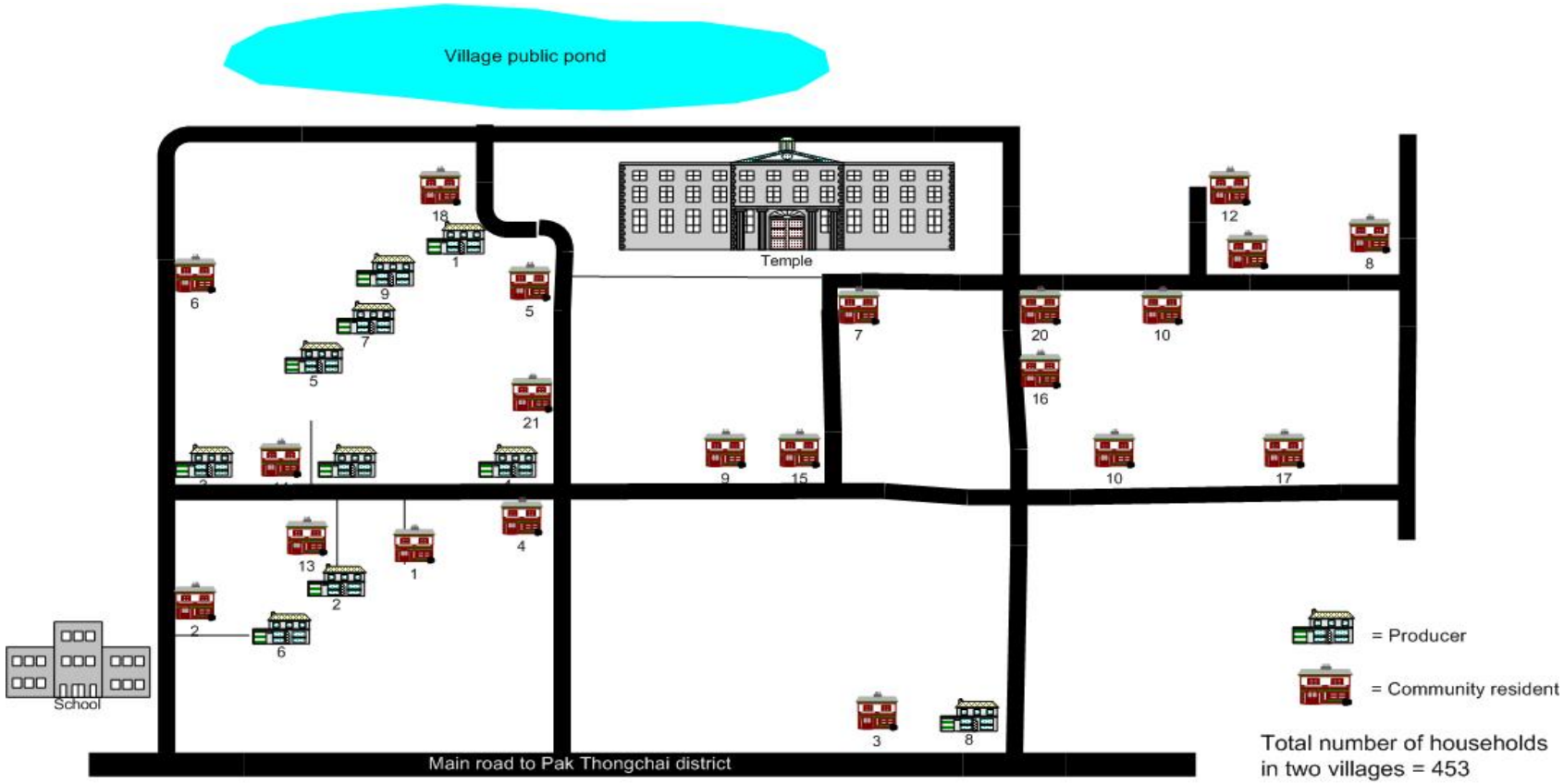
Appendix 1.1: Map of respondents in Doo and Doo Noak villages

(Source: Survey 2004)



Appendix 1.2: Map of respondents in Don Khang and Kud Kradi villages

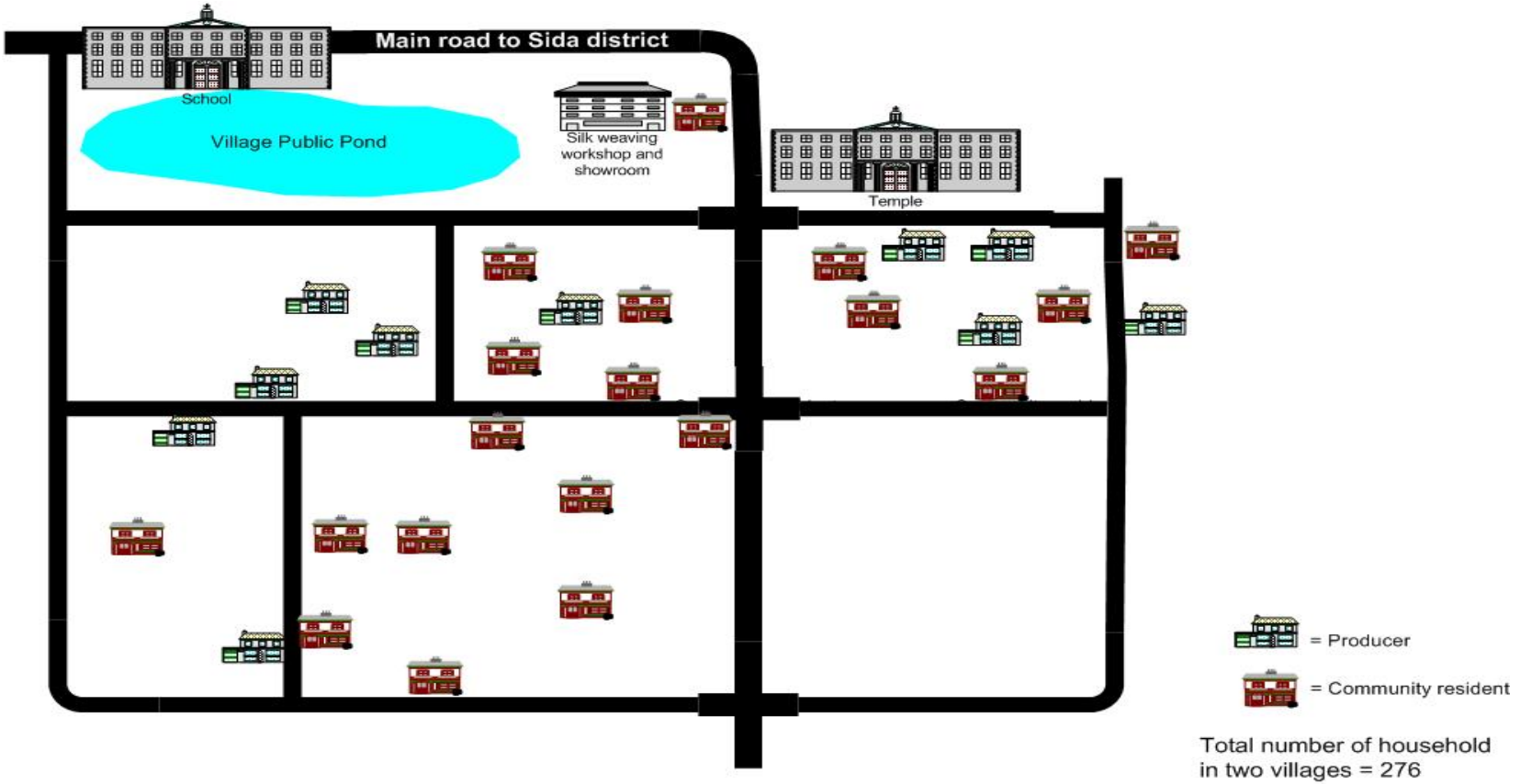
(Source: Survey 2004)



Han–Han Tai villages map (no scale)

Appendix 1.3: Map of respondents in Han and Han Tai villages

(Source: Survey 2004)



Appendix 1.4: Map of respondents in Fhake and Non Samran villages

(Source: Survey 2004)

Appendix 2: Details of questionnaires used in the semi-structured interviews

Appendix 2.1: Questionnaire for silk producer (30) *(10)*[1]

Part I. General data

1. Main producer in family

1. Name-Surname.....
2. Sex ○ Female (20) *(10)* ○ Male (10)
3. Age ○ < 35 year (5) *(1)* ○ 35-44 year (10) *(1)*
   ○ 45-54 year (17) *(5)* ○ > 55 year (7) *(3)*
4. Education ○ Elementary (17) *(9)* ○ Junior secondary (4) *(1)*
   ○ Senior secondary/Vocational (5) ○ Bachelor or higher (4)
5. Marital status ○ Single (2) ○ Married (28) *(10)*
6. Religion ○ Buddhist (30) *(10)* ○ Christ
   ○ Muslim
7. Number of family member ○ < 4 (3) *(1)* ○ 4-6 (24) *(6)*
   ○ 7-9 (3) *(3)* ○ > 9
8. Main occupation .....
9. Supplementary occupation .....
10. Type of business
    ○ Private (19)
    ○ Group (11) *(10)*; group title
    .....
    ○ Other; title .....
11. In terms of source of income, silk production is your
    ○ Main source of income (29) ○ Supplementary source of income (1) *(10)*
12. Year of established business or being involved with silk production
    ○ Before 1984 (1) *(3)* ○ 1984-1994 (12) *(6)*
    ○ 1995-2000 (3) *(1)* ○ 2001-now (14)

2. Production data

To investigate the information of silk production in various aspects, mark ✓ in the proper answer you agree with.

<u>Production management</u>

1. Production format
   ○ All process was produced by hand *(10)*
   ○ Most processes were produced by handiwork but some processes were done by machines (30)
2. Objective of production
   ○ To use in family only
   ○ To mainly use in family and sell the rest for additional income

[1] Survey data of respondents in Pak Thongchai and Baan Fhake and Baan Non Samran villages in Sida are presented in the normal and italic fonts, respectively. As some questions were not answered, the total figures of respondents in each question are not same as the total number of respondents in each questionnaire.

- ○ To mainly sell for increasing income and use in family in a few amount *(10)*
- ○ To sell only (30)

3. Driving factors to operate silk business
   - ○ Original business from parents (6) *(10)*
   - ○ New interesting business which can add value for sericulture farmer's product (1)
   - ○ New interesting business with high market demand (22)
   - ○ New interesting business which are promoted by government sector (1)
4. Production Know-how
   - ○ Local wisdom inherited by family (17) *(10)*
   - ○ External adaptive know-how (13)
5. Most production method is
   - ○ Self trial and error (12) *(1)*
   - ○ Consult with the expert (4) *(1)*
   - ○ Both methods (14) *(8)*

<u>Product</u>

6. Type of product
   - ○ Plain style (8)
   - ○ Mat-mee (ikat) style
   - ○ Pattern style
   - ○ Silk derived product
   - ○ Plain and pattern fabric (18)
   - ○ Mat-mee and pattern fabric *(7)*
   - ○ Plain and pattern fabric and other silk product (4)
   - ○ Mat-mee and pattern fabric and other silk product *(3)*
7. Main products produced in recent years
   - ○ Plain style (30)
   - ○ Mat-mee style *(10)*
8. Factors encouraging production
   - ○ Marketing
   - ○ Festivals (30) *(10)*
   - ○ Culture
   - ○ Excessive raw material
9. Production period
   - ○ All year (30) *(2)*
   - ○ Seasonal (8)
10. Production unit
    - ○ Fold *(10)*
    - ○ Roll (30)
11. Time duration of silk production per unit
    - ○ < 16 days (2)
    - ○ 16-30 days (17) *(2)*
    - ○ 31-45 days (6) *(2)*
    - ○ 46-60 days (5) *(6)*
12. Quantity of silk fabric production

    Quantity of silk fabric production per batch ..... unit

    Quantity of silk fabric production per year ..... unit

    Number of looms
    - ○ < 4 (2) *(10)*
    - ○ 4-25 (22)
    - ○ 26-110 days (1)
    - ○ > 111 (4)
13. Production cost per unit

    Silk yarn
    - Warp threads ..... Baht
    - Weft threads ..... Baht

    Chemical dye and substance ..... Baht

Fuel (Wood fuel/natural gas/electricity)	.....	Baht
Water	.....	Baht
Labour	.....	Baht
- Bleaching and dyeing process	.....	Baht
- Reeling warp threads	.....	Baht
- Reeling weft threads	.....	Baht
- Lengthening warp	.....	Baht
- Tying warp thread into heddle shaft	.....	Baht
- Weaving	.....	Baht
Machinery	.....	Baht
Loom and apparatus	.....	Baht
- Loom		
- Weaving apparatus set (shuttle, heddle shaft, reed, reel, etc.)		
Furnace build-up	.....	Baht
Other	.....	Baht
Total	.....	Baht

14. Raw material sourcing management
- ○ No (25) *(3)*
- ○ Yes (5) *(7)*

Details .....

Financial management

Capital

15. Capital amount
- ○ Less than 10,000 Baht *(7)*
- ○ Between 10,001-50,000 Baht (1) *(3)*
- ○ Between 50,001-100,000 Baht (7)
- ○ Higher than 100,000 Baht (22)

16. Source of capital
- ○ Owner (25) *(10)*
- ○ External source
  - ❍ Government agency (3)
  - ❍ Financial firm (1)
- ❍ Owner and external source (1)

Debt

17. Debt amount
- ○ Less than 10,000 Baht (1) *(6)*
- ○ Between 10,001-50,000 Baht (1) *(3)*
- ○ Between 50,001-100,000 Baht (3)
- ○ Higher than 100,000 Baht (20)
- ○ None (5)

18. Source of loan
- ○ Group *(6)*
- ○ External source
  - ❍ Government agency (1) *(1)*
  - ❍ Financial firm (6) *(2)*

- ❍ Informal financial source (8)
- ❍ Government agency and financial firms (5)
- ❍ Government agency and informal financial firms (2)
- ❍ Financial firms and informal financial firms (1)
- ❍ Government agency, financial firms and informal financial firms (4)

19. Cause of indebtedness
    - ○ Invest in business only (22) *(8)*
    - ○ Business investment and daily life use (4) *(1)*

Income

20. Source of income (Ordering by the highest to lowest)
    - ○ Product distribution (10) *(2)*
    - ○ Tailor-made order
    - ○ Raw material and chemical substances to other producers
    - ○ Product distribution and tailor-made order (19) *(5)*
    - ○ Product and raw material and chemical substances distribution *(3)*
    - ○ Product and raw material and chemical substances distribution and tailor-made order (1)

21. Income amount

    Approximate income per batch
    - ○ 5,001-10,000 Baht *(8)*
    - ○ Higher than 10,000 Baht (29) *(2)*

    Approximate income per year
    - ○ Less than 10,000 Baht
    - ○ Between 10,001-50,000 Baht *(8)*
    - ○ Between 50,001-100,000 Baht *(2)*
    - ○ Higher than 100,000 Baht (29)

Expenditure

22. Total production cost
    - ○ Less than 10,000 Baht
    - ○ Between 10,001-50,000 Baht
    - ○ Between 50,001-100,000 Baht
    - ○ Higher than 100,000 Baht

Savings

23. Total savings
    - ○ Less than 10,000 Baht (3) *(3)*
    - ○ Between 10,001-50,000 Baht (3)*(6)*
    - ○ Between 50,001-100,000 Baht (5)
    - ○ Higher than 100,000 Baht (19) *(1)*

24. Saving management
    - ○ Deposit in financial firm *(4)*
    - ○ Business investment (16)
    - ○ Business investment and family expenditure (14) *(6)*

25. Other assets collected from silk production
    - ○ Machinery/apparatus (1) *(8)*
    - ○ Land
    - ○ Stove and dyehouse
    - ○ Mix between mentioned assets (29) *(2)*

Marketing and distribution

26. Brand ○ Yes (3) ○ No (27) *(10)*

27. Target market ○ Wholesale (12) *(1)* ○ Retail ○ Mix (18) *(9)*

28. Marketer and distributor
    - ○ Self-distribution (17)
    - ○ By group/network (3) *(3)*
    - ○ By middle man (1)
    - ○ All mentioned methods (9) *(7)*

29. Distribution extent

○ Nationwide (28) *(10)* ○ Export (2)

30. Sale unit ○ Yard (30) *(10)* ○ Metre

31. Sale amount

Average	.....	per month	.....	per year
Maximum	.....	per month	.....	per year
Minimum	.....	per month	.....	per year

32. Quality control and grading product

○ Yes (30) *(10)* ○ No

33. Methodology or standard implementing in quality control

○ Self standard (30) *(6)* ○ Group standard *(4)*

○ Community product standard ○ Cooperation product standard

○ OTOP standard

34. Quality controller

○ Self controlling (30) *(6)* ○ Group *(4)*

35. Detail of quality control .....

36. Other organisations supporting

Organi-sation	Type of org.	Type of support	Supporting extent			Year	Objec-tive	Detail
			Begin-ning phase	Extension phase	other			

○ Government (5) *(7)* ○ Private

○ Government and private (7) ○ No support organization (18) *(3)*

37. Problem and obstacle of silk production

Production problem

○ Raw materials (13) *(3)* ○ Product quality (3)

○ Mix (9) *(4)* ○ No problem (5) *(3)*

Marketing and distribution problem

○ No market (3) ○ Market limitation (20) ○ No problem (7) *(10)*

Financial problem

○ Lack of cash flow (24) *(6)* ○ No problem in short term (3) *(6)*

○ No problem at all (1)

Administration problem

○ Labour (21) ○ Management *(1)*

○ Mix (7) ○ No problem (2) *(9)*

38. Group (for the producer who is a member of group only)

Group characteristic

❍ Informal group (4) ❍ Formal group (14) *(10)*

❍ Other .....

Group relationship

Topic	Detail	
Production planning	○ Yes (10) *(10)*	○ No problem (8)
Marketing	○ Yes (4) *(10)*	○ No problem (14)
Distribution	○ Yes (11) *(10)*	○ No problem (7)
Management	○ Yes (4) *(10)*	○ No problem (14)
Member cooperation	○ Yes (12) *(10)*	○ No problem (6)

Part III. Social data

To investigate the social impacts from silk production when it becomes the main occupation of community, mark ✓ in the proper scale you agree with.

