CHAPTER IV

LABOUR MIGRATION IN LOWER NORTHEAST THAILAND AND ITS IMPACT ON FARMING PRACTICES

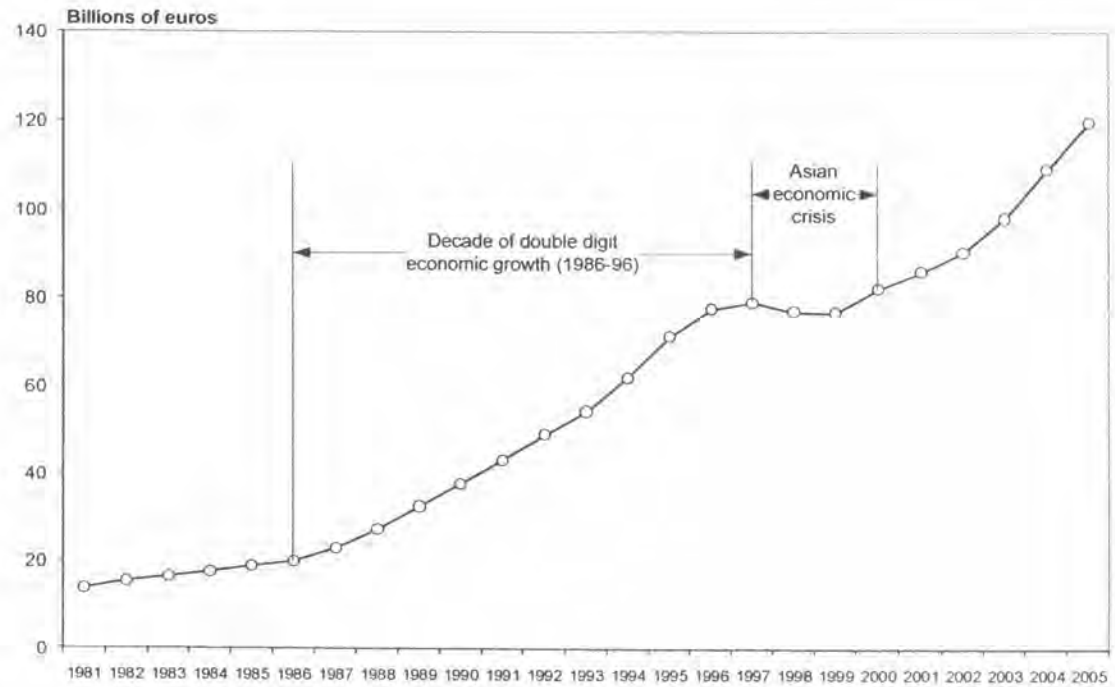
Farmers working in RLR ecosystems commonly use light machinery such as hand tractors, threshers and motorized water pumps. Investments in such machinery are made to alleviate labour scarcity in the production of rice. However, labour demand is always high during RLR transplanting and harvest. The labour required for these two activities can hardly be replaced by the use of farm machinery due to issues of limited accessibility that are caused by irregular small undulating plots with high bunds. Although the demand for labour is relatively high in the rice-growing season, most farm workers are rarely employed after the rice has been harvested. Consequently, many of them often migrate to work in cities. The availability of farm labour is generally determined by two key migratory patterns; these forms of migration can be classified as seasonal and more-permanent migration. Migration transitions have been closely related to Thailand's economic growth. From the 1960s, labour migration was seen as a social problem by many scholars, and this perception did not change until recently. This migratory evolution is important in understanding the migration decision-making processes that lead to changes in farming practices that alleviate labour scarcity when and where it occurs.

4.1. Transitions in Migrations in Relation to Economic Growth

Originally, the purpose of the repeated movements of the Thai-Lao ethnic group in the Korat Basin was to reclaim better land for RLR cultivation. Alongside Thailand's recent economic growth, these rural people, who were subject to out-migration, were perceived to be economic needy subjects that could supply cheap labour to the industrial and service sectors. From this economic perspective, three periods can be defined in relation to labour migration.

4.1.1. Before Rapid Economic Growth from Self-subsistent Systems to a More Export-led Economy

Before the late 1950s, RLR production in the northeast was managed by family labourers, mutual help through kinship networks, and the use of draft animals. Producing rice was mainly undertaken to satisfy family consumption. This subsistence economy still predominated throughout this region before national economic strategy shifted to export-led growth in 1982, with vast transportation development being a centerpiece of Thailand's fifth national economic development plan (Manarangsan, 2002). As a result of this change, the national GDP increased rapidly during the late 1980s and early 1990s (Figure 4.1). In the period between 1970 and 1980, rural-urban migration from the northeast region to Bangkok and the central plain increased by 21% (Richter, Chamratrithirong et al., 1990).