Topic	Attitude scale on social impact
Impact on family relationship	
1. Migration of family's member	○ No migration (10) *(4)* ○ Not different from the past (5) *(2)* ○ Increase more than the past (4) *(1)* ○ Decrease more than the past (8) *(3)*
2. Condition of house	○ Not different (3) *(1)* ○ Better than the past (23) *(8)* ○ Worse than the past (1) *(1)*
3. Educational opportunity of children (Mark ○ in the scale you agree with)	The children have not different / less / more opportunity to graduate in elementary school The children have not different / less / more opportunity to graduate in junior high school level The children have ~~not different / less /~~ more opportunity to graduate in senior high school or vocational level (1) *(6)* The children have ~~not different /~~ less (1)/ more (23) *(4)* opportunity to graduate in university level Detail .....
4. Communication and activity within family	
• Time spending in family's communication	○ Not different from the past (6) *(3)* ○ Increase more than the past (17) *(5)* ○ Decrease more than the past (3) *(2)* Detail .....
• Time spending in family's activities	○ Not different from the past (5) *(6)* ○ Increase more than the past (12) *(2)* ○ Decrease more than the past (9) *(2)* Detail .....

Topic	Attitude scale on social impact
5. Health problems that are derived from silk production on family member (Mark ○ in the scale you agree with)	No health problem (10) *(2)* The number of people who suffer in respiratory problems are not different / less than/ more (5) *(4)* than the past or do not heard of (12) *(4)* Symptoms ..... The number of people who suffer in dermatological problems are not different / less than/ more (3) *(2)* than the past or do not heard of (14) *(6)* Symptoms ..... The number of people who suffer in anxiety or unknown headache are not different / less than/ more (12) *(3)* than the past or do not heard of (5) *(5)* Symptoms ..... The number of people who suffer in muscular pain are not different / less than/ more (11) *(5)* than the past or do not heard of (6) *(3)* Symptoms .....
6. Other	
Silk production impact on the relationship of community.	
7. Silk producers' participation in community's activities	○ Not different from the past (5) *(7)* ○ Increase more than the past (16) *(3)* ○ Decrease more than the past (4) Detail .....
8. Silk production impact on the relationship of community.	
• Willingness in cooperating activities with neighborhood	○ Not different from the past (7) *(8)* ○ Increase more than the past (16) *(1)* ○ Decrease more than the past (2) *(1)* Detail .....
• Relationship between neighborhood and producer	○ Not different (12) *(8)* ○ Better than the past (11) *(2)* ○ Worse than the past (2) Detail .....
• Willingness in cooperating activities with community	○ Not different from the past (8) *(8)* ○ Increase more than the past (17) *(2)* ○ Decrease more than the past (3) Detail .....
• Relationship with community	○ Not different (10) (8) ○ Better than the past (17) (2) ○ Worse than the past (1) Detail .....

Topic	Attitude scale on social impact
9. Health problems derived from silk production on non-family member (Mark ○ in the scale you agree with)	No problem at all (19) *(4)* The number of people who suffer in respiratory problems are not different / less than/ more (4) *(3)* than the past or do not heard of (3) *(4)* Symptoms ..... The number of people who suffer in dermatological problems are not different (1) / less than/ more (2) *(4)* than the past or do not heard of (4) *(3)* Symptoms ..... The number of people who suffer in anxiety or unknown headache is not different *(1)* / less than/ more (6) *(4)* than the past or do not heard of (1) *(2)* Symptoms ..... The number of people who suffer in muscular pain are not different *(1)* / less than/ more (4) *(5)*than the past or do not heard of (3) *(1)* Symptoms .....
10. Degree of community overcrowding from the immigration of labour	○ Not different from the past (15) *(9)* ○ Increase more than the past (10) ○ Decrease more than the past Detail .....
11. Social problems, such as crime, drug, etc. from the community overcrowding	○ Not different from the past (6) (6) ○ Increase more than the past ○ Decrease more than the past (19) (3) Detail .....
12. Other	

Topic	Attitude scale on social impact
Other benefits from silk production	
13. Impact of production on the revival or re-innovating of silk know-how, e.g. expanding of local sericulture, practicing or re-innovating new design from ancient fabric pattern, and transferring silk know-how, to younger generation or other people in community	○ Not different from the past (10) *(2)* ○ Increase more than the past (16) *(7)* ○ Decrease more than the past Detail ....
14. Enhancing Community development such as infra-structure improvement?	○ Not different from the past (9) ○ Increase more than the past (19) *(9)* ○ Decrease more than the past Detail .....
15. Other	

Part IV. Economic data

To investigate the economic impacts from silk production become the main occupation of community, mark ✓ in the proper scale you agree with.

Topic	Attitude scale on economic impact
1.Income	○ Not different from the past (1) ○ Increase more than the past approximately …..... % (29) *(10)* ○ Decrease more than the past approximately …..... % Detail.....
2. Expenditure	○ Not different from the past (1) *(2)* ○ Increase more than the past approximately …..... % (29) *(8)* ○ Decrease more than the past approximately …..... % Detail.....
3. Cost • Food • Clothing • Medical care • Education • Entertaining /leisure/ • Social expense • Utility • Household • Job expense	Similar Decrease (%) Increase (%) ....
4. Savings	○ No savings (10) ○ Not different from the past (2) *(3)* ○ Increase more than the past approximately …..... % (18) *(7)* ○ Decrease more than the past approximately …..... % Detail.....
5. Debt	○ No debt (6) *(1)* ○ Not different from the past (1) *(3)* ○ Increase more than the past approximately …..... % (20) *(5)* ○ Decrease more than the past approximately …..... % (3) *(1)* Detail.....
6. Other impacts	○ Contribute tax to local authorities (6) ○ Promote local businesses in raw material provision (30) *(3)* ○ Generate jobs in local areas (30) *(3)* ○ Increase savings from buying silk fabric from external source (29) *(9)* ○ Economic loss in health impact or accident from silk production (5) ○ Other…….

Part V. Environmental data

1. Evaluate the changing of community environmental problem between the periods before and after silk production has become main occupation of community

Environmental problem	Attitude scale	Detail
Physical changing of community environment	○ Not different from the past (1) *(4)* ○ Increase more than the past (25) *(6)* ○ Decrease more than the past (2)	
Community overcrowding	○ Not different from the past (9) *(3)* ○ Increase more than the past (7) *(19)* ○ Decrease more than the past	
Waste	○ Not different from the past (8) ○ Increase more than the past (12) *(3)* ○ Decrease more than the past (8) *(7)*	
Water resource	○ Not different from the past (4) *(1)* ○ Increase more than the past (19) *(9)* ○ Decrease more than the past (5)	
Odour	○ Not different from the past (7) *(8)* ○ Increase more than the past (16) *(2)* ○ Decrease more than the past (4)	
Other	○ Not different from the past ○ Increase more than the past ○ Decrease more than the past	

2. The pollutants from silk production

Type	Process	Quantity	Characteristic
Solid waste			
Waste water			
Dust and particle			
Odour			
Noise			

3. Evaluate the degree of environmental problems by comparing the two periods before and after silk production becomes the main source of community income. Mark ✓ in the degree level you agree with.

Environmental problems	**Degree of problems**							
	Before				**After**			
	Not at all	**A bit serious**	**Quite serious**	**Very serious**	**Not at all**	**A bit serious**	**Quite serious**	**Very serious**
Community overcrowding	21 *(10)*	5	1	1	11 *(7)*	9 *(1)*	5 *(2)*	2
Waste water from silk production	14 *(10)*	11	2	-	4 *(10)*	6	11	6
Solid waste from silk production	21 *(9)*	5 *(1)*	1	-	17 *(7)*	6 *(2)*	4 *(1)*	-
Noise from silk production	22 *(10)*	4	1	-	14 *(10)*	10	3	-
Odours from silk production	20 *(10)*	6	1	-	4 *(6)*	9 *(3)*	11 *(1)*	3
Lack of drinking water	25 *(10)*	2	1	-	16 *(10)*	1	9	2
Lack of non-potable water	23 *(10)*	3	2	-	15 *(2)*	4 *(1)*	6 *(3)*	6 *(1)*
Lack of land dump	25 *(9)*	-	1 *(1)*	-	20 *(9)*	3 *(1)*	3	-

4. Availability of waste management system

Type	Yes/No	Detail
Waste water	Yes (24) No (3) *(10)*	
Solid waste	Yes (27) *(6)* No *(4)*	

5. Appropriate waste treatment system for community in your opinion

Type	Centralised / individualized system	Maintainer	Main Investor	Support from silk producer
Waste water	Centrality (12) Individual (18) *(10)*	Local authority (14) Producer (12) *(10)* Expert (3)	Local authority Producer (11) *(10)* Both (19)	
Solid waste	Centrality (10) *(10)* Individual (20)	Local authority (11) *(9)* Producer (18) *(1)* Expert (1)	Local authority (1) *(10)* Producer (17) Both (12)	
Other				

6. Problems of natural-based raw material provision

Type	Quantity	Provision problem (Yes/No)
Water		Need to buy from external (19) *(8)* Hire other producers to bleach and dye yarn (5) No problem (4) *(2)*
Fuel wood		Need to buy from external (23) Hire other producers to bleach and dye yarn (5) No problem *(10)*
Other		

Attitude scaling Mark ✓ in the proper scale when you agree with the following statements.

Topic	Scale of attitude						Reason
	Strongly disagree	**Disagree**	**Quite**	**Agree**	**Strongly Agree**	**No comment**	
1. **Group production perception**							
• Group production can earn more income and benefits than individual production				3.76 *(4.50)*			
• Group production should focus on solving cash flow problem more than analyzing potential problems and needs of group and community				3.31 *(3.00)*			
• Group production should encourage member to use their savings for production and investment more than use for consumption or emergency only				3.58 *(3.20)*			
• Group production should enhance community development by allocating profit into communities' social fund				4.04 *(4.20)*			
• Local authority should increase support in community business more than infra structure investment				3.96 *(4.30)*			

Topic	Scale of attitude						Reason
	Strongly disagree	**Disagree**	**Quite**	**Agree**	**Strongly Agree**	**No comment**	
2. **Social and community perception** • Silk production is a job which can pass on local culture to the next generation				4.55 *(4.20)*			
• Silk production is a job which enhances social status and acceptability by the community				4.38 *(4.50)*			
• Silk production is a secure job for the young generation to adequately support their future life				4.21 *(4.20)*			
• Society and community should learn and understand more about the value of silk as well as increase their day-to-day silk consumption				4.35 *(4.40)*			
• Society should buy silk from producer who constantly controls their product's quality more than buy low quality silk from the cut-price producer.				4.50 *(4.30)*			

Topic	Scale of attitude						Reason
	Strongly disagree	**Disagree**	**Quite**	**Agree**	**Strongly Agree**	**No comment**	
3. **Economic perception** • Although there was an inadequate capital for producing a batch of silk, loan should be borrowed to continue the production	2.24 *(2.20)*						
• Silk business could survive in the long term if producers conduct their businesses with honesty and not take advantage from their customers	4.59 *(4.00)*						
• Good practices that could produce the same quality of product but use less production cost should be emphasized.	4.52 *(4.11)*						
• Producers should develop a silk network to reduce local competitiveness and community conflicts.	4.28 *(4.10)*						
• Producers should pay more attention in product development, particularly in developing an unique style and making various kinds of products including controlling of commodity's quality constantly	4.52 *(4.10)*						

Topic	Scale of attitude						Reason
	Strongly disagree	**Disagree**	**Quite**	**Agree**	**Strongly Agree**	**No comment**	
4. **Local resources and environmental management perception** • There is no impact on surrounding soil and water resources from discharging untreated wastewater from the bleaching and dyeing process			2.62 *(3.67)*				
• Local resource and environmental management is the responsibility of local authorities, not the villagers			3.10 *(3.40*)				
• Polluters should respond to any environmental impact in the local area caused by any waste from the production process.			4.00 *(4.00)*				
• At present, most implemented wastewater treatment systems can effectively treat sewage as the legislative regulation requires			2.70 *(no comment)*				
• The use of effective and valuable resources, such as water, chemical dyes, etc., will minimise waste and save production costs			3.96 *(4.20)*				

Appendix 2.2: Questionnaire for silk group leaders (3) *(1)*

Part I. General data

Group data

1. Group title .....
2. Name-Surname of group leader .....
3. Sex ○ Female (1) *(1)* ○ Male (2)
4. Age ○ < 35 year ○ 35-44 year *(1)*
   ○ 45-54 year (1) ○ > 55 year (2)
5. Education ○ Elementary ○ Junior (2) *(1)*
   ○ Senior/Vocational (1) ○ University
6. Year of established group .....
   ○ Before 1984 ○ 1984-1994 *(1)*
   ○ 1995-2000 ○ 2001-now (3)

Part II. Production data

To investigate the information of silk production in various aspects, mark ✓ in the proper answer you agree with.

Product

1. Type of product
   ○ Plain style (3) *(1)* ○ Mat-mee (ikat) style (1) *(1)*
   ○ Pattern style (2) *(1)* ○ Other silk products (2) *(1)*
2. Main and secondary products produced in recent years
   ○ Plain style (3) *(1)* ○ Mat-mee (ikat) style (1) *(1)*
3. Production period
   ○ All year (3) *(1, except tranfering rice and harvest period))*
   ○ Seasonal
4. Production unit
   ○ Fold *(1)* ○ Roll (3)
5. Time duration of silk production per unit ……. days
   ○ < 16 days ○ 16-30 days
   ○ 31-45 days (1) ○ 46-60 days (2) *(1)*
6. Quantity of silk fabric production
   Quantity of silk fabric production per batch ..... unit
   Quantity of silk fabric production per year ..... unit
7. Production cost per unit
   Silk yarn
   - Warp threads ..... Baht
   - Weft threads ..... Baht

   Chemical dye and substance ..... Baht
   Fuel ..... Baht
   (Wood fuel/natural gas/electricity)
   Water ..... Baht
   Labour ..... Baht

- Bleaching and dyeing process ..... Baht
- Reeling warp threads ..... Baht
- Reeling weft threads ..... Baht
- Lengthening warp ..... Baht
- Tying warp thread into heddle shaft ..... Baht
- Weaving ..... Baht

Machinery ..... Baht

Loom and apparatus ..... Baht

- Loom
- Weaving apparatus set

(shuttle, heddle shaft, reed, reel, etc.)

Furnace build-up ..... Baht

Other ..... Baht

Total ..... Baht

8. Quality control and grading product
   - ○ Yes (3) *(1)*
   - ○ No
9. Methodology or standard implemented in quality control process
   - ○ Self standard (3)
   - ○ Group standard *(1)*
   - ○ Community product standard
   - ○ Cooperation product standard
   - ○ OTOP standard
10. Quality controller
    - ○ Self controlling (3) *(1)*
    - ○ Other organisation .....
11. Detail of quality control

.....

Group administration

12. Account system recording ❍ Yes (2) *(1)* ❍ No (go to No. 16) (1)
13. Type of account
    - ❍ Financial account (2) *(1)*
    - ❍ Raw material account (2)
    - ❍ Product account (2) *(1)*
    - ❍ Other
14. Accountant
    - ❍ Internal accountant (2) *(1)*
    - ❍ External accountant
15. Number of member
    - ○ < 30
    - ○ 30-59 (2)
    - ○ 60-89
    - ○ > 90 (1) *(1)*
16. Education level of member

    Elementary ..... Junior .....

    Senior /Vocational ..... University .....
17. Member training (Mark ✓ in the proper answer)
    - ❍ Yes (2) *(1)*
    - ❍ No (go to No. 19) (1)

Topic	Source of trainer	
	Internal	**External**
Production technique	*(1)*	*(1)*
Financial technique		(1) *(1)*
Administration technique		(1) *(1)*
Marketing technique		(2) *(1)*

18. Selecting and purchasing silk fabric from member

.....

19. Benefits allocated in group

❍ Yes (1) *(1)* ❍ No (2)

Categories	Detail
Profit allocation	*(1)*
Other benefits	
- Low interest loan for production	**(1)** *(1)*
- Low interest loan for children education	
- Cheap price sale on raw material and apparatus for silk production	*(1)*
- Other	*(1)*

Financial management

Capital

20. Capital amount

○ Less than 10,000 Baht ○ Between 10,001-50,000 Baht

○ Between 50,001-100,000 Baht ○ Higher than 100,000 Baht (3) *(1)*

21. Source of capital

○ Owner (2) ○ Group member (1) *(1)*

○ External supporting source

❍ Government agency (2) *(1)* ❍ Financial firm

❍ Informal financial firm

22. Capital management

❍ raise from member via stock exchanging (2) *(1)*

❍ gather product from member ❍ no funding raising (1)

23. Number of total stock .....

24. Number of stockholder .....

Debt

25. Debt amount

○ No debt (1) ○ Less than 10,000 Baht

○ Between 10,001-50,000 Baht (1) ○ Between 50,001-100,000 Baht
○ Higher than 100,000 Baht (1) *(1)*

26. Source of loan
    - ○ Group
    - ○ External supporting source
        - ❍ Government agency (1) *(1)* ❍ Financial firm (1)
        - ❍ Informal financial firm (2)

27. Start year of indebtedness …….
28. Cause of indebtedness

.....

29. Debt management

.....

Income

30. Source of income (Ordering by the highest to lowest)
    - ○ Product distribution (3) *(1)* ○ Tailor-made order (3)
    - ○ Raw material and chemical substances to other producers
    - ○ Other *(1)*

31. Income amount

    Approximate income per batch
    - ○ Less than 10,000 Baht ○ Between 10,001-50,000 Baht (2) *(1)*
    - ○ Between 50,001-100,000 Baht ○ Higher than 100,000 Baht (1)

    Approximate income per year
    - ○ Less than 10,000 Baht ○ Between 10,001-50,000 Baht
    - ○ Between 50,001-100,000 Baht *(1)* ○ Higher than 100,000 Baht (3)

Expenditure

32. Total production cost
    - ○ Less than 10,000 Baht ○ Between 10,001-50,000 Baht
    - ○ Between 50,001-100,000 Baht *(1)* ○ Higher than 100,000 Baht (2)

33. Approximate production cost per annual

Categories	**Cost (Baht)**
Raw material	
- Silk yarn	
- Water	
- Wood fuel	
- Chemical dye	
- Chemical substances	
- Labour	
- Other	
Utilities (electricity, water, etc.)	
Machinery and apparatus	

Categories	Cost (Baht)
Furnace	
Waste treatment cost	
Building and office rent	
Administration cost	
Shop rent	
Booth rent	
Product stock cost	
Product R&D cost	
Human resource development cost	
Community development supporting fund	
Other	

Savings

34. Total savings
    - ○ Less than 10,000 Baht
    - ○ Between 10,001-50,000 Baht (1)
    - ○ Between 50,001-100,000 Baht *(1)*
    - ○ Higher than 100,000 Baht (2)

35. Savings management
    - ○ Deposit in financial firm
    - ○ Business investment (1) *(1)*
    - ○ Business investment and family expenditure (1)

36. Other assets from silk production
    - ○ Machinery/apparatus for silk production
    - ○ Land
    - ○ Stove and building
    - ○ Mix mentioned assets (3) *(1)*

Marketing and distribution

37. Brand ○ Yes (1) *(1)* ○ No (2)

38. Target market ○ Wholesale ○ Retail ○ Mix (3) *(1)*

39. Marketing and distributor
    - ○ Self-distribution (2)
    - ○ By group/network (2) *(1)*
    - ○ By middle man
    - ○ Other

40. Distribution extent
    - ○ Nationwide (3) *(1)*
    - ○ Export

41. Sale unit ○ Yard (3) ○ Metre ○ Fold *(1)*

42. Sale amount

Average	.....	per month	.....	per year
Maximum	.....	per month	.....	per year
Minimum	.....	per month	.....	per year

42. Other organisations support

Organi-sation	Type of org.	Type of support	Supporting extent			Year	Objec-tive	Detail
			Begin-ning phase	Extension phase	other			

- ○ Government (1) *(1)*
- ○ Government and private (2)
- ○ Private
- ○ No support organization

43. Problem and obstacle of silk production

Production problem

- ○ Raw materials (3)
- ○ Product quality
- ○ No time to produce due to joining government's activities *(1)*
- ○ Mix

Marketing and distribution problem

- ○ No market
- ○ Market limitation (2) *(1)*
- ○ Cut price war (3)
- ○ No problem

Financial problem

- ○ Lack of cash flow (3) *(1)*
- ○ No problem in short term
- ○ No problem at all

Administration problem

- ○ Labour (2)
- ○ Management (1) *(1)*
- ○ Group cooperation (1)
- ○ No problem

44. Group

Group characteristic

- ❍ Informal group
- ❍ Formal (3) *(1)*

Group relationship

Topic	**Detail**	
Production planning	○ Yes (2) *(1)*	○ No
Marketing	○ Yes (2) *(1)*	○ No (1)
Distribution	○ Yes (3) *(1)*	○ No
Management	○ Yes (2) *(1)*	○ No (1)
Member cooperation	○ Yes (2) *(1)*	○ No (1)

Part III. Social data

To investigate the social impacts from silk production when it becomes the main occupation of community. Mark ✓ in the proper scale you agree with.

Topic	Attitude scale on social impact
Impact on group relationship	
1. Member entering-leaving	○ No member enter into or leave from group ○ Not different from the past ○ Increase more than the past *(1)* ○ Decrease more than the past (3) Detail .....
2. Conditions of group's buildings (in case of it exist)	○ Not different from the past ○ Increase more than the past (2) *(1)* ○ Decrease more than the past ○ No group's building (1)
3. Member's opportunity of skill development	○ Not different from the past (1) ○ Increase more than the past *(1)* ○ Decrease more than the past (1) Detail .....
4. Communication and activity within group	
• Group's cooperation in production	○ Not different from the past (1) ○ Increase more than the past (1) *(1)* ○ Decrease more than the past Detail .....
• Group's cooperation in product distribution e.g. no competition in cutting price	○ Not different from the past ○ Increase more than the past (3) *(1)* ○ Decrease more than the past Detail .....
• Group's cooperation in do group's activities?	○ Not different from the past (1) ○ Increase more than the past (1) *(1)* ○ Decrease more than the past Detail .....
• Frequency of communication and consultation within group	○ Not different from the past (1) ○ Increase more than the past (2) *(1)* ○ Decrease more than the past Detail .....

Topic	Attitude scale on economic impact
5. Health impact from silk production on family member? (Mark ○ in the scale you agree with)	The number of people who suffer in ***respiratory problems*** are <u>not different / less than/ more than</u> (3) *(1)* the past. Symptoms ..... The number of people who suffer in ***dermatological problems are*** <u>not different *(1)*/ less than/ more than</u> (3) the past. Symptoms ..... The number of people who suffer in ***anxiety or unknown headache*** are <u>not different / less than/ more than</u> (3) *(1)* the past. Symptoms ..... The number of people who suffer in ***muscular pain*** are <u>not different / less than/ more than</u> (3) *(1)* the past. Symptoms .....
6. Other	
<u>Silk production impact on the relationship of community.</u>	
7. Participation in community's activities	○ Not different from the past (1) *(1)* ○ Increase more than the past (2) ○ Decrease more than the past Detail .....
8. Silk production impact on the relationship of community.	
• Willingness in cooperating activities with community	○ Not different from the past (1) *(1)* ○ Increase more than the past (2) ○ Decrease more than the past Detail .....
• Relationship with community	○ Not different (1) ○ Better than the past (2) *(1)* ○ Worse than the past Detail .....

Other benefits from silk production	
9. Impact of production on the revival or re-innovating of silk know-how, e.g. expanding of local sericulture, practicing or re-innovating new design from ancient fabric pattern, and transferring silk know-how, to younger generation or other people in community	○ Not different from the past ○ Increase more than the past (3) *(1)* ○ Decrease more than the past Detail .....
10. Enhancing Community development such as infra-structure improvement	○ Not different from the past (2) ○ Increase more than the past (1) *(1)* ○ Decrease more than the past Detail .....
11. Other	

Part IV. Economic data

To investigate the economic impacts from silk production become the main occupation of community. Mark ✓ in the proper scale you agree with.

Topic	Attitude scale on economic impact
1.Income	○ Not different from the past (1) ○ Increase more than the past approximately …..... % (2) *(1)* ○ Decrease more than the past approximately …..... % Detail.....
2. Expenditure	○ Not different from the past (1) ○ Increase more than the past approximately …..... % (2) ○ Decrease more than the past approximately …..... % Detail..... ....
3. Cost • Food • Clothing • Medical care • Education • Entertaining /leisure/ • Social expense • Utility • Household • Job expense	Similar Decrease (%) Increase (%) ....
4. Savings	○ No savings (2) ○ Not different from the past (1) ○ Increase more than the past approximately …..... % ○ Decrease more than the past approximately …..... % Detail.....
5. Debt	○ No debt (2) ○ Not different from the past ○ Increase more than the past approximately …..... % (1) ○ Decrease more than the past approximately …..... % Detail.....
6. Other impacts	○ Contribute tax to local authorities ○ Promote local businesses in raw material provision *(1)* ○ Generate jobs in local areas (3) *(1)* ○ Increase savings from buying silk fabric from external source ○ Economic loss in health impact or accident from silk production ○ Other…….

Part V. Environmental data

1. Evaluate the changing of community environmental problem between the periods before and after silk production has become main occupation of community

Environmental problem	Attitude scale	Detail
Physical changing of community environment	○ Not different from the past ○ Increase more than the past (3) *(1)* ○ Decrease more than the past	
Community overcrowding	○ Not different from the past *(1)* ○ Increase more than the past (3) ○ Decrease more than the past	
Waste	○ Not different from the past *(1)* ○ Increase more than the past (1) ○ Decrease more than the past (2)	
Water resource	○ Not different from the past (1) ○ Increase more than the past (2) *(1)* ○ Decrease more than the past	
Odour	○ Not different from the past *(1)* ○ Increase more than the past (3) ○ Decrease more than the past	
Other	○ Not different from the past ○ Increase more than the past ○ Decrease more than the past	

2. The pollutants from silk production

Type	Process	Quantity	Characteristic
Solid waste			
Waste water			
Dust and particle			
Odour			
Noise			

3. Evaluate the degree of environmental problems by comparing the two periods before and after silk production becomes the main source of community income. Mark ✓ in the degree level you agree with.

Environmental problems	Degree of problems							
	Before				After			
	Not at all	A bit serious	Quite serious	Very serious	Not at all	A bit serious	Quite serious	Very serious
Community overcrowding	1	2			1	2		
Waste water from silk production		3					1	2
Lack of drinking water	3				1		1	1
Lack of non-potable water	3				2			1
Solid waste from silk production	2	1				2	1	
Lack of land dump	3				2	1		
Noise from silk production	3				2	1		
Odours from silk production	3					1	1	1

*** There is no data from group leader in Sida due to time limit**

4. Availability of waste management system

Type	Yes/No	Detail
Waste water	Yes (3) No	
Solid waste	Yes (3) No	

5. Appropriate waste treatment system for community in your opinion

Type	Centralised / individualized system	Maintainer	Main Investor	Support from silk producer
Waste water	Centrality (3) Individual	Local authority (1) Producer Expert (1)	Local authority Producer Both (2)	
Solid waste	Centrality (2) Individual (1)	Local authority (1) Producer (1) Expert (1)	Local authority Producer (1) Both (2)	
Other				

6. Problems of natural-based raw material provision

Type	Quantity	Provision problem (Yes/No)
Water		Need to buy from external (1) Hire other producers to bleach and dye yarn No problem (2)
Fuel wood		Need to buy from external No because hiring other producers to bleach and dye yarn (1) No problem (2)
Other		

Attitude scaling Mark ✓ in the proper scale when you agree with the following statements.

Topic	Scale of attitude						Reason
	Strongly disagree	**Disagree**	**Quite**	**Agree**	**Strongly Agree**	**No comment**	
1. **Group production perception**							
• Group production can earn more income and benefits than individual production				5.00 *(4.00)*			
• Group production should focus on solving cash flow problem more than analyzing potential problems and needs of group and community				4.67 *(2.00)*			
• Group production should encourage member to use their savings for production and investment more than use for consumption or emergency only				4.67 *(4.00)*			
• Group production should enhance community development by allocating profit into communities' social fund				4.33 *(4.00)*			
• Local authority should increase support in community business more than infra structure investment				4.67 *(4.00)*			

Topic	Scale of attitude						Reason
	Strongly disagree	**Disagree**	**Quite**	**Agree**	**Strongly Agree**	**No comment**	
2. **Social and community perception** • Silk production is a job which can pass on local culture to the next generation				4.67 *(4.00)*			
• Silk production is a job which enhances social status and acceptability by the community				4.33 *(5.00)*			
• Silk production is a secure job for the young generation to adequately support their future life				4.67 *(4.00)*			
• Society and community should learn and understand more about the value of silk as well as increase their day-to-day silk consumption				4.67 *(4.00)*			
• Society should buy silk from producer who constantly controls their product's quality more than buy low quality silk from the cut-price producer.				4.67 *(4.00)*			

Topic	Scale of attitude						Reason
	Strongly disagree	**Disagree**	**Quite**	**Agree**	**Strongly Agree**	**No comment**	
3. **Economic perception** • Although there was an inadequate capital for producing a batch of silk, loan should be borrowed to continue the production				2.33 *(2.00)*			
• Silk business could survive in the long term if producers conduct their businesses with honesty and not take advantage from their customers				4.67 *(4.00)*			
• Good practices that could produce the same quality of product but use less production cost should be emphasized.				4.33 *(4.00)*			
• Producers should develop a silk network to reduce local competitiveness and community conflicts.				4.33 *(4.00)*			
• Producers should pay more attention in product development, particularly in developing an unique style and making various kinds of products including controlling of commodity's quality constantly				4.67 *(4.00)*			

Topic	Scale of attitude						Reason
	Strongly disagree	**Disagree**	**Quite**	**Agree**	**Strongly Agree**	**No comment**	
4. **Local resources and environmental management perception** • There is no impact on surrounding soil and water resources from discharging untreated wastewater from the bleaching and dyeing process			1.00 *(4.00)*				
• Local resource and environmental management is the responsibility of local authorities, not the villagers			3.00 *(2.00*)				
• Polluters should respond to any environmental impact in the local area caused by any waste from the production process.			4.00 *(4.00)*				
• At present, most implemented wastewater treatment systems can effectively treat sewage as the legislative regulation requires			2.67 *(no comment)*				
• The use of effective and valuable resources, such as water, chemical dyes, etc., will minimise waste and save production costs			3.67 *(4.00)*				

Appendix 2.3: Questionnaire for community residents (62) ***(19)***

Part I. General Data

1. Name-Surname.....

2. Sex	❍ Female (53) *(18)*	❍ Male (8) *(1)*
3. Age	❍ 20-30 year (3) (1)	❍ 31-40 year (19) (4)
	❍ 41-50 year (10) (7)	❍ > 50 year (28) (7)
4. Education	❍ Elementary (30) *(17)*	❍ Junior (8) *(1)*
	❍ Senior/Vocational	❍ University *(1)*
5. Marital status	❍ Single (8)	❍ Married (53) *(19)*
6. Religion	❍ Buddhist (62) *(19)*	❍ Christ
	❍ Muslim	❍ Other .....

7. Number of family member ……
8. Main occupation .....
9. Supplement occupation .....
10. Type of business
    - ❍ Private
    - ❍ Group; group title .....
    - ❍ Other .....
11. In terms of source of income, silk production is your
    - ❍ Main source of income (14) ❍ Supplementary source of income (14) *(14)*
    - ❍ Not my source of income at all (30) *(5)*
12. Have you been lived in this district?
    - ❍ Yes
    - ❍ No, I moved from ..... …….. since .....
      Reason .....

Part II. Social data

To investigate the social impact from silk production by comparing the two periods before and after silk production become the main source of community income.

Silk production impact on the relationship of community

Mark ✓ in the proper answer you agree with.

1. How is the willingness of activities' cooperation between residents and producer?
    - ❍ Not different (27) *(15)*
    - ❍ Increase more than the past (29) *(4)*
    - ❍ Decrease more than the past (5)

Details .....

2. How is the relationship between residents and producer?
    - ❍ Not different (40) *(10)*
    - ❍ Better than the past (17) *(9)*
    - ❍ Worse than the past (5)

Details .....

3. How is the willingness of activities' cooperation between producer and community?
   - ❍ Not different (21) *(16)*
   - ❍ Increase more than the past (34) *(3)*
   - ❍ Decrease more than the past (5)

Details .....

4. How is the relationship between producer and community?
   - ❍ Not different (27) *(13)*
   - ❍ Better than the past (26) *(6)*
   - ❍ Worse than the past (8)

Details .....

5. Since silk production has become main job of community, how is different of health impact from silk production on community? (Mark ✓ in the proper scale you agree with)

Type of problems	Attitude scale				Detail of symptom
	Not at all	Not different	Less than past	More than past	
Respiratory problems	10 *(7)*			38 *(6)*	
Dermatological problems				27 *(2)*	
Anxiety/Unknown headache				31 *(8)*	
Muscular problems				42 *(5)*	

6. Since silk production has become main job of community, does it promote the immigration of external labour into the community?
   - ❍ No (go to question No.9) (54) *(8)*
   - ❍ Yes (go to next question) (8) *(11)*

7. How is the degree of congestion of community?
   - ❍ Not different (6)
   - ❍ Increase more than the past (6) *(19)*
   - ❍ Decrease more than the past

Details .....

8. How is the degree of social problems, such as crime, drug, etc., derived from the congestion of community?
   - ❍ Not different (8) *(4)*
   - ❍ Increase more than the past (3) *(1)*
   - ❍ Decrease more than the past (44) *(13)*

Details .....

Other benefit from silk production

9. Does silk production enhance the reviving or re-innovating of silk wisdom, such as expanding of local sericulture, practicing or re-innovating new design from ancient fabric pattern, and transferring silk know-how, to younger generation or other people in community?
    - ❍ Not at all (16) *(1)*
    - ❍ Not different from the past (6) *(6)*
    - ❍ Increase more than the past (39) *(12)*
    - ❍ Decrease more than the past

Details .....

10. Does silk production boost the community development such as infra-structure improvement?
    - ❍ Not at all (10) *(3)*
    - ❍ Not different from the past (12) *(2)*
    - ❍ Increase more than the past (38) *(14)*
    - ❍ Decrease more than the past (2)

Details .....

11. Other problems

.....

.....

Part III. Economic data

To investigate the economic impact from silk production by comparing the two periods before and after silk production become the main source of community income.

1. Do you think silk production can boost economic development of the village? How? (More answers can be chosen)
    - ❍ Not at all
    - ❍ Increase consumption of consuming product (61) *(17)*
    - ❍ Decrease consumption of consuming product (1) *(1)*
    - ❍ Enhance job creation in community (59) *(18)*
    - ❍ Not enhance job creation in community (2)
    - ❍ Other.....

Details .....

Part IV. Environmental data

1. Evaluate the degree of environmental problems by comparing the two periods before and after silk production becomes the main source of community income. Mark ✓ in the degree level you agree with.

Environmental problems	Degree of problems							
	Before				After			
	Not at all	A bit serious	Quite serious	Very serious	Not at all	A bit serious	Quite serious	Very serious
Community congestion	59 *(1)*	3	-	-	50 *(11)*	12 *(5)*	*(3)*	-
Waste water from silk production	49 *(1)*	13	-	-	19 *(17)*	7 *(2)*	11	25
Solid waste from silk production	53 *(19)*	6	2	-	32 *(19)*	13	12	4
Noise from silk production	51 *(19)*	7	3	1	45 *(17)*	10 *(2)*	6	-
Odour from silk production	44 *(19)*	14	3	-	16 *(12)*	12 *(5)*	8 *(2)*	25
Lack of drinking water	52 *(19)*	9	1	-	24 *(18)*	9	14 *(1)*	15
Lack of non-potable water	59 *(19)*	2	1	-	37 *(8)*	6 *(8)*	7 *(2)*	12 *(1)*
Lack of land dump	56 *(19)*	3	3	-	33 *(18)*	9 *(1)*	7	13

Appendix 2.4: Questionnaire for village leaders (5) *(3)*

Part I. General Data

1. Name-Surname.....
2. Sex ○ Female (1) *(1)* ○ Male (4) *(2)*
3. Age ○ 45-54 year (4) *(2)* ○ > 55 year (1) *(1)*
4. Education ❍ Elementary (1) ❍ Junior secondary (2)
   ❍ Senior secondary /Vocational (1) *(2)* ❍ University (1) *(1)*
5. Have you been lived in this district?
   ❍ Yes
   ❍ No, I moved from .....since.....

   Present title ❍ Village head (4) *(2)* ❍ Teacher (1) *(1)*
   ❍ TAO official since .....
6. Main occupation ❍ Government official (2) *(1)* ❍ Private (3) *(2)*
7. Supplement occupation ❍ Government official (3) *(2)* ❍ Private (2) *(1)*

Part II. Social data

To investigate the social impact from silk production by comparing the two periods before and after silk production become the main source of community income.