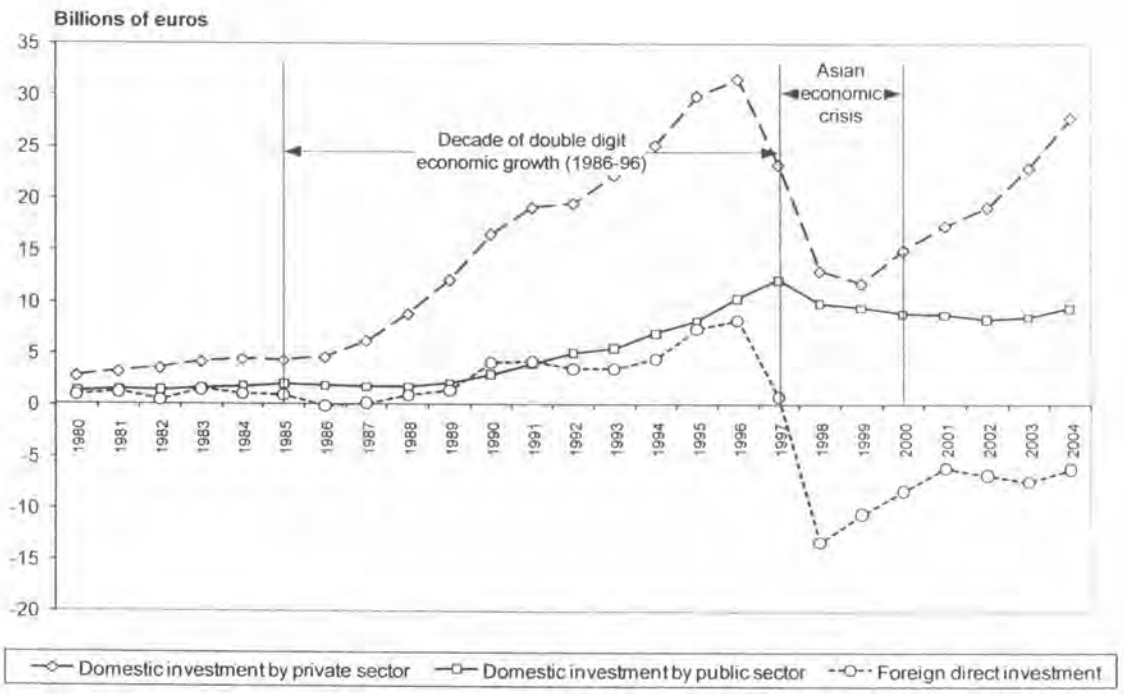


Source: National Statistical Office, Ministry of Information and Communication Technology, Bangkok.

Figure 4.1 Growth of Thailand's Gross Domestic Product (1981-2005).

4.1.2. During the Rapid Economic Growth Decade of 1986-1996

Rapid economic growth resulted from massive amounts of direct foreign investment and the investments from the private sector facilitated by public investment in major infrastructure projects (Figure 4.2). By the late 1980s, low agricultural prices, land scarcity, and a growing population created the backdrop for massive rural-urban migration. In addition to these push factors, the expansion of industry and service sectors in Bangkok and its peripheral areas played an important role in pulling those migrants from rural areas (Matsumura et al., 2003). Low wages, progressive reductions in trade barriers, and years of conservative macroeconomic management resulting in low inflation and a somewhat stable currency exchange rate, attracted mega investment, especially from Japan, after the Plaza Accord (Siamwalla, Vajragupta et al., 1999).

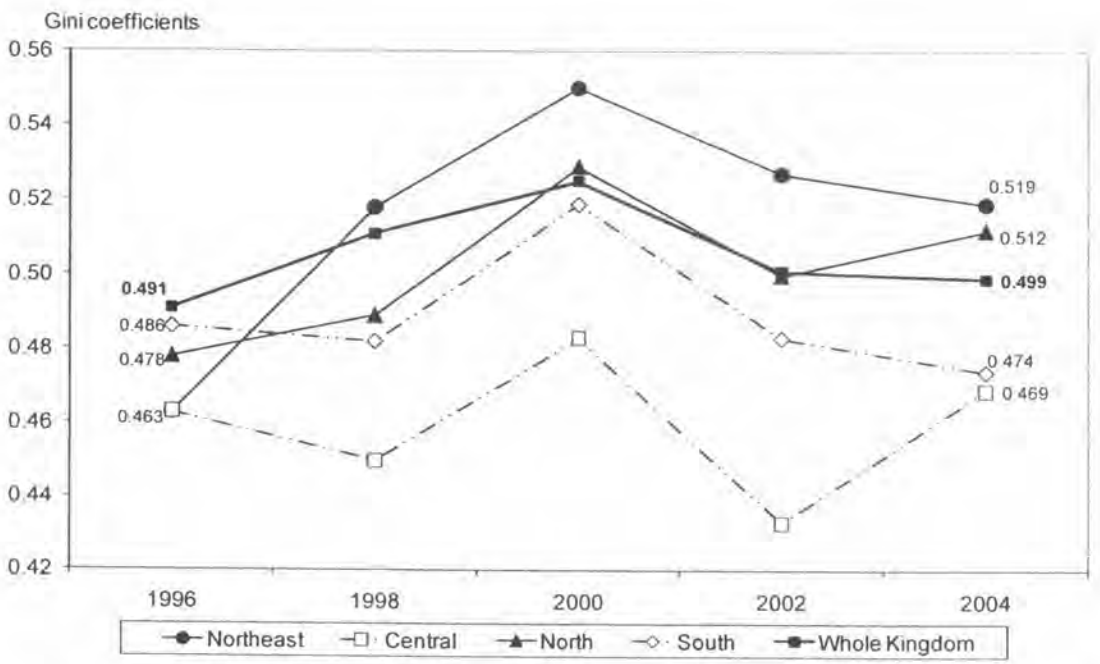


Source: National Economic and Social Development Board (NESDB), Bangkok.