<u>Community infra-structure and services</u>

Mark in the period the following services has been set up in the community

Type		Before	After	Detail
Electricity	No			
	Yes	(4) *(2)*		
Water	No			
	Yes	(4) *(2)*		
Public telephone	No			
	Yes	(3) *(2)*		
Well	No			
	Yes	(3) *(2)*		
Public health centre service	No		*(2)*	
	Yes	(4)		
Govt. hospital	No		(4) *(2)*	
	Yes			
Private hospital	No		(4) *(2)*	
	Yes			
Private clinic	No	(2)		
	Yes	(1)	(1) *(1)*	
Primary school	No		(1)	
	Yes	(3) *(2)*		
Secondary school	No		(3) *(2)*	
	Yes	(1)		

Type		Before	After	Detail
Vocational college	No		(4) *(2)*	
	Yes			
Temple	No			
	Yes	(4) *(2)*		
Monastery	No		(4) *(2)*	
	Yes			
Mosque	No		(4) *(2)*	
	Yes			
Church	No		(4) *(2)*	
	Yes			

Population characteristics

1. In your village, there are ..... households
2. Population total ..... male ..... female .....
3. The religion of population
   - Buddhist ..... family
   - Christ ..... family
   - Muslim ..... family
   - Other ..... family
4. The number of silk entrepreneurs in the area
   - Former …… entrepreneurs
     - ❍ < 10 (1)
     - ❍ 10-30 (1) *(1)*
     - ❍ 31-60
     - ❍ > 60 (1) *(3)*
   - Present …… entrepreneurs
     - ❍ < 10 (2)
     - ❍ 10-30 (1)
     - ❍ 31-60
     - ❍ > 60 *(3)*

   The number of silk producers groups in the area
   - Former …… group
   - Present …… groups
     - ❍ 1 (1) *(3)*
     - ❍ 2
     - ❍ 3 (1)

Silk production impact on the relationship of community

Mark ✓ in the proper answer you agree with.

5. How is silk producers' cooperation in any activity of community?
   - ❍ Not different (3) *(2)*
   - ❍ Increase more than the past (2) *(1)*
   - ❍ Decrease more than the past

Details .....

6. How is the willing to cooperative in any activities between community and producer?
   - ❍ Not different (2) *(1)*
   - ❍ Increase more than the past (3) *(2)*

❍ Decrease more than the past

Details .....

7. How is the relationship between community and producer?
   - ❍ Not different
   - ❍ Better than the past (4) *(3)*
   - ❍ Worse than the past (1)

Details .....

8. Is there a organizing of watchdog groups, e.g. security group and environmental monitoring group, in community?
   - ❍ Not different (4) *(1)*
   - ❍ Increase more than the past (1) *(2)*
   - ❍ Decrease more than the past

Details .....

10. Does silk production enhance the reviving or re-innovating of silk wisdom, such as the promoting of sericulture, adoption or adaptation of ancient fabric design, and transferring the know-how, to young generation or other people in community?
   - ❍ Not at all
   - ❍ Not different from the past (1)
   - ❍ Increase more than the past (3) *(3)*
   - ❍ Decrease more than the past (1)

Details .....

10. Since silk production has become main job of community, does it promote the immigration of external labour into the community?
   - ❍ No (go to Part III) (3) *(1)*
   - ❍ Yes (go to next question) (1) *(2)*

11. How is the degree of congestion of community?
   - ❍ Not different (3) *(1)*
   - ❍ Increase more than the past (1) *(2)*
   - ❍ Decrease more than the past

Details .....

12. How is the degree of derived problem, such as crime, drug, etc. from the congestion of community?
   - ❍ Not different (2)
   - ❍ Increase more than the past
   - ❍ Decrease more than the past (3) *(3)*

Details .....

Part III. Economic data

To investigate the economic impact from silk production, by comparing the two periods before and after silk production become the main source of community income. Mark ✓ in the proper answer you agree with.

1. Does silk production boost the community economic? How?
   - ❍ Not at all
   - ❍ Not different from the past
   - ❍ Increase more than the past (4) *(3)*
   - ❍ Decrease more than the past

Details .....

2. Does silk production have a negative impact on community? How?
   - ❍ No (1) *(2)*
   - ❍ Yes (4) *(1)*

Details .....

3. In the case silk production has negative impact on community, have you solved any problem? How?
   - ❍ No (2)
   - ❍ Yes (3)

Details .....

Further suggestions for solving problems

Details .....

4. Do you think most villagers are satisfied with the changing conditions? How?
   - ❍ No
   - ❍ Yes (5) *(3)*

Details .....

5. Has your village got any developing community projects from other local politicians or provincial authorities? How?
   - ❍ No
   - ❍ Yes, from the member of provincial council.
     For example, ...
   - ❍ Yes, from the member of parliament.
     For example, ...
   - ❍ Yes, from the provincial administration organisation.
     For example, ...
   - ❍ Yes, from the sub-district administration organisation.
     For example, ...

6. When villagers have any problems and need for help, who are the person they can ask for help in your village?
   - Position ..... response in any issues about
     .....

Part IV. Environmental data

1. At the present, do you have any pollutants in the area?
   - ❍ No *(1)*
   - ❍ Yes (5) *(2)*

Details .....

2. Which are urgent problems? (More answers can be chosen)

Waste water (5) *(1)*

- ❍ Lack of drinking water (2) *(1)*
- ❍ Lack of supply water (2) *(3)*
- ❍ Solid waste (2) *(1)*
- ❍ Noise
- ❍ Odour (4)

3. Further suggestions for solving problems

Details .....

4. Evaluate the degree of environmental problems by comparing the two periods before and after silk production becomes the main source of community income. Mark ✓ in the degree level you agree with.

Environmental problems	**Degree of problems**							
	Before				**After**			
	Not at all	**A bit serious**	**Quite serious**	**Very serious**	**Not at all**	**A bit serious**	**Quite serious**	**Very serious**
Community congestion	5 *(3)*	-	-	-	4 *(2)*	1	*(1)*	-
Waste water from silk production	5 *(3)*	1	-	-	*(3)*	-		5
Lack of drinking water	5 *(3)*	1	-	-	4 *(2)*	-	1 *(1)*	-
Lack of non-potable water	4 *(3)*	1	-	-	3 *(1)*	1	-	1 *(2)*
Solid waste from silk production	3 *(3)*	2	-	-	2 *(1)*	2 *(2)*	-	1
Lack of land dump	4 *(3)*	1	-	-	2 *(1)*	1 *(2)*	2	-
Noise from silk production	5 *(3)*	-	-	-	3 *(3)*	2	-	*(2)*
Odour from silk production	4 *(3)*	1	-	-	1 *(3)*	1	-	3

5. Investigate water resource of community and evaluate the degree of water shortage problem by comparing the two periods before and after silk production becomes the main source of community income.

Type	Period	Water resource					Degree of problems				Detail
		Well	Canal	Pond	Rain	Buying water	Not at all	A bit serious	Quite serious	Very serious	
Drinking water	Before	1	2	4 *(1)*	5 *(2)*	-	4 *(3)*	1	-	-	
	After	3	2	1	3 *(3)*	2	2 *(3)*	1	1	1	
Non-potable water	Before	3	3	3 *(3)*	2	1	4 *(2)*	*(1)*	-	-	
	After	5	-	1 *(3)*	3	2	3	-	-	2 *(3)*	

Appendix 2.5: Questionnaire for TAO administrative chairmen (3) *(1)*

Part I. General Data

1. Name-Surname.....
2. Sex ❍ Female ❍ Male (3) *(1)*
3. Age ❍ 45-54 year (3) ❍ > 55 year *(1)*
4. Education ❍ Elementary ❍ Junior *(1)*
   ❍ Senior/Vocational (2) ❍ University (1)
5. Have you been lived in this district?
   ❍ Yes
   ❍ No, I moved from .....since.....
   Present title .....since .....
6. Main occupation ❍ Government official (2) *(1)* ❍ Private (1)
7. Supplement occupation ❍ Government official (1) ❍ Private (1) *(1)*

Part II. Social data

To investigate the social impact from silk production by comparing the two periods before and after silk production become the main source of community income.

<u>Community infra-structure and services</u>

Mark in the period the following services has been set up in the community

Type		Before	After	Detail
Electricity	No			
	Yes	(3)	*(1)*	
Water	No			
	Yes	(3)	*(1)*	
Public telephone	No	(1)		
	Yes	(2)	*(1)*	
Well	No			
	Yes	(3) *(1)*		
Public health centre service	No			
	Yes	(3) *(1)*		
Govt. hospital	No		(3) *(1)*	
	Yes			
Private hospital	No		(3) *(1)*	
	Yes			
Private clinic	No		(2) *(1)*	
	Yes	(1)		
Primary school	No			
	Yes	(3) *(1)*		
Secondary school	No		*(1)*	
	Yes	(2)	(1)	

Type		Before	After	Detail
Vocational college	No		(3) *(1)*	
	Yes			
Temple	No			
	Yes	(3) *(1)*		
Monastery	No		(1)	
	Yes	(2) *(1)*		
Mosque	No		(3) *(1)*	
	Yes			
Church	No		(3) *(1)*	
	Yes			

Population characteristics

8. In your sub-district, there are ..... villages ..... families
9. Population total ..... male ..... female .....
10. The religion of population
    - Buddhist ..... family
    - Christ ..... family
    - Muslim ..... family
    - Other ..... family
11. The number of silk entrepreneurs in the area
    - Former …… entrepreneurs
    - Present …… entrepreneurs

    The number of silk producers groups in the area
    - Former …… entrepreneurs
    - Present …… entrepreneurs

Silk production impact on the relationship of community

Mark ✓ in the proper answer you agree with.

12. How is silk producers' cooperation in any activity of community?
    - ❍ Not different (1)
    - ❍ Increase more than the past (2) *(1)*
    - ❍ Decrease more than the past

Details .....

13. How is the willing to cooperative in any activities between community and producer?
    - ❍ Not different (1)
    - ❍ Increase more than the past (2) *(1)*
    - ❍ Decrease more than the past

Details .....

14. How is the relationship between community and producer?
    - ❍ Not different *(1)*
    - ❍ Better than the past (2)

❍ Worse than the past (1)

Details .....

15. Is there a organizing of watchdog groups, like security group or environmental monitoring, in community?
    - ❍ Not different (2)
    - ❍ Increase more than the past (1)*(1)*
    - ❍ Decrease more than the past

Details .....

10. Does silk production enhance the reviving or re-innovating of silk wisdom, such as the promoting of sericulture, adoption or adaptation of ancient fabric design, and transferring the know-how, to young generation or other people in community?
    - ❍ Not at all (1)
    - ❍ Not different from the past (1)
    - ❍ Increase more than the past (1) *(1)*
    - ❍ Decrease more than the past

Details .....

13. Since silk production has become main job of community, does it promote the immigration of external labour into the community?
    - ❍ No (go to Part III) (3) *(1)*
    - ❍ Yes (go to next question)

14. How is the degree of congestion of community?
    - ❍ Not different (1)
    - ❍ Increase more than the past
    - ❍ Decrease more than the past

Details .....

15. How is the degree of derived problem, such as crime, drug, etc. from the congestion of community?
    - ❍ Not different (1)
    - ❍ Increase more than the past
    - ❍ Decrease more than the past (2) *(1)*

Details .....

Part III. Economic data

To investigate the social impact from silk production by comparing the two periods before and after silk production become the main source of community income. Mark ✓ in the proper answer you agree with.

7. Does silk production boost the community economic? How?
    - ❍ Not at all
    - ❍ Not different from the past
    - ❍ Increase more than the past (3) *(1)*
    - ❍ Decrease more than the past

Details .....

8. In the case silk production has brought the benefit to community, do you think your organization should promote or develop this business to boost community development? How?
    - ❍ No
    - ❍ Yes (2) *(1)*

Details .....

Other benefit from silk production

9. Since silk production has become main business of community, does it have a positive impact on community? How?
    - ❍ No
    - ❍ Yes (3) *(1)*

Details .....

10. Does silk production have a negative impact on community? How?
    - ❍ No (1) *(1)*
    - ❍ Yes (2)

Details .....

11. In the case silk production has negative impact on community, do your organisation has solve the problem? How?
    - ❍ No
    - ❍ Yes (3)

Details .....

Further suggestions for solving problems

Details .....

12. Do you think most villagers are satisfied with the changing conditions? How?
    - ❍ No (1)
    - ❍ Yes (2) *(1)*

Details .....

13. Has your sub-district got any developing community projects from other local politicians or provincial authorities? How?
    - ❍ No
    - ❍ Yes, from the member of provincial council.
      For example, ...
    - ❍ Yes, from the member of parliament.
      For example, ...
    - ❍ Yes, from the provincial management authority.
      For example, ...
    - ❍ Yes, from the sub-district management authority.
      For example, ...

14. When villagers have any problems and need for help, who are the person they can ask for help in your organisation?
    - Position ..... response in any issues about ....
    - Position ..... response in any issues about ....

Part IV. Environmental data

1. At the present, do you have any pollutants in the area?
    - ❍ No (1) *(1)*
    - ❍ Yes (2)

Details .....

2. Which are urgent problems? (More answers can be chosen)
    - ❍ Waste water (2)
    - ❍ Lack of drinking water (3) *(1)*
    - ❍ Lack of non-potable water (3) *(1)*
    - ❍ Solid waste
    - ❍ Noise (1)
    - ❍ Odour

3. Further suggestions for solving problems

Details .....

4. Evaluate the degree of environmental problems by comparing the two periods before and after silk production becomes the main source of community income. Mark ✓ in the degree level you agree with.

Environmental problems	**Degree of problems**							
	Before				**After**			
	Not at all	**A bit serious**	**Quite serious**	**Very serious**	**Not at all**	**A bit serious**	**Quite serious**	**Very serious**
Community congestion	3 *(1)*	-	-	-	3 *(1)*	-	-	-
Waste water from silk production	1*(1)*	1	-	-	*(1)*	-	1	1
Solid waste from silk production	1 *(1)*	1	-	-	-	*(1)*	2	
Noise from silk production	3 *(1)*	-	-	-	3 *(1)*	-	-	-
Odour from silk production	3 *(1)*	-	-	-	1 *(1)*	-	1	1
Lack of drinking water	2 *(1)*	1	-	-	1 *(1)*	2	-	-
Lack of non-potable water	2*(1)*	1	-	-	1	1	*(1)*	1
Lack of land dump	2 *(1)*	-	-	-	-	*(1)*	2	-

5. Investigate water resource of community and evaluate the degree of water shortage problem by comparing the two periods before and after silk production becomes the main source of community income.

Type	Period	Water resource					Degree of problems				Detail
		Well	Canal	Pond	Rain	Buying water	Not at all	A bit serious	Quite serious	Very serious	
Drinking water	Before	-	-	1 *(1)*	3 *(1)*	-	2 *(1)*	1	-	-	
	After	-	-	1	3 *(1)*	2	2 *(1)*	3	-	-	
Non-potable water	Before	2	1 *(1)*	2 *(1)*	1	-	2	1 *(1)*	-	-	
	After	3*(1)*	2	2	2	1	-	2 *(1)*	-	1	

Appendix 2.6: Questionnaire for health promotion official (3) *(1)*

Part I. General Data

1. Name-Surname.....
2. Sex ○ Female (3) *(1)* ○ Male
3. Age .....
4. Have you been lived in this district?
   - ❍ Yes
   - ❍ No, I moved from .....since.....

   Present title .....since .....
5. Organisation .....
6. The responsible area of organization
   - ❍ 6-10 villages(1) *(1)* ❍ 11-15 villages (2)
   - ❍ < 1,000 households (1) *(1)* ❍ 1,501-2,000 households (2)

   Total populations ……..; male ……. female ……..

Part II. Health impacts from silk production

1. By comparing the two periods before and after silk production becomes the main source of community income, how is the degree of community health problems in 4 aspects that involved with silk production?

Topic	Period	Attitude scale				Details
		Not at all	A little serious	Quite serious	Very serious	
Respiratory system problems	Before	1 *(1)*	2	-	-	
	After	1 *(1)*	1	1	-	
Dermatological system problems	Before	1 *(1)*	2	-	-	
	After	1	1 *(1)*	2	-	
Anxiety / unknown headache	Before	1 *(1)*	2	-	-	
	After	1	*(1)*	2	-	
Unknown muscular problems	Before	1	1 *(1)*	1	-	
	After	1	-	2 *(1)*	-	

3. In your opinion, after most villagers have produced silk as the main job, do you think silk production has negative impact on human health? How?

❍ Yes (3) *(1)* ❍ No

Details .....

4. In the case that silk production has negative impact on health, has your organisation conducted any activities to relieve or solve the problem? How?

❍ Yes (2) *(1)* ❍ No (1)

Details .....

5. More suggestions for problem solving

Details .....

Appendix 2.7: Questionnaire for silk promotion extension official (1) *(2)*

Part I. General Data

1. Name-Surname.....
2. Sex ○ Female (1) *(1)* ○ Male *(1)*
3. Age .....
4. Have you been lived in this district?
   - ❍ Yes
   - ❍ No, I moved from .....since.....

   Present title ..... since .....
5. Organisation .....
6. The responsible area of organization … (16) *(5)*…. sub-districts (1) *(1)* districts
7. The number of silk entrepreneurs in the area
   - Former …(700)…… entrepreneurs
   - Present …(53 SMEs+300 MSEs)…*(167)*… entrepreneurs

   The number of silk producers groups in the area
   - Former …(2-3)…*(6)*… groups
   - Present …(7)… *(6)*… groups

Part II. Business impacts from silk production

9. By comparing the two periods before and after silk production becomes the main source of community income, how are different of the present silk production from the past in various aspects?

Topic	Attitude scale	Details
Number of Producer	❍ Not different ❍ Increase more than the past (1) *(2)* ❍ Decrease more than the past	
Production format	❍ Not different (1) ❍ Better than the past *(2)* ❍ Worse than the past	
Production techniques and technology	❍ Not different *(2)* ❍ Better than the past (1) ❍ Worse than the past	
Raw material	❍ Not different (1) *(1)* ❍ Better than the past *(1)* ❍ Worse than the past	
Labour	❍ Not different *(2)* ❍ Better than the past (1) ❍ Worse than the past	
Product (appearance, quality, innovation)	❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	

Topic	Attitude scale	Details
Marketing	❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	
Distribution	❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	
Production management	❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	
Financial management	❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	
Environment	❍ Not different *(1)* ❍ Better than the past ❍ Worse than the past (1) *(1)*	
Production knowledge and wisdom	❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	
Group production	❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	
The relationship between producer and community	❍ Not different *(1)* ❍ Better than the past *(1)* ❍ Worse than the past (1)	
Community development	❍ Not support any development of community ❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	
Recovering and transferring of silk wisdom	❍ No silk wisdom recovering and transferring ❍ Not different *(1)* ❍ Increase more than the past (1) *(1)* ❍ Decrease more than the past	
Government supporting	❍ Not different ❍ Better than the past (1) *(2)* ❍ Worse than the past	
Linkage with private sector	❍ Not different *(1)* ❍ Better than the past (1) *(1)* ❍ Worse than the past	

10. By comparing the two periods before and after silk production becomes the main source of community income, how is the degree of problems in silk production?

Topic	Period	Attitude scale				Details
		Not at all	A little serious	Quite serious	Very serious	
Raw material management	Before	*(1)*		1 *(1)*		
	After		1	*(2)*		
Production technique	Before	1 *(2)*				
	After	1	*(1)*	*(1)*		
Lack of labour	Before	1 *(2)*				
	After	1 *(1)*	*(1)*			
Production management	Before	1 *(2)*				
	After	1 *(1)*	*(1)*			
Marketing	Before	*(2)*		1		
	After	*(2)*	1			
Distribution	Before	1 *(2)*				
	After	*(1)*	1 *(1)*			
Financial management	Before	1 *(2)*				
	After	*(2)*	1			
Product appearance	Before	1 *(2)*				
	After	1	*(2)*			
Product development	Before	1 *(2)*				
	After	*(2)*	1			
Lack of production expert	Before	1 *(2)*				
	After	1 *(2)*				
Lack of production inheritor	Before	1 *(2)*				
	After	*(1)*			1 *(1)*	
Group production management	Before	1 *(2)*				
	After	1 *(2)*				
Lack of production skill	Before	1 *(2)*				
	After	*(1)*	1 *(1)*			
Environmental management	Before	1 *(2)*				
	After	*(2)*		1		
Conflict in community	Before	1 *(2)*				
	After	*(1)*	1 *(1)*			
Government official supporting	Before	1 *(2)*				
	After	1 *(1)*	*(1)*			
Linkage with the private sector	Before	*(2)*		1		
	After	*(1)*	1	*(1)*		

11. In your opinion, which are urgent problems? (More one choice can choose)
- ❍ Production (Production technique, raw material, labour, etc.)
- ❍ Production management
- ❍ Financial management *(1)*
- ❍ Marketing (1)
- ❍ Distribution (1) *(1)*
- ❍ Product development (1)
- ❍ Lack of production expert
- ❍ Lack of production apprentice (1)
- ❍ Lack of production skill
- ❍ Group production management
- ❍ Environmental management (1) *(1)*
- ❍ Conflict in community
- ❍ Government official supporting
- ❍ Linkage with the private sector

12. In your opinion, after silk production has become main occupation of community, do you think it has brought any positive impact on the community? How?

❍ Yes (1) *(2)* ❍ No

Details .....

13. In your opinion, after silk production has become main occupation of community, do you think it has led to any problems or negative impact on the community? How?

❍ Yes (1) ❍ No *(2)*

Details .....

14. In recently, has your organisation set up any activities to help or solve those problems of producer? How?

❍ Yes (1) *(1)* ❍ No

Details .....

15. Other supporting organisations
- Name ..... Type govt. / private / NGOs support in .....
- Name ..... Type govt. / private / NGOs support in .....

16. Other suggestions

Details .....

Appendix 2.8: Questionnaire for environmental official (1)

Since the 11th REO have environmental data of Nakhon Ratchasima in general and does not have data about wastewater and waste from silk production, **this questionnaire was not used**. In-depth interview was conducted in order to gather the information about the related environmental data and plans in target areas.

Part I. General Data

1. Name-Surname.....
2. Sex ○ Female ○ Male
3. Age .....
4. Education ❍ Elementary ❍ Junior
   ❍ Senior/Vocational ❍ University
5. Have you been lived in this district?
   ❍ Yes
   ❍ No, I moved from .....since.....
   Present title .....since .....
6. Organisation .....
7. The responsible area of organization ……. sub-districts
   …… districts …….. provinces

Part II. Environmental impacts from silk production

8. At the present, are there any environmental problems in Sida sub-district and Pak Thongchai district? How?
   ❍ Yes ❍ No

Details .....

9. What are urgent problems in those areas? (More one answer can be selected)
   - ❍ Untreated Waste water from .....
   - ❍ Lack of drinking water
   - ❍ Lack of non-potable water
   - ❍ Solid waste from .....
   - ❍ Noise from .....
   - ❍ Odour from ……..

10. By comparing the two periods before and after silk production becomes the main source of community income, how is the degree of following problems in silk production? (Mark ✓ in the appropriate scale you agree with)

Type	Period	Not at all	A bit serious	Quite serious	Very serious	Details
Waste water from silk production	Before					
	After					
Solid waste from silk production	Before					
	After					
Drink water supply	Before					
	After					
Non-potable water	Before					
	After					
Soil	Before					
	After					
Community congestion	Before					
	After					
Air pollutant	Before					
	After					
Noise	Before					
	After					

11. In your opinion, after most villagers have produced silk as the main job, do you think silk production has negative impact on the environment? How?

❍ Yes ❍ No

Detail .....

12. In the case that silk production has negative impact on environment, has your organization conducted any activities to relieve or solve the problems? How?

❍ Yes ❍ No

Details .....

13. More suggestion for problem solving

Details .....

Appendix 2.9: Significant level of probability value of producers' data between gender and age distribution and two types of productions

Most data except those marked with [a] are analysed by non-parametric test. In order to find significant value between gender, Mann-Whitney test are employed. Kruskal Wallist test are used to explore the significant value between different groups of age. Meanwhile, those data marked with [a] and [b] are analyed by parametrict test. Different gender and age are analyed by Independent samples T-test and One-way ANOVA methods, respectatively. Significant values between different types of production marked with [c] are analysed by Independent samples T-test. Due to lack of data in producers in Sida, so there is no result in the one marked with *.

Questions	Producers in Pak Thongchai				Producers in Sida		Different types of production	
	Gender		Age		Age			
	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.
Production issue								
Production format	1	No	1	No	1	No	0.034	Yes
Objective of production	1	No	1	No	1	No	0	Yes
Driving factors to operate silk business	0.88	No	0.735	No	1	No	0.057	No
Production Know-how	0.04	Yes	0.315	No	1	No	0.057	No
Most production method	0.596	No	0.318	No	0.029	Yes	0.004	Yes
Type of product	0.023	Yes	0.496	No	0.277	No	0.001	Yes
Main products produced in recent years	0.157	No	0.682	No	1	No	0	Yes
Factors encouraging production	1	No	1	No	1	No	1	No
Production period	1	No	1	No	0.154	No	0	Yes
Production unit	1	No	1	No	1	No	0.042	Yes
Time duration of silk production per unit	0.155	No	0.509	No	0.392	No	0	Yes
Quantity of silk fabric production	0.282	No	0.887	No	0.414	No	0	Yes
Production cost per unit	0.333	No	0.961	No	0.442	No	0[c]	Yes
Capital amount	0.53	No	0.14	No	0.438	No	0	Yes
Source of capital	0.015	Yes	0.368	No	1	No	0.48	No
Debt amount	0.42	No	0.221	No	0.681	No	0	Yes
Source of loan	0.91	No	0.037	Yes	0.301	No	0	Yes
Cause of indebtedness	0.79	No	0.207	No	0.849	No	0.707	No
Source of income	0.028	Yes	0.192	No	0.375	No	0.257	No

Questions	Producers in Pak Thongchai				Producers in Sida		Different types of production	
	Gender		Age		Age			
	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.
Income amount	1	No	1	No	0.154	No	0	Yes
Total savings	0.509	No	4.59	No	0.483	No	0.007	Yes
Saving management	0.611	No	0.571	No	0.572	No	0.625	No
Other assets collected from silk production	0.48	No	0.172	No	0.438	No	0	Yes
Raw material sourcing management	0.496	No	0.034	Yes	0.134	No	0.008	Yes
Brand	1	No	0.038	Yes	1	No	0.309	No
Target market	1	No	0.617	No	0.506	No	0.097	No
Marketer and distributor	0.843	No	0.764	No	0.105	No	0.009	Yes
Distribution extent	0.309	No	0.178	No	1	No	0.309	No
Sale unit	1	No	1	No	1	No	1	No
Quality control and grading product	1	No	1	No	0.815	No	0	Yes
Methodology or standard implementing in quality control	1	No	1	No	1	No	0.48	No
Quality controller	1	No	1	No	0.572	No	0	Yes
Other organisations supporting	0.598	No	0.593	No	0.105	No	0.003	Yes
Production problem	1	No	0.961	No	0.284	No	0.176	No
Marketing and distribution problem	0.03	Yes	0.438	No	1	No	0	Yes
Financial problem	0.136	No	0.766	No	0.572	No	0.209	No
Administration problem	0.547	No	0.319	No	0.506	No	0.003	Yes
Type of group	0.274	No	0.954	No	1	No	0.192	No
Production planning	0.022	Yes	0.96	No	1	No	0	Yes
Marketing	0.891	No	0.617	No	1	No	0	Yes
Distribution	0.268	No	0.181	No	1	No	0.059	No
Management	0.891	No	0.617	No	1	No	0.111	No
Member cooperation	0.47	No	0.056	No	1	No	0.03	Yes
Social issue								
Migration of family's member	0.836[a]	No	0.188[b]	No	0.561	No	0.96	No
Condition of habitation	0.739	No	0.21	No	1	No	0.746	No

Questions	Producers in Pak Thongchai				Producers in Sida		Different types of production	
	Gender		Age		Age			
	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.
Educational opportunity of children	0.532	No	0.037	Yes	0.321	No	0	Yes
Time spending in family's communication	0.543	No	0.188	No	0.229	No	0.867	No
Time spending in family's activities	0.13	No	0.423	No	0.281	No	0.162	No
No health effects on family member	0.269	No	0.135	No	0.861	No	0.204	No
Respiratory effects on family member	0.323	No	0.087	No	0.626	No	0.001	Yes
Dermatology effects on family member	0.768	No	0.535	No	0.761	No	0	Yes
Nervous effects on family member	0.951	No	0.537	No	0.506	No	0.003	Yes
Muscular effects on family member	0.596	No	0.321	No	0.706	No	0.017	Yes
Silk producers' participation in community's activities	0.365[a]	No	0.487[b]	No	0.438	No	0.022	Yes
Willingness in cooperating activities with neighbours	0.575[a]	No	0.586[b]	No	0.305	No	0.042	Yes
Relationship between neighbours and producers	0.43	No	0.36	No	0.212	No	0.062	No
Willingness in cooperating activities with community	0.257[a]	No	0.455[b]	No	0.212	No	0.019	Yes
Relationship with community	0.614	No	0.46	No	0.212	No	0.019	Yes
No health effects on non-family member	0.314	No	0.21	No	0.572	No	0.292	No
Respiratory effects on non-family member	0.823	No	0.92	No	0.277	No	.194[c]	No
Dermatological effects on non-family member	0.517	No	0.368	No	0.574	No	.021[c]	Yes
Nervous effects on non-family member	0.527	No	0.287	No	0.732	No	0.103	No
Muscular effects on non-family member	0.18	No	0.16	No	0.272	No	0.022	Yes
Degree of community overcrowding	0.1	No	0.058	No	1	No	0.022	Yes
Social problems	0.039	Yes	0.296	No	0.202	No	0.17	No
Impact on the revival or re-innovating of silk know-how	0.774	No	0.722	No	0.796	No	0.719	No
Enhancing C_ommunity development	0.314	No	0.378	No	1	No	0.033	Yes
Economic issue								
Income	0.157	No	0.09	No	1	No	1	No
Expenditure	0.157	No	0.09	No	0.861	No	0.042	Yes
Savings	0.839	No	0.48	No	0.438	No	0.329	No
Debt	0.329	No	0.159	No	0.327	No	0.454	No

Questions	Producers in Pak Thongchai				Producers in Sida		Different types of production	
	Gender		Age		Age			
	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.
Tax contribution	1	No	0.394	No	1	No	1	No
Promote local businees	1	No	1	No	0.766	No	0.156	No
Generate jobs	1	No	1	No	0.202	No	0	Yes
Save from buying silk fabric	0.157	No	0.09	Yes	1	No	0	Yes
Economic loss from silk production	0.173	No	0.8	No	1	No	1	No
Environmental issue								
Physical changing of community environment	0.448	No	0.847	No	0.572	No	0.334	No
Community overcrowding	0.859	No	0.517	No	0.438	No	0.859	No
Waste	0.608	No	0.049	No	0.438	No	0.035	No
Water resource	0.663	No	0.103	No	0.029	Yes	0.635	No
Odour	0.872	No	0.078	No	0.029	Yes	0.008	Yes
Degree of environmental problems								
Community overcrowding (Before)	0.164	No	0.205	No	1	No	0.045	Yes
Community overcrowding (After)	0.705	No	0.265	No	0.816	No	0.147	No
Waste water from silk production (Before)	0.352	No	0.173	No	1	No	0.021	Yes
Waste water from silk production (After)	0.429	No	0.216	No	1	No	0	Yes
Lack of drinking water (Before)	0.893	No	0.857	No	1	No	0.283	No
Lack of drinking water (After)	0.303	No	0.712	No	1	No	0.008	Yes
Lack of non-potable water (Before)	0.943	No	0.469	No	1	No	0.18	No
Lack of non-potable water (After)	0.958	No	0.871	No	0.347	No	0.58	No
Solid waste from silk production (Before)	0.238	No	0.145	No	0.801	No	0.238	No
Solid waste from silk production (After)	0.748	No	0.163	No	0.256	No	0.598	No
Lack of land dump (Before)	0.429	No	0.522	No	0.801	No	0.732	No
Lack of land dump (After)	0.452	No	0.988	No	0.506	No	0.528	No
Noise from silk production (Before)	0.372	No	0.191	No	1	No	0.104	No
Noise from silk production (After)	0.106	No	0.257	No	1	No	0.003	Yes
Odours from silk production (Before)	0.622	No	0.063	No	1	No	0.103	No

Questions	Producers in Pak Thongchai				Producers in Sida		Different types of production	
	Gender		Age		Age			
	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.
Odours from silk production (After)	0.221	No	0.436	No	0.19	No	0.004	Yes
Availability of waste water management system	1	No	0.749	No	1	No	0	Yes
Availability of solid waste management system	1	No	1	No	1	No	0.002	Yes
Appropriate waste water treatment system for community								
Centralised / individualized system	0.437	No	0.547	No	1	No	0.036	Yes
Maintainer	0.278	No	0.126	No	1	No	0.019	Yes
Main Investor	0.188	No	0.132	No	1	No	0.004	Yes
Appropriate solid waste treatment system for community								
Centralised / individualized system	0.178	No	0.067	No	1	No	0	Yes
Maintainer	0.505	No	0.15	No	0.801	No	0.002	Yes
Main Investor	0.244	No	0.181	No	1	No	0	Yes
Problems of water provision	0.612	No	0.097	No	0.154	No	0.284	No
Problems of fuel wood provision	0.684	No	0.05	No	1	No	0.001	Yes
Attitudes and beliefs of silk producers								
Group production perception question 1	0.627	No	0.774	No	0.293	No	0.11	No
Group production perception question 2	0.868	No	0.797	No	0.516	No	0.472	No
Group production perception question3	0.272	No	0.802	No	0.321	No	0.635	No
Group production perception question 4	0.145	No	0.816	No	0.212	No	0.448	No
Group production perception question 5	1	No	0.71	No	0.493	No	0.604	No
Social and community perception question 1	0.69	No	0.403	No	0.522	No	0.055	No
Social and community perception question 2	0.87	No	0.572	No	0.516	No	0.502	No
Social and community perception question 3	0.635	No	0.766	No	0.266	No	1	No
Social and community perception question 4	0.733	No	0.433	No	0.572	No	0.87	No
Social and community perception question 5	0.691	No	0.634	No	0.438	No	0.375	No
Economic perception question 1	0.189	No	0.234	No	0.029	Yes	0.241	No
Economic perception question 2	0.914	No	0.225	No	1	No	0.003	Yes
Economic perception question 3	0.895	No	0.434	No	0.67	No	0.039	Yes

Questions	Producers in Pak Thongchai				Producers in Sida		Different types of production	
	Gender		Age		Age			
	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.	Sig. value	Sig. diff.
Economic perception question 4	0.259	No	0.17	No	0.801	No	0.056	No
Economic perception question 5	0.546	No	0.589	No	0.138	No	0.112	No
Environmental management perception question 1	0.005	Yes	0.305	No	0.846	No	0.006	Yes
Environmental management perception question 2	0.164	No	0.037	Yes	0.438	No	0.236	No
Environmental management perception question 3	0.169	No	0.064	No	1	No	0.192	No
Environmental management perception question 4	0.353	No	0.731	No	*	n/a	*	n/a
Environmental management perception question 5	0.388	No	0.455	No	0.212	No	0.621	No

Appendix 3: Pictures of modern and traditional silk production process

Appendix 3.1: Picture of modern silk production process of MSEs in Pak Thongchai

Bleaching silk yarn

Dyeing silk yarn

Reeling warp thread on bobbins

Reeling weft thread on shuttles

Reeling warping frame

- Lengthening warp thread

- Storing warp thread with reed

- Rolling warping frame

Threading warp through heddle and beater

Tied Warp thread with heddle and beater

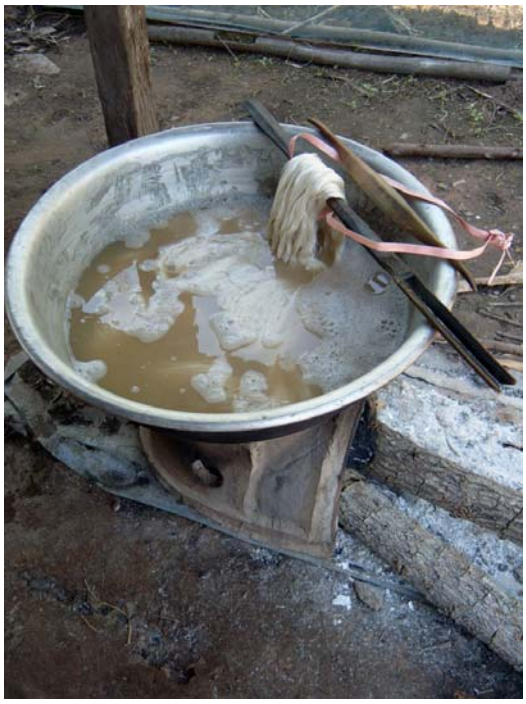
Weaving fabric by using flying shuttle loom

Appendix 3.2: Picture of traditional silk production process of SMCE in Sida

Rearing silk worms

Threading silk yarn from cocoons

Boiled silk worm was sold as a popular snack in Isan



Bleaching silk thread

Dyeing silk thread

Spinning silk threads

Reeling warp thread on bobbins

Lengthening warp yarn

Threading warp through reeds

Threading warp through heddle and beater

Attaching heddle shaft to treadle






Preparing Matmi weft thread

1) Tying yarn by plastic string in required pattern. At present, new learner will use a diagram of fabric pattern as a model, while the expert can design how to tie thread by looking at the original fabric.

2) Dyeing, retying and redyeing for each colour addition, finally dyed thread is keep twine in order.

Reeling weft thread through the shuttle

Weaving by using traditional style metal loom

Weaving by using tradition wooden loom

Sample of award-winning Matmi fabric (up) and plain monochrome fabric (down)

Appendix 4: Example of CT options for improving modern and traditional silk production efficiencies

Appendix 4.1: Example of CT options for improving modern silk production efficiency

From the CT audits in silk MSEs in Pak Thongchai and SMCE in Sida, the following CT options were suggested by the CT audit teams. These options not only reduce waste, raw material use and risks from OHS in the production, but also mitigate the BOD and COD in waste water.

Waste/Source of waste	CT options
Waste water from rinsing process	• Optimise water use in dyeing and rinsing process • Collect dye solution to reuse in dyeing of same shade colour fabric • Collect the final rinsed water in rinsing and drying process and reuse this water for soaking silk yarn before bleaching • Early planning for similar colour shade dyeing to reduce the amount of rinsing water used in the process • Repair leaking hoses and pipes
Chemical agents in dyeing and bleaching processes	• Read label on chemical package or containers carefully before use • Collect used chemical packages and containers in hazardous waste bins every time after use instead of burning in order to prevent the contamination of working areas and release of hazardous fumes from chemical leftovers • Measure chemicals during use to reduce excess consumption • Good housekeeping of chemical agents: keep agents in suitable labeled container and in appropriate safe conditions; and safety dispose of substances whose expiry dates have been exceeded
Energy	• Improve the burning capacities of stoves by cleaning the chimneys and increasing air ventilation • Use heat saving materials, e.g. brick and metal sheet, to build or restore the stove in order to reduce heat losses • Use local agricultural residues, i.e. corncob and rice husks, or natural gas to reduce production costs and the risk of total reliance on wood for fuel • Reduce fuel wood consumption by using thermometers to control process temperatures

Waste/Source of waste	CT options
Production management	• Sort and keep raw materials and tools according to frequency of use • Keep materials at reaching level and put large sized materials at low elevation without blocking pathway • Avoid smoking, drinking and eating food when working • Wash one's body and change into new clothes after work or before having a meal • Prevent chemical exposure by using gloves, safety glasses, and gown • Reduce waste and raw material consumption by early production planning for similar shades or colours of fabrics • Housekeeping of amounts of materials used and any OHS accidents or incidents in order to improve production process and working effectiveness • Setting up of training courses to increase management and OHS skills as well as waste treatment knowledge

Appendix 4.2: Example of CT options for improving traditional silk production efficiency

Waste/Source of waste	CT options
Waste water from rinsing process	• Optimise water use in dyeing and rinsing process • Collect dye solution and rinsed water in drying process and reuse in the dyeing and rinsing processes • Repair leaking hoses and pipes
Chemical agents in dyeing and bleaching processes	• Read label on chemical packages or containers carefully before use • Dissolve the bleaching agent indoors and use scissors to cut the package instead of a knife in order to eliminate chemical dusts that may spill over the ground and are inhaled by workers • Collect used chemical packages and containers in hazardous waste bins every time after use instead of burning in order to prevent the contamination of in working areas and release of hazardous fumes from chemical leftover • Optimise chemical use to reduce consumption

Waste/Source of waste	CT options
Chemical agents in dyeing and bleaching processes (cont)	• Good housekeeping of chemical agents: keep agents in suitable containers and safety dispose of substances whose expiry date have been exceeded • Useappropriate chemical dyes and agents
Energy	• Use lids to cover containers during bleaching and dyeing processes in order to save energy and reduce any health risk from chemical fumes • Clean the bottoms of containers • Reduce fuel wood consumption by using thermometers to control process temperatures and increase energy efficiency by using fuel saving stoves
Production management	• Sort and keep raw materials and tools according to frequency of use • Keep materials at reaching level and put large sized materials at low elevation without blocking pathway • Avoid smoking, drinking and eating food when working • Wash one's body and change into new clothes after work or before having a meal • Prevent chemical exposure by using gloves, safety glasses, and gown • Reduce waste and raw material consumption by early production planning for similar shades or colours of fabrics • Improve ventilation of bleaching and dyeing areas • Housekeeping of amounts of materials used and any OHS accidents or incidents in order to improve production process and working effectiveness • Setting up of training courses to increase management and OHS skills as well as waste treatment knowledge

Appendix 5: Details of estimated number of producers and workers and market values of business in silk Subsector map

Appendix 5.1: Estimated number of silk MSEs in Pak Thongchai

- According to the interview result with Pak Thongchai community development, it is estimated there were 700 silk producers in Pak Thongchai in 2004.
- Estimated number of silk SMEs in Pak Thongchai from the database of Thailand Department of Industrial Work is 50.
- Hence, estimated number of informal silk MSEs in Pak Thongchai is 650.

Appendix 5.2: Estimated number of employment in Pak Thongchai

- In order to produce a roll of fabric, it was necessary to subcontract tasks to at least 6-7 workers, depending on whether weaving was conducted by a producer or not. This assumes a two-month duration to finish a roll of fabric.
- The survey revealed that the production process can be divided into 2 phases, preparation and weaving, with each phase taking a month to finish. Details about the tasks and their duration times for each process are presented in below.

Phase	Details	Expected time to complete task
I. Preparation phase		1 month
1. Bleaching and dyeing	This process requires 2 workers. It is estimated that 2 workers could work with a stove to prepare dyed yarn for producing 3 rolls of fabric per week. However, for a production process using 2 stoves at the same time, it is possible to increase capacity to 4 rolls within 2 days. Then, silk yarn for12 rolls of fabrics could be prepared within a week	1 week (the calculation is based on 6 working days)
2. Reeling and spinning warp yarn	Since reeling and spinning machines have been introduced, it is believed that silk yarn for making 5 rolls of fabric can be reeled and spun within one day.	1 week
3. Reeling and spinning weft yarn	Similarly, using machines can prepare weft yarn for producing 4 fabric rolls within one day. This process can occur in parallel with the process of warp yarn preparation	20 working days
4. Framing and combing warp yarn	Two workers are needed to work together in this process. It takes a whole day to prepare warp yarn for making a roll of fabric	1 week

Phase	Details	Expected time to complete task
5. Tying warp yarn with heddles	A worker could tying warp yarn with heddle in preparation for producing 2 fabric rolls within one day	1 week
II. Weaving phase	A weaver need a month maximum to complete a roll of fabric	1 month
Total		2 months

- Regarding the survey result in 2004, it is believed most households in Baan Doo and Doo Noak villages had involvement with the silk business during the silk boom in 2003. However, the decline of silk fabric price and the intense competition has caused a reduction in the number of micro producers in the village in 2004. The most popular numbers of looms operating by silk informal enterprises in Pak Thongchai are 10-15 looms (40%), 5-9 looms (21%) and 20-30 looms (17%).
- During the silk boom in 2003, the estimated structure of informal silk business at the village level was dominated by micro enterprise. Meanwhile, the second rank was small enterprises which developed their businesses from silk workers or from investments by unemployed workers who moved back to the villages. Finally, medium enterprise was in third place. Details of percentages of the informal enterprises are shown in the following table.

Number of looms	Percentage of silk informal enterprise in village	Estimated number of silk informal enterprise in Pak Thongchai	Estimated number of employee in each enterprise	Estimated number of employment in Pak Thongchai
1-3 (avg. = 2)	50	325	7	2,275
5	30	195	13	2,535
10	15	98	21	2,058
30	5	32	57	1,824

- Therefore, the estimated number of employee who worked for the informal micro and small enterprises (whose possess less than 26 looms) in Pak Thongchai in 2003 should be more than 6,000 people.

Appendix 5.3: Market value of silk business

Market value = Average yards of fabric produced per loom per annum x Average wholesale price of a yard of fabric (paid by cash) x Estimated number of looms of each significant silk informal enterprises in Pak Thongchai x Estimated number of silk informal enterprises in Pak Thongchai

Average yards of fabric produced per loom per annum

= Average yard of silk fabric produced by one loom of silk informal enterprises in Pak Thongchai in one year (a figure come from the finding results from the survey) x Minimum number of production per annum

= 234.2 yards per loom per batch x 6 batch per annum

= 1,405.2 yards per loom per annum

Average wholesale price of a yard of fabric (paid by cash) in 2003 was 180 baht per yard.

Number of looms	**Percentage of silk informal enterprise in village**	**Estimated number of silk informal enterprises in Pak Thongchai**	**Market value (Baht/annum)**
1	50	325	82,204,200
5	30	195	246,612,600
10	15	98	247,877,280
30	5	32	242,818,560
Total			**819,512,640**
			£12,231,531.94

- Market value of silk informal businesses in Pak Thongchai in 2003 is approximately 819,512,640 THB/annum or 12,231,532 GBP/annum or 20,799,813 USD/annum

References

A. K. Jain, V. K. Gupta, A. Bhatnagar, and Suhas. (2003). "Utilization of industrial waste Products as adsorbents for the removal of dyes." *Journal of Hazardous Materials*, 101(1), 31-42.

A.N. Oppenheim. (1992). *Questionnaire Design and Attitude Measurement*, Printer, London.

Agrifood Consulting International. (2005). *Thailand North East Development Report: Final Report for the North East Thailand Silk Value Chain Study*, Bathesda, Maryland.

Albu, M., and Scott, A. (2001). *Understanding livelihoods that involve micro-enterprise: markets and technological capabilities in the SL framework*, Intermediate Technology Development Group (ITDG).

Allen, C., and Sattaur, O. (2001). "Summary report: Private sector and enterprise development: pro-poor markets and livelihoods seminar." University of Wolverhampton.

Allison, E. H., and Ellis, F. (2001). "The livelihoods approach and management of small-scale fisheries." *Marine Policy*, 25, 377-388.

Allison, E. H., and Horemans, B. (2006). "Putting the principles of the Sustainable Livelihoods Approach into fisheries development policy and practice." *Marine Policy*, 30, 757-766.

Alreck, P. L., and Settle, R. B. (1995). *The Survey Research Handbook*, Irwin McGraw-Hill, Boston.

APEC-Micro-Enterprise Working Group. (2003). "Micro-Enterprise Development Action Plan." Submitted paper in The APEC SMEs Working Group Meeting, Chiang Mai, Thailand.

ATA. (2004). "Manual for Local Energy Planning in Thailand." Appropriate Technology Association (ATA), Bangkok. (in Thai)

Bangkok Business Newspaper. (2002). "Editor Section." *Bangkok Business Newspaper*. Available at: http://www.bangkokbiznews.com/2002/08/27/comment/index.php (in Thai) [Accessed November 2002]

Bangkok Post. (1999). "Economic Review Year-End 1999." *Bangkok Post*. Available at: http://www.bangkokpost.com/99year-end/1.economy.htm [Accessed November 2002]

Bangkok Post. (2000). "Economic Review Year-End 2000." *Bangkok Post*. Available at: http://www.bangkokpost.com/yearview2000/economy.html [Accessed November 2002]

Bangkok Post. (2004). "WE CARE: Plantings seeds of HOPE." *Bangkok Post* Available at: http://www.mcc.cmu.ac.th/agsust/hot_issue/ID=04_191004.htm [Accessed May 2005]

Bank of Thailand. (2006). *Inflation Report January 2006*, Bank of Thailand, Bangkok Thailand. (in Thai)

Baumann, P. (2000). "Sustainable livelihoods and political capital: Arguments and evidence from decentralisation and natural resource management in India." Working Paper 136, Overseas Development Institute.

Baumann, P. (2002). *Poverty and Access to Natural Resources: Insights from a Sustainable Livelihood Perspective*, Food and Agriculture Organization of the United Nations (FAO).

Bebbington, A. (1999). "Capitals and capabilities: A framework for analyzing peasant viability, rural livelihoods and poverty." *World Development*, 27(12).

Bechtold T., Turcanu A., Ganglberger E., and Geissler S. (2003). "Natural dyes in modern textile dyehouses - how to combine experiences of two centuries to meet the demands of the future?" *Journal of Cleaner Production*, 11(5), 499-509.

Beck, T. (2001). "Building on poor people's capacities: the case of common property resources in India and West Africa." *World Development*, 29(1), 119-133.

Beerube, G. G., and Villeneuve, F. (2002). "Ethical dilemmas and the decision-making process. Is a consensus realistic?" *Energy Policy*, 30, 1285-1290.

Berkel, R. V. (2000). "Cleaner Production perspectives for the next decadee (II)." The UNEP's 6th International High-level Seminar on Cleaner Production, Montreal, Canada

Bingen, J. (2000). *Institutions and Sustainable Livelihoods*, FAO, Rome.

Birner, R., and Wittmer, H. (2003). "Using social capital to create political capital: how do local communities gain political influence? A theoretical approach and empirical evidence from Thailand." The Commons in the New Millennium: Challenges and Adaptation N. Dolsak and E. Ostrom, eds., MIT Press.

Blaikie, P. (2006). "Is small really beautiful? Community-based natural resource management in Malawi and Botswana." *World Development*, 34(11), 1942-1957.

Bond, R., Kapondamgaga, P. H., and Yadav, R. P. S. (2003). "Monitoring the livelihood platform: reflections on the operation of LAST " “New directions in impact assessment for development: methods and practice” conference,, University of Manchester.

Boomgard, J. J., Davies, S. P., Haggblade, S. J., and Mead, D. C. (1992). "A Subsector Approach to small enterprise promotion and research." *World Development*, 20(2), 199-212.

Borden, N. H. (1964). “The Concept of the Marketing Mix.” *Journal of Advertising Research*, 4(June), 2-7. Available in Schwartz G. Science in Marketing. John Wiley & Sons, NY 386-97

Brown, H. C. P. (2006). "Conference report of sustainable livelihoods and ecosystem health: informing policy, practice and research." Building Institutional Capacity for Sustainable Rural Development Project, University of Guelph.

Brugere, C., and Lingard, J. (2001). "Evaluation of a Livelihoods Approach in assessing the introduction of poverty focused aquaculture into a large-scale irrigation system in Tamil Nadu, India." The 74th EAAE Seminar on Livelihoods and Rural Poverty: Technology, Policy and Institutions, Imperial College at Wye.

Buch-Hansen, M. (2001). *Local Institutions and the Political Process of Controlling Land and Resources in Thailand*, The GlobAsia Research Project funded by the Danish Research Council for Social and Economic Research.

Bulmer, M. (1993). "Sampling." *Social Research in Developing Countries: Surveys and Censuses in the Third World*, M. Bulmer and D. P. Warwick, eds., UCL Press, London.

Bunyarattanasunthon, C. (2001). "The study of welfare development by communtiy: case study in Fhuen Nakhon community zone 8 saving group " *Welfare Development by Community Initiative: Saving Group*, N. Petchprasert, ed., Ammaridha Book Centre Ltd., Bangkok. (in Thai)

Bush, S. (2000). *The Silk Industry: A Shire Album*, Shire Publication Ltd, Prince Risborough.

Chaloenloet, V. (1999). "Women Workers and the Develoment of Social Movement Trade-Union." San Diego, Cal.: Latin American Studies and Pacific Rim Studies, University of California-San Diego. 24 pp. (available at http://orpheus.ucsd.edu/las/studies/pdfs/Voravidh.PDF).

Chang Noi. (2002). "Is It Goodbye to Thai Village?" Based on the Project on the Economy of the Village Community supported by the Thailand Research Fund, *The Nation*. Available at: http://www.geocities.com/changnoi2/awasan.htm [Accessed November 2002]

Chantanusornsiri, W. (2006). "Populist policies get a facelift." *Bangkok Post*. Available at: http://www.bangkokpost.net/yearend2006/page10.html [Accessed December 2006]

Chantawich, N. "Textile and way of life." *The National Seminar in Thai Textile: Past Present and Future*, Bangkok.

Chavalitsakulchai, P., and Shahnavaz, H. (1993). "Musculoskeletal disorders of female workers and ergonomics problems in five different industries of a developing country." *Journal of Human Ergology (Tokyo)*, 22(1), 29-43.

Chen, M. A. (2004). "Rethinking the informal economy: linkages with the formal economy and the formal regulatory environment." The EGDI-WIDER Conference “Unleashing Human Potential: Linking the Informal and Formal Sectors”, Helsinki, Finland.

Chernia, J. A., Dynerb, I., Henaoc, F., Jaramillod, P., Smithe, R., and Fontf, R. O. (2007). "Energy supply for sustainable rural livelihoods: A multi-criteria decision-support system." *Energy Policy*, 35, 1493–1504.

Choice, W. (1995). "Uprooting of the rice farming community: From poor farmers to worse-off labourers." *Thai Development Newsletter*, 86, 27-28.

Chowdhury, A. (1999). "Villain of the Asian Crisis: Thailand or the IMF?" *ASEAN Economic Bulletin*, 16(2).

Cohen, E. (2000). “The study of commercialized crafts of Thailand: approach, background and principle conclusions”. In E Cohen (ed), *The Commercialized Crafts of Thailand: Hill Tribes and Lowland Villages.* Curzon, Richmond, Surrey.

Conway, S. (1992). *Thai Textiles*, The British Museum Press, London.

Coxhead, I., and Plangpraphan, J. (1998). "Thailand’s economic boom and agricultural bust.” Some economic questions and policy puzzles. University Of Wisconsin-Madison, Department Of Agricultural And Applied Economics, Staff Paper Series.

CTAP. (2002). "Manual of CT auditing for the 2002 CT Internship Programme." Cleaner Technology Advancement Program (CTAP), Thailand National Metal and Materials Technology Center Bangkok. (in Thai)

Cushing, K. K., Wise, P. L., and Hawes-Davis, J. (1999). "Evaluating the implementation of cleaner production audit demonstration projects-Clear Water, Blue Skies." *Environmental Impact Assessment Review*, 19(5), 569-586.

Dahles, H., and Zwart, E. (2003). "Tourism and silk trade in post-civil war Cambodia." *Pacific Tourism Review*, 6(3/4), 143-157.

Darlington, S. M. (2000). "Rethinking Buddhism and development: the emergence of environmentalist monks in Thailand." *Journal of Buddhist Ethics*, 7.

Daymon, C., and Holloway, I. (2002). *Qualitative Research Methods in Public Relations and Marketing Communications*, Routledge, London.

DCD. (2007). *The 2007 OTOP Promotion Plan*, Department of Community Development (DCD), Thailand Ministry of Interior. (in Thai)

Delios, A., and Keeley, T. D. (2000). "Asian influence; Thailand: the outlook brightens." *IVEY Business Journal*, Jan-Feb.

DEPQ. (1999). *Environmental Quality Preservation and Promotion of Thailand*, Department of Environmental Quality Promotion (DEPQ), Thailand Ministry of Science, Technology and Environment, Bangkok.

DFID. (2001). *Sustainable Livelihoods Guidance Sheets*, The UK Department for International Development (DFID). Available at: http://www.livelihoods.org/info/info_guidanceSheets.html#6. [Accessed May 2004]

Dilokvidhyarat, L. (1995). "Development vs. Collapse of Self-sufficient Agricultural Society." *Thai Development Newsletter*.

DIW. (2007). *List of Permitted Textile Factories*, Department of Industrial Works (DIW), Ministry of Industry, Thailand. Available at: http://www.diw.go.th/diw/data1search.asp (in Thai) [Accessed May 2007]

DLA. (n.d.). *TAO Working Manual*, Department of Local Administration (DLA), Thailand Ministry of Interior. (in Thai)

Dorward, A., Poole, N., Morrison, J., Kydd, J., and Urey, I. (2003). "Markets,institutions and technology: missing links in Livelihoods Analysis." *Development Policy Review*, 21(3), 319–332.

DPC. (2002). *The National Master Plan on Cleaner Production*, Kurusapha, Bangkok (in Thai)

Duesenberry, J.S. (1952). *Income, Savings and the Theory of Consumer Behavior*, Cambridge: The Harvard University Press

Dwight, L. (1994). *Small Farmer Development Programme in Thailand. Post-Project Study*, the Food and Agriculture Organization of the United Nations (FAO), Rome.

Economist Intelligence Unit. (2001). *EIU Country Profile 2001: Thailand*, The Economist Intelligence Unit Limited.

Edgcomb, E., and Thetford, T. (2004). *The Informal Economy: Making It In Rural America*, FIELD, The Aspen Institute. The United States of America.

EPA. (2001). *Frequently Asked Questions About Atmospheric Deposition: A Handbook for Watershed Managers*, Environmental Protection Agency (EPA), The United States of America. Available at: http://www.epa.gov/air/oaqps/gr8water/handbook/airdep_sept_1.pdf [Accessed August 2004]

EPA. (2006). *Waste Minimization*, Environmental Protection Agency (EPA), The United States of America. Available at: http://www.epa.gov/epaoswer/hazwaste/minimize/index.htm [Accessed December 2006]

EPPO. (2007). *Retail LPG Prices*, Energy Policy and Planning Office (EPPO), Ministry of Energy, Thailand. Available at: http://www.eppo.go.th/retail_LPG_prices.html (in Thai) [Accessed August 2007]

Federico, G. (1997). *An Economic History of the Silk Industry 1830-1930*, Cambridge University Press, Cambridge.

Fielding, J., and Gilbert, N. (2000). *Understanding Social Statistics*, SAGE Publication Ltd, London.

Flick, U. (2006). *An Introduction to Qualitative Research*, SAGE Publications Ltd, London.

Formisano, R. A. (2004). *Manager's Guitde to Strategy*, McGraw-Hill, New York.

Gawkrodger, D. J. (2001). "Patch testing in occupational dermatology" *Occupational Environmental Medical*, 58, 823-828.

Gibson, C. C., and Marks, S. A. (1995). "Transforming rural hunters into conservationists: an assessment of community-based wildlife management programs in Africa." *World Development*, 23(6), 941-957.

Glavovic, B. C., and Boonzaier, S. (2007). "Confronting coastal poverty: building sustainable coastal livelihoods in South Africa." *Ocean & Coastal Management*, 50, 1–23.

Gobster, P. H., and Rickenbach, M. G. (2004). "Private forestland parcelization and development in Wisconsin's Northwoods: perceptions of resource-oriented stakeholders." *Landscape and Urban Planning*, 69, 165-182.

Griskey, R. G. (2000). *Chemical Engineers' Portable Handbook*, McGraw-Hill Professional Publishing, New York.

Gunter, P., and Bjerregaard O. (1999). *Towards a Technology Strategy for Sustainable Livelihoods*, UNDP, Social Development and Poverty Elimination Division, Bureau for Development Policy.

Haggblade, S., and Ritchie, N. (1992). "Opportunities for Intervention in Thailand's Silk Subsector." *GEMINI Working Paper No.27*, Bethesda. Md.: Development Alternatives.

Hareven, T. K. (2002). *The Silk Weavers of Kyoto: Family and Work in a Changing Traditional Industry*, University of California Press, Ltd., Berkeley, U.S.A.

Hobley, M. (2001). *Unpacking the PIP Box*, Sustainable Livelihoods Resource Group. Available at: www.livelihoods.org/pip/pip/PIP-syn.rtf. [Accessed May 2004]

Holland, A. F., Sanger, D. M., Gawle, C. P., Lerberg, S. B., Santiago, M. S., Riekerk, G. H. M., Zimmerman, L. E., and Scott, G. I. (2004). "Linkages between tidal creek ecosystems and the landscape and demographic attributes of their watersheds." *Journal of Experimental Marine Biology and Ecology*, 298.

Huhtala, A., and Ciccozzi, E. (2003). "Financing cleaner production investments-UNEP experience." *Clean Technologies and Environmental Policy*, 5(2)

ILO. (1993). *Informal Sector; Who are they*, Employment Sector, International Labour Office (ILO). Available at: http://www.ilo.org/public/english/employment/skills/informal/who.htm. [Accessed on November 2002]

ILO. (2002). *Women and men in the informal economy: A statistical picture.* Employment Sector, International Labour Office (ILO), GENEVA.

International Trade Centre. (1999a). *Silk in World Markets*, The International Trade Forum.

International Trade Centre. (1999b). *Silk: A Traditional with a Future?*, The International Trade Forum.

International Trade Centre. (2008). *Silk import-export statistic 2001-5*, International trade statistics by product group and country. International Trade Centre UNCTAD/WTO. Available at: http://www.intracen.org/tradstat/sitc3-3d/ip261.htm, http://www.intracen.org/tradstat/sitc3-3d/ep261.htm [Accessed February 2008].

Jansen, K. (2001). "Thailand: the making of a miracle?" *Development and Change*, 32 (2), 343-370.

Jitsuchon, S. (2002). "A Series Articles of Sufficiency Economy: Moderation and Economic Conception." Series Articles in *Bangkok Business Newspaper*, 2002. (in Thai)

Jones, A., and Laverack, G. (n/d). *Building Capable Communities within a Sustainable Livelihoods Approach: Experiences from Central Asia*, Livelihoods Connect.

Jones, H., and Kittisuksathit, S. (2003). "International labour migration and quality of life: findings from rural Thailand." *International Journal of Population Geography*, 9, 517-530.

Jones, S. (1985). "Depth Interviewing." *Applied Qualitative Research*, R. Walker, ed., Dartmouth, Hants.

Jongudomkarn, D., and Camfield, L. (2005). *Exploring the Quality of Life of People in North Eastern and Southern Thailand*, ESRC Research Group on Wellbeing in Developing Countries.

Jütting, J., Kauffmann, C., Donnell, I. M., Osterrieder, H., Pinaud, N., and Wegner, L. (2004). *Decentralisation and Poverty in Developing Countries: Exploring the Impact*, OECD.

Kaewrueng, V. (2004). "Lan Kam Hom: Thai silk house and the Queen." Online Article, Thailand: Department of Agriculture, 2004. (in Thai)

Kaewrueng, V., and Pimpasali, S. (2005). "Thai silk product trademark." *Colour Way Textile Journal*, 58. (in Thai)

Kaewthep, K. (2001). "Rice mill of the natural conservation club: Naso community, Kud Chum district, Yasathon province." *Welfare Development by Community Initiative: Manufacturing Group*, P. Narong, ed., Ammaridha Book Centre Ltd., Bangkok, 111-158. (in Thai)

Kannasutra, K. (2001). "The study of social welfare development by communtiy: case study in Sajja saving group for developing morality throughout life cycle." *Welfare Development by Community Initiative: Saving Group*, N. Petchprasert, ed., Ammaridha Book Centre Ltd., Bangkok, 123-170. (in Thai)

Kanoksilp, J. (2006). "Sufficiency economy difficult to swallow." *The Nation*, Bangkok. Available at: www.nationmultimedia.com/2006/10/31/index.php [Accessed October 2006]

Kern, R. M. (2001). *S.U.R.E.-Fire Direct Response Marketing: Generating Business-to-Business Sales Leads for Bottom-Line Success*, McGraw-Hall, New York.

Kettunen, P. (2004). "Value creation in SMEs. the entrepreneurship's viewpoint." *Value Creation in Entrepreneurship and SMEs*, the Swiss Research Institute of Small Business and Entrepreneurship.

Kiattikomol R.W. and Umpush J. (2003). "Dye Removal from Wastewater of Dyeing Process in Household Industry by Montmorillonite Clays". Annual Progressive Report, Suranaree University of Technology.

Korf, B., and Oughton, E. (2006). "Rethinking the European countryside—can we learn from the South?" *Journal of Rural Studies*, 22, 278-289.

Krueger, R. A., and Casey, M. A. (2000). *Focus groups: a practical guide for applied research*, Sage Publications, London

Lao-Araya, K. (2002). "Effect of decentralisation strategy on macroeconomic stability in Thailand." ERD working paper series NO. 17, Economics and research department, Asian Development Bank.

Larson, A. M. (2003). "Decentralisation and forest management in Latin America: towards a working model." *Public Administration and Development*, 23, 211-226.

Lashuay, N., Burgel, B. J., Harrison, R., Israel, L., Chan, J., Cusic, C., Pun, J. C., Fong, K., and Shin, Y. (2002). "We spend our days working in pain:" A Report on Workplace Injuries in the Garment Industry." Asian Immigrant Women Workers Clinic, Oakland, California.

Leesuwan, V. (1987). *Thai Textiles: Industrial and Social Development*, Industrial Financial Corporation of Thailand, Bangkok. (in Thai)

Le Poer, B. L. (1987). *Thailand: A Country Study*, Federal Research Division, ed., Library of Congress.

Li, T. M. (2002). "Engaging simplifications: community-based resource management, market processes and state agendas in upland Southeast Asia." *World Development*, 30(2), 265-283.

Livelihood Support Programme. (2004). *FAO Livelihood Support Programme (LSP)*, Sustainable Livelihoods, FAO.

Livelihoods Connect. (2007). *Organisational Links*, Institute of Development Studies (IDS).

Lund, F., and Nicholson, J. (2003). *Chains of production, ladders of protection: social protection for workers in the informal economy*, The School of Development Studies, University of Natal, Pinetown.

Magarinos, C. (2001). "Speech of the UNIDO Director-General ", The attendants in the 6th Annual Meeting of the Directors of the UNIDO/UNEP National Cleaner Production Centres, ed., Seoul, Republic of Korea.

Majale, M., and Albu, M. (2001). *Livelihoods among the Roofing Construction Subsector in Nakuru, Kenya*, Intermediate Technology Development Group (ITDG).

Malavisi, A. (n/d). "North-South relationship: partners or pawns. Building a Relationship Using an Ethical Focus." Flinders University of South Australia.

Ma-Mangkorn. (2000). "Sufficiency Economy: the origin and development." *Thai Topic Magazine.* Available at: www.thaitopic.com/mag/econ/suff.htm (in Thai) [Accessed November 2002]

Manager Magazine. (2000a). "New Step of Jim Thompson in Thailand." *Manager Magazine.* Available at: http://www.gotomanager.com/app/details.asp?menu=theguide,industry&id=507&pn=1 (In Thai) [Accessed July 2004]

Manager Magazine. (2000b). "Ratri Thai Silk: Lesson of Supplier." *Manager Magazine.* Available at: http://www.gotomanager.com/news/details.aspx?id=41 (in Thai) [Accessed July 2004]

Manager-Online. (2006). "Village Resolving Fund: Popularism Nightmare." *Manager Online*. Available at: http://www.manager.co.th/Home/ViewNews.aspx?NewsID=9490000007238 (in Thai) [Accessed January 2006]

Mansfield Historical Society. (2004). "The Beginnings of Silk Culture." Mansfield Historical Society. Available at: http://www.mansfieldct-history.org/Silk/SilkProductionInCT.htm [Accessed March 2007]

Marks, R. B. (1998). *Tiger, Rice, Silk and Silt: Environment and Economy in Late Imperial South China*,Cambridge University Press, Cambridge

Maurice, A. (1999). *Micro and Small Enterprises (MSEs) in Thailand – Definitions and Contributions*, ILO/UNDP.

Mitchell, C. (2003). "Promoting Cleaner Production in Vietnam: the role of training & education in strengthening industry's environmental behavior." University of Toronto.

Middleton, N., and O'Keefe, P. (2001). *Redefining sustainable development*, Pluto Press London. Ministry of Textiles. (2004). "Sericulture Industry." Ministry of Textiles, India.

Ministry of Textiles. (2004). *Sericulture Industry*, Ministry of Textiles, India. Available at: http://texmin.nic.in/Sericulture%20Industry.pdf [Accessed March 2007]

Mizuno, Y. (1999). "Development of eco-technology and eco-investment." The 6th International Workshop for ECO ASIA Long-term Perspective Project, ECO ASIA (Environment Congress for Asia and the Pacific) Tokyo, Japan.

Mola, L. (2000). *Silk Industry of Renaissance Venice*, The Johns Hopkins University Press, London.

Morgan, D. L. (1997). *Focus groups as qualitative research*, SAGE, London.

Moser, C. O. L. (1998). "The Asset Vulnerability Framework: reassessing urban poverty reduction strategies." *World Development*, 26(1), 1-19.

Moss, B. (1998). *Ecology of Fresh Waters: Man and Medium, Past to Future*, Blackwell Science, Oxford.

n/a. (2002). *Thailand: A Traveller's Companion*, Asia books, Bangkok.

Nabi, I., and Shivakumar, J. (2001). *Back from the Brink: Thailand's Response to the 1997 Economic Crisis*, The World Bank, Washington D.C.

Naenna, P. (1984). *Thai Textiles: Threads of a Cultural Heritage*, Office of the Prime Minister, Bangkok.

Nakhon Ratchasima Province. (2004). *The Development Strategies of Nakhon Ratchasima*, Nakhon Ratchasima Province. (in Thai)

Nandasuwan, V. (2002). "Learning process for the development of community master plan." *Community Enterprise: the Mechanic of Fundamental Economy*, N. Petchprasert and V. Wongkul, eds., Amarin Book Centre, Bangkok, 141-160. (in Thai)

Narintarangkul-Na-Ayuthaya, P. (2002). "Direction of the development: high-land community economic institute." *Community Enterprise: the Mechanic of Fundamental Economy*, N. Petchprasert and V. Wongkul, eds., Amarin Book Centre, Bangkok, 107-129. (in Thai)

Nartsupa, C. (1999). *The Thai Village Economy in the Past*, Silkworms Books, Bangkok.

Na-Ubon, S., and Nil-a-thi, S. (1992). "Ubon Ratchani Weaving Fabric." *Art and Culture Magazine*, 13(9). (in Thai)

Neely, C., Sutherland, K., and Johnson, J. (2004). *Do Sustainable Livelihoods Approaches Have a Positive Impact on the Rural Poor? A look at twelve case studies*, FAO.

Neefjes, K. (n/d). "Oxfam GB and Sustainable livelihoods: lessons from learning."

NESDB. (2003a). *Economic Theoretical Conceptual Framework: Sufficiency Economy Philosophy*, Sufficiency Economy Working Group, The Office of National Economic and Social Development Board (NESDB), Bangkok.

NESDB. (2003b). *Informal Economy: NESDB Report*, 2 (1), The Office of National Economic and Social Development Board (NESDB), Bangkok.

NESDB. (2003c). *Literature Review of the Related Document with the Sufficiency Economy Philosophy*, Sufficiency Economy Working Group, The Office of National Economic and Social Development Board (NESDB), Bangkok.

NESDB. (2004a). *The Competitiveness Development Strategies of Northeastern Region*, Office of North Eastern National Economic and Social Development, ed., The Office of National Economic and Social Development Board (NESDB).

NESDB. (2004b). *The 2003 Monitoring and Evaluating Report on Grass Root Economy and Social Security Policies*, Office of the National Economic and Social Development Board (NESDB), Bangkok. (in Thai)

NESDB. (2005). *Summary Report of the Seminar in the Future of Social Assets in Thailand during the Implementation of the 10th Economic and Social Development Plan*, The Office of National Economic and Social Development Board (NESDB), Bangkok. (in Thai)

NESDB. (2006a). *The Summary of Thailand 10th National Economic and Social Plan (Draft)*, The Office of the National Economic and Social Development Board (NESDB), Bangkok. (in Thai)

NESDB. (2006b). *Social Protection for Informal Workers in Community*, Office of Social and Quality of Life Development, The Office of National Economic and Social Development Board (NESDB). (in Thai)

NESDB. (2007). *Economic Performance in Q4 and Outlook for 2007*, The Office of the National Economic and Social Development Board (NESDB), Bangkok.

Nishijin Textile Centre. (n/a). *The history of Nishijin weaving*, Nishijin Textile Centre. Available from http://www.nishijin.or.jp/eng/history/history.htm [Accessed from March 2007]

Nitta, E. (1993). "Ancient industries, ecosystems and the environment with special reference to the Northeast of Thailand." *Symposium on Environment and Culture with Emphasis on Urban Issues*, T. S. Society, ed., Amarin Printing and Publishing Pcl., Bangkok.

North, L. L., and Cameron, J. D. (2000). "Grassroots-based rural development strategies: Ecuador in comparative perspective." *World Development*, 28(10), 1751-1766.

NSO. (2001). *The 2001 Survey on Micro Enterprises*, Thailand National Statistic Office (NSO), Bangkok. Available from http://service.nso.go.th/nso/nso_center/project/table/files/S-mfg-hh/2544/000/00_S-mfg-hh_2544_000_000000_00100.xls (in Thai) [Accessed from March 2006]

NSO. (2003). *The 2003 Manufacturing Industry Survey Report*, Thailand National Statistical Office (NSO), Bangkok. Available from http://service.nso.go.th/nso/nso_center/project/table/files/S-mfg /2546/000/00_S-mfg _2545_000_010000_00100.xls (in Thai) [Accessed from March 2006]

NSO. (2004). *Summary Report: The Survey of Labour Force*, Thailand National Statistic Office (NSO), Bangkok. Available from http://service.nso.go.th/nso/nso_center/project/table/files/S-lfs-y/2549/000/00_S-lfs _2549_000_000000_00200.xls (in Thai) [Accessed from March 2006]

NSO. (2005a). *The 2005 Informal Employed Survey*, Thailand National Statistical Office (NSO), Bangkok. Available from http://service.nso.go.th/nso/nso_center/project/table/files/S-informal-employ/2548/000/00_S-informal-employ_2548_000_000000_00100.xls (in Thai) [Accessed from March 2006]

NSO. (2005b). *The 2005 Survey Report of Home Work in Thailand*, Thailand National Statistic Office (NSO), Bangkok. Available from http://service.nso.go.th/nso/nso_center/project/table/files/S-homework/2548/000/00_S-homework_2548_000_000000_00200.xls (in Thai) [Accessed from March 2006]

NSO. (2006a). *The 2006 Household Income and Expenditure Survey Report*, Thailand National Statistical Office (NSO), Bangkok. Available from http://service.nso.go.th/nso/g_service/s_survey_49/socio_49.pdf (in Thai) [Accessed from April 2007]

NSO. (2006b). *The 2003-5 Statistic of the Most Top Ten Provinces Having Largest Number of Registered Industrial Factories in Thailand*, Thailand National Statistic Office (NSO), Bangkok. Available from http://service.nso.go.th/nso/data/topten/industry/T1101/th/th.htm (in Thai) [Accessed from March 2007]

Office of Technology Assessment. (1995). *Environmental Policy Tools: A User's Guide*, The U.S. Government Printing Office, Washington D.C.

Office of the Council of State. (1994). *Tambon Council and Tambon Administrative Authority Act B.E. 2537*, Office of the Council of State.

Office of Tourism Development. (2005). *OTOP Tourism Village*, Thailand Office of Tourism Development, Bangkok. Available from http://www.tourism.go.th/otop_tourism_village/index.php (in Thai) [Accessed from April 2006]

OSMEP. (2002). *White Paper on Small and Medium Enterprises in Thailand*, Office of Small and Medium Enterprises Promotion (OSMEP), Bangkok.

Oxfam. (2006). "Oxfam GB-DFID Partnership Programme Agreement." *Annual progress report 2005-06*.

Paige, R. C., and Littrell, M. A. (2002). "Craft retailers' criteria for success and associated business strategies." *Journal of Small Business Management*, 40(4), 314-331.

Pak Thongchai District. (n.d.). *Pak Thongchai in Brief*, Pak Thongchai district, Nakhon Ratchasima.

Panyarachun, A. (2000). "Opening Speech: The 1999 Year-end Conference “Sufficiency Economy". *TDRI Quarterly Review*. (in Thai)

Parnwell, M. J. G. (1993). "Tourism and Rural Handicrafts in Thailand." *Tourism in South-East Asia*, M. Hitchcock, V. T. King, and M. J. G. Parnwell, eds., Routledge, London.

Paul B McGuire, and Conroy, J. D. (1998). "Effects on Microfinance of the1997-1998 Asian Financial Crisis." the Second Annual Seminar on New Development Finance, Goethe University of Frankfurt

Petchprasert, N. (2001a). "The study of welfare development by communtiy: case study in Jana saving group " *Welfare Development by Community Initiative: Saving Group*, N. Petchprasert, ed., Ammaridha Book Centre Ltd., Bangkok. (in Thai)

Petchprasert, N. (2001b). "The synthesis of 11 case studies: the format and possibility of the welfare initiation by community sector." *Welfare Development by Community Initiative: Saving Group*, N. Petchprasert, ed., Amarin Book Centre, Bangkok. (in Thai)

Phongpaichit, P. (1998). "The Economic Crisis and the Way Ahead." *The presentation on the occasion of remembering Pridi Bhanomyong*, The Pridi Bhanomyong Institute, Bangkok.

Phongpaichit, P., and Baker, C. (1998). *Thailand's Boom and Bust*, Silkworms Books, Bangkok.

Phongpit, S. (2002). "Community enterprise, not community business." *Community Enterprise: the Mechanic of Fundamental Economy*, P. N. and W. V., eds., Amarin Book Centre, Bangkok, 185-197. (in Thai)

Phusawang, R. (2001). "The study of health problems in local textile producers." *The Effects of Chemical Dyeing to Producer Health Meeting*, Regional Information Service Centre for Southeast Asia on Appropriate Technology (RISE-AT), University of Chiang Mai. (in Thai)

Pinprathip, P. (n/a). *The Overview of Community Networks*, Rak Ban Kerd.com. Available from http://www.rakbankerd.com/01_jam/thaiinfor/country_info/index.html?topic_id=812&db_file= (in Thai) [Accessed from April 2006]

Platteau, J.-P., and Gaspart, F. (2005). *Disciplining Local Leaders in Community-Based Development*, ECRU, Université Catholique de Louvain.

Poldej, J. (2003). *Community Enterprise*, Thailand Department of Community Development, Bangkok. (in Thai)

Pomeroy, R. S. (1995). "Community-based and co-management institutions for sustainable coastal fisheries management in Southeast Asia." *Ocean & Coastal Management*, 27(3), 143-162.

Pongsapich, A., Namthip, P., KovitBuraphatanin, Khamman, S., SujitrapornNagalakshana, Phothichan, I., and Ravivong, V (2001). "Social Safety Nets in Thailand: Analysis and Prospects." *Social Policy Paper No. 8*, UNESCAP. (in Thai)

Portes, A., and Haller, W. (2005). "The informal economy" *The Handbook of Economic Sociology*, Neil J Smelser and Richard Swedberg, eds., Princeton University Press.

Pound, B. (2004). *The Development of Sustainable Agricultural Livelihoods in the Eastern Hazarajat, Afghanistan: Methods for Sustainable Livelihoods Analysis*, Food and Agriculture Organization of the United Nations (FAO).

Prayukvong, W. (2005). "A Buddhist Economic Approach to the Development of Community Enterprises: A Case Study from Southern Thailand." *Cambridge Journal of Economics*, 29, 1171-1185.

Puntasen, A., Piamphongsant, P., Boonyarattanasoontorn, J., Sodarak, J., and Pruthiarenun, C. (2002). *A System Of Local Exchange: A Case Study Of Thailand*, Rural and Social Management Institute. Available from http://www.appropriate-economics.org/asia/thailand/A_System_of_Local_Exchange.pdf [Accessed from April 2007]

Punthasen, A. (2004). *Local Exchange System*, Rural and Social Management Institute. Available from http://www.rasmi-trrm.org/index.php?lay=show&ac=article&Id=77275 (In Thai) [Accessed from April 2007]

Punthasen, A., Soravitchya, P., and Pichet, K. (2003). *Sufficiency Economy Concept: The Application with Small and Medium Sized Enterprises*, Thailand Research Fund, Bangkok. (in Thai)

Raekpinij, J. (2002). "Community business and industry: concept and experience in the building of community economy system." *Community Enterprise: the Mechanics of Fundamental Economy*, P. N. and V. Wongkul, eds., Amarin Book Centre, Bangkok, 131-140. (in Thai)

Rahman, Q., Nettesheim, P., Smith, K. R., Seth, P. K., and Selkirk, J. (2001). "International Conference on Environmental and Occupational Lung Diseases Meeting Report." *Environmental Health Perspectives* 109(4).

Rajchagool, C. (1999). "Tambon Administration Organisation: are the people in the dramatis personae or in the audience?." *The Transport and Communications Bulletin for Asia and the Pacific* (69).

Ramon Magsaysay Award Foundation. (2004). "Citation for Prayong Ronnarong: The 2004 Ramon Magsaysay Award for Community Leadership." Ramon Magsaysay Award Foundation. Available from http://www.rmaf.org.ph/Awardees/Citation/CitationPrayongRon.htm [Accessed from January 2007]

Richards, G. (1999). "Culture, crafts and tourism: A vital partnership." *Developing and marketing crafts tourism*, ATLAS, Tilburg

Riffe, D., Lacy, S., and Fico, F. G. (2005). *Analyzing Media Messages: Using Quantitative Content Analysis in Research*, Lawrence Erlbaum Associates, Inc., New Jersey.

Rigg, J., and Nattapoolwat, S. (2001). "Embracing the global in Thailand: activism and pragmatism in an era of deagrarianization." *World Development* 29(6), 945-960.

Ronnarong, P. (2004). *It Takes a Village to Lead Development: Lessons from Mai Riang Farmers*, The 2004 Magsaysay Awardees, Manila, The Phillipines. Available from http://www.rmaf.org.ph/Awardees/Lecture/LecturePrayongRon.htm [Accessed from January 2007]

Rujjanaseri, P. (n/a). *The improvement of local administration*, Thai Rak Thai Party. (in Thai)

Russo, A. P., and Borg, J. V. D. (2002). "Planning considerations for cultural tourism: a case study of four European cities." *Tourism Management*, 23(5).

Saengpassa, C. (2006). "Social issues are set for new approach." *The Nation*, Bangkok. Available from www.nationmultimedia.com/2006/10/10/politics/politics_30015810.php [Accessed from October 2006]

Salm, A. (2002). *South African Garment Industry Subsector Study for ECI's ComMark Design Project*, Com Mark Trust.

Samuel, M. B., and Larry, A. W. (2004). "Systems thinking and green chemistry in the textile industry: concepts, technologies and benefits." *Journal of Cleaner Production*, 12, 585-601.

Samutakupta, S. (2000). *Cultural Politics and the Secularization of the Bun Phawes in Roi-et Market Town*, Suranari University of Technology, Nakhon Ratchasima. (in Thai)

Samutakupta, S., and Kitiasa, P. (1994). *Ways of Isan weavers: development of textiles production and the changing roles of women in contemporary Isan villages*, Suranari University of Technology, Nakhon Ratchasima. (in Thai)

Sathirathai, S. (2003). "Environmental governance: the case of industrial waste and pollution management in Thailand under the existing context of globalization." The RCSD International conference on "Politics of the Commons: Articulating Development and Strengthening Local Practices, Chiang Mai, Thailand.

Schnitzer, H., and Ulgiati, S. (2007). "Editorial Less bad is not good enough: approaching zero emissions techniques and systems." *Journal of Cleaner Production*, 15.

Schumacher, E. F. (1973). *Small Is Beautiful: A Study of Economics As If People Matter*, Blond & Briggs Ltd, England.

Scoones, I. (1998). "Sustainable rural livelihoods: a framework for analysis." Working Paper 72, Institute of Development Studies, Brighton.

Scott, T. (2006). *Decentralization and Human Development: Findings and Recommendations*, UNDP.

Scott-Goldman, J. (2001). *Literacy Programmes and Sustainable Livelihoods*, Livelihoods Connect.

Sen, A. (1997). "Editorial: Human capital and human capability." *World Development*, 25(12), 1959-1961.

Sharples, J. (1994). *Thai Silk*, Post Books, Bangkok.

Siamwalla, A., and Sobchokchai, O. (1998). "Responding to the Thai economic crisis." *The High-Level Consultative Meeting "Policy Response to the Economic Crisis and Social Impact in Thailand"*, UNDP

Silverman, D. (2006). *Interpreting Qualitative Data*, SAGE Publication Ltd, London.

Singh, N. (2001). *Investing for Sustainable Livelihoods*. Available from http://www.sustainable-livelihoods.com/pdf/investingforsustainable.pdf [Accessed from March 2006]

Singh, N., and Gilman, J. (1999). "Making livelihoods more sustainable." *International social science journal*, 51(4), 539-545.

Sinha, S. (1990). *The Development of Indian Silk: A Wealth of Opportunities*, Intermediate Technology Publications, London.

Soni, B. P., and Sheretz, E. F. (1996). "Contact dermatitis in the textile industry: a review of 72 patients." *American Journal of Contact Dermatitis*, 7(4), 220-230.

Soonthorndhada, K. (1989). "Health problems and illness of female worker in textile industrys." *Worasan Prachakon Lae Sangkhom*, 2(1), 63-90. (in Thai)

Suranaree University of Technology. (2003). *The Study of Small and Medium Community Enterprises in Sam Mueung Sub-district*, School of Management, Suranaree University of Technology. (in Thai)

Sussangkarn, C. (1999). *Economic Crisis and Recovery in Thailand: The Role of the IMF*, Thailand Development Research Institute

Sustainable Community Development for Well Being Foundation. (n/a-a). *Pai Soisraklang: Buri Rum local scholar in management*, Rak Ban Kerd Foundation. Available from http://www.rakbankerd.com/01_jam/thaiinfor/country_info/index.html?topic_id=2818&db_file= [Accessed from January 2007]

Sustainable Community Development for Well Being Foundation. (n/a-b). *Yoo Suntornthai: Isan Senior Local Scholar*, Rak Ban Kerd Foundation. Available from http://www.rakbankerd.com/01_jam/thaiinfor/country_info/index.html?topic_id=2816&db_file= [Accessed from January 2007]

Sustainable Livelihoods for Livestock producing Communities Project. (2001). "The Livelihoods Analysis." *Sustainable Livelihoods for Livestock Producing Communities in Kyrgyzstan*, Sustainable Livelihoods for Livestock producing Communities Project.

Tallontire, A., Bedford, A., Blowfield, M., Burnett, D., and Greenhalgh, P. (2001). "The implications of value chains and responsible business for the sustainable livelihoods framework: case studies of tea and cocoa." Natural Resources and Ethical Trade programmem, University of Greenwich.

Tantivejkul, S. (1999). *H.M. The King's Suffiency Economy*, NESDB.

Tavivat, P. (1998). "Toward a Buddhist social ethics: the case of Thailand." *Cross Currents*, 48(3).

TEI. (2000). *The Survey of 10-year-CT Implementation in Thailand*, Business Development Unit, Thailand Environmental Institute (TEI). (in Thai)

Thailand Institute of Scientific and Technological Research. (2004). *The Pollution Prevention Technology Handbook for Community Product: Fabric and Textile,Pollution Control Department*, Ministry of Natural Resource and Environment, Bangkok. (in Thai)

Thanh, H. X., Anh, D. N., and Tacoli, C. (2005). "Livelihood Diversification and Rural-Urban Linkages in Vietnam's Red River Delta." *Working Paper Series on Rural-Urban Interactions and Livelihood Strategies*, 11.

The Customs Department. (2007). "Export Statistics: Silk and Silk Related Products." The Customs Department, Ministry of Commerce, Thailand. Available from http://www.customs.go.th/Customs-Eng/Statistic/StatisticIndex.jsp [Accessed from May 2007]

The Province Cluster of Lower Northeastern Region. (2006). *Review of Province Cluster Strategy: Plan and Project in the 2007-8 Fiscal Year*. The Province Cluster of Lower Northeastern Region. Available from http://www.opdc.go.th/thai/CEO_new/CEO_2/group_7.1.pdf (in Thai) [Accessed from April 2006]

The Royal Thai Government. (2001). *Policy of the Government of H.E. Prime Minister Thaksin Shinawatra (Unofficial translation)*, Royal Thai Government. Available from http://www.thaigov.go.th [Accessed from August 2003]

The Royal Thai Government. (2006). *Prime Minister' statement on government's policy*, Royal Thai Government. Available from http://www.thaigov.go.th (In Thai) [Accessed from December 2006]

The Sustainable Fisheries Livelihoods Programme (SFLP). (2002). *Community approaches and Participatory Methods*, SFLP.

Toner, A. (2003). "Exploring sustainable livelihoods approaches in relation to two interventions in Tanzania." *Journal of International Development*, 15, 771-781.

Tubplien, P. (2003). *The Way of Community Economy in Capitalist System*, Sangsan Publishing, Bangkok. (in Thai)

Twigg, J. (2007). "Sustainable Livelihoods Approaches." *Tools for Mainstreaming Disaster Risk Reduction: Guidance Notes for Development Organisations*, The Provention Consortium, Geneva.

UNDP. (1999). *Sustainable Livelihoods: Concepts, Principles and Approaches to Indicator Development*, Sustainable Livelihoods Unit, The (United Nations Development Programme (UNDP).

UNDP. (2007). *Sufficiency Economy and Human Development*, The United Nations Development Programme (UNDP), Bangkok.

UNEP. (2001). *Cleaner Production - Key Elements*, The United Nations Environment Programme (UNEP): DTIE. Available at: http://www.uneptie.org/pc/cp/understanding_cp/home.htm#definition [Access in May 2005]

UNEP. (2001). *Cleaner Production Assessment in Industries*, The United Nations Environment Programme (UNEP): CP Activity Groups. Available at: http://www.uneptie.org/pc/cp/understanding_cp/cp_industries.htm [Accessed August 2004]

UNESCO PROAP. (2001). *Handbook on Effective Implementation of Continuing Education at the Grassroots*, Bangkok.

UNIDO. (n.d.). *Cleaner Production*, CP Programme, United Nations Industrial Development Organisation (UNIDO). Available at: http://www.unido.org/cp [Accessed August 2004]

Uwanno, B., and Burns, D. W. (1998). "The Thai constitution of 1997 sources and process." *The University of British Columbia Law Review*, 32(2).

Vasi, P. (1999). *Sufficiency Economy and Civic Movement: The Economic and Social Recovery Way*, NESDB.

Veblen, T. (1899). *The Theory of the Leisure Class*, New York, Macmillan.

Vejayachai, A. (2001). "Mae Ying Group: The North-East handicraft and women development network." *Welfare Development by Community Initiative: Manufacturing Group*, P. Narong, ed., Ammaridha Book Centre Ltd., Bangkok. (in Thai)

Ven. P. A. Payutto. (1988). *Buddhist Economics: A Middle Way for the market place*, The Buddhadhamma Foundation, Bangkok.

Viroj, K., and Suthisan, P. (2005). "Thai silk product trademark." *Colour Way Textile Journal*, 58(May-June). (in Thai)

Volker, R. (1996). "Traditional Synthesis Dye: The Investigation of the Best Dyeing Condition for Textile Production in Community Level." The Dyeing Technology for Community Based Producers Meeting, University of Chiang Mai.

Vongchavalitkul University. (1994). *Local Isan: Korat Folks*, Art and Culture Office, Vongchavalitkul University. (in Thai)

Vongkul, P. (2003). "The holistic and sustainable concept and development of community based enterprise" *Community Based Enterprise: Mechanism of Grass Root Economy*, Narong Petchprasert and Pitaya Vongkul, eds., Ammaridha Book Centre Ltd., Bangkok. (in Thai)

Ward, S., and Gilbert, S. (2001). *Livelihoods among the Angola Carpentry Cluster in Kumasi, Ghana*, Intermediate Technology Development Group (ITDG).

Warr, P. G. (1999). "What Happened to Thailand?" *The World Economy*, 22(July), 631-650.

Wasuntiwongse, M. (1999). *The Needs and Characteristics of a Sample of Micro and Small Enterprises (MSEs) in Thailand*, ILO/UNDP.

Weber, R. P. (1990). *Basic Content Analysis*, SAGE Publication Inc, California.

Weeks, E. I. (2002). "Transformations for the market: science, technology and power in the south Indian silk industry," New School for Social Research, New York.

Wheeler, D., McKague, K., and Thomson, J. (2003). *Sustainable Livelihoods and the Private Sector: How Development Agencies Can Strengthen Sustainable Local Enterprise Networks*, School of Business, York University.

WHO. (1999). *WHO Occupational Health: Ethically Correct, Economically Sound, Fact Sheet No.84*, World Health Organisation (WHO)

Wiboonpongse, A., and Chaovanapoonphol, Y. "Rice Marketing System in Thailand." The International Symposium on Agribusiness Management towards StrengtheningAgricultural Development and Trade, Chiang Mai, Thailand.

Williams, C. C. (2005). *Small Business in the Informal Economy: making the transition to the formal economy*, The Small Business Council, London.

Wuttakul, W., and Panyura, Y. (1994). "Weaving textile and the way of Thai life." *Thai textile*, The National Culture Committee Office, Bangkok. (in Thai)

Yamada J. (1998). “Capital outflow from the agriculture sector in Thailand”. *WorldBank Policy Research Working Paper No. 1910*. World Bank.

Yoon, S. (2006). "Who's afraid of the ghost of populism?" *The Nation*, Bangkok. Available at: www.nationmultimedia.com/2006/10/26/opinion/opinion_30017127.php [Access in October 2006]