Figure 4.2 Evolution of investment by sector in Thailand (1980- 2004).

However these investments did not benefit all regions equally, and regional inequalities and rural poverty rates increased over the period. The Gini coefficient indicates that the Northeast region suffered from this skewed income distribution

(Figure 4.3). Remittances generated by migrants is a way to transfer money from urban to rural areas in order to equalize income distribution at the national level (Skeldon, 1997). But this source of income is often underestimated or ignored because accurate data on remittances are extremely difficult to obtain, particularly in cases where there are exchanges in kind. The negative impacts could be seen at both the sending and receiving communities. For a sending community, the adverse impact of the social cost related to left-behind family members, and loss of development capacity due to an increasing number of more educated and younger migrant labours is prominent (Chantavanich and Risser, 2000). Overpopulation at a receiving community, which causes many social and economic problems, can be generated by the flux of migrants. For a migrant sending region like the Northeast, the problem of farm labour shortages leads to limitations in total agricultural output and the underutilization, or abandonment, of farm land. It also causes share-cropping, and the renting out of land (Paris, 2003).



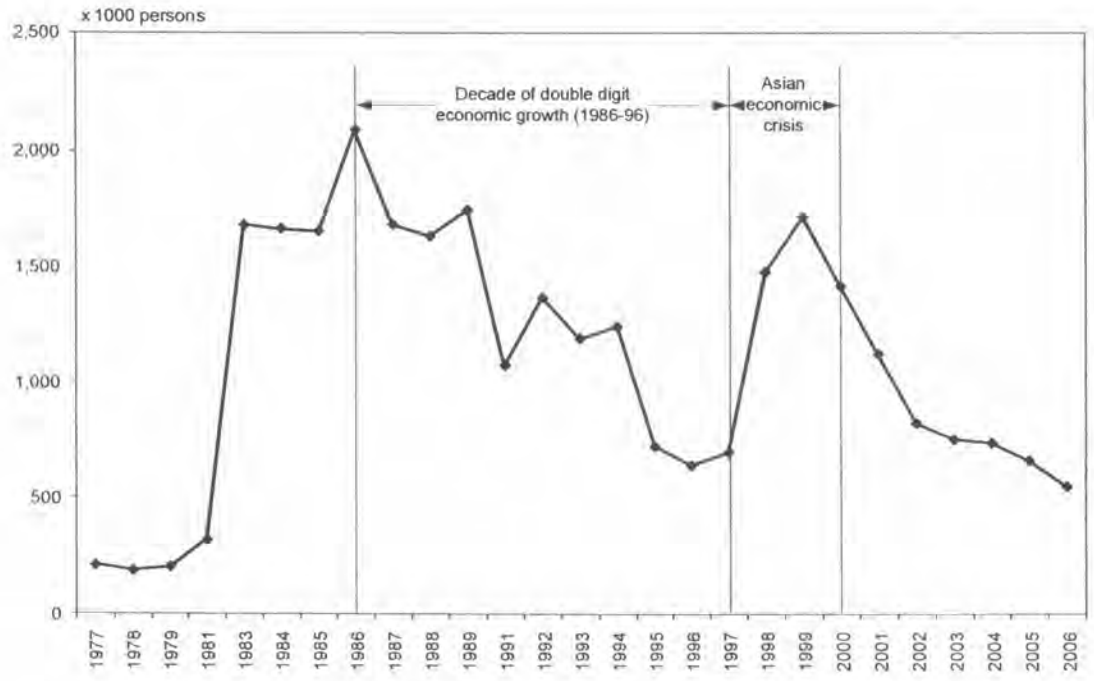
Source: Statistic Year Book 2006, National Statistical Office, Ministry of Information and Communication Technology, Bangkok.
Note: The Gini coefficient is widely used to display overall inequality in the distribution of income. It varies from 0.00, indicating perfect equality in income distribution, to 1.00, indicating a maximum degree of inequality.

Figure 4.3 Trends in income inequality by region indicated by the Gini coefficient Thailand (1996-2004).

The establishment of a securities market (SET), and a series of economic policy reforms to open Thai capital accounts, facilitated a rapid increase in short-term borrowings from abroad (Coxhead and Plangpraphan, 1998). The sudden outflow of these investments caused a major economic crisis affecting the labour market in 1997.

4.1.3. Thailand's Economic Crisis in 1997 and the Following Recovery Period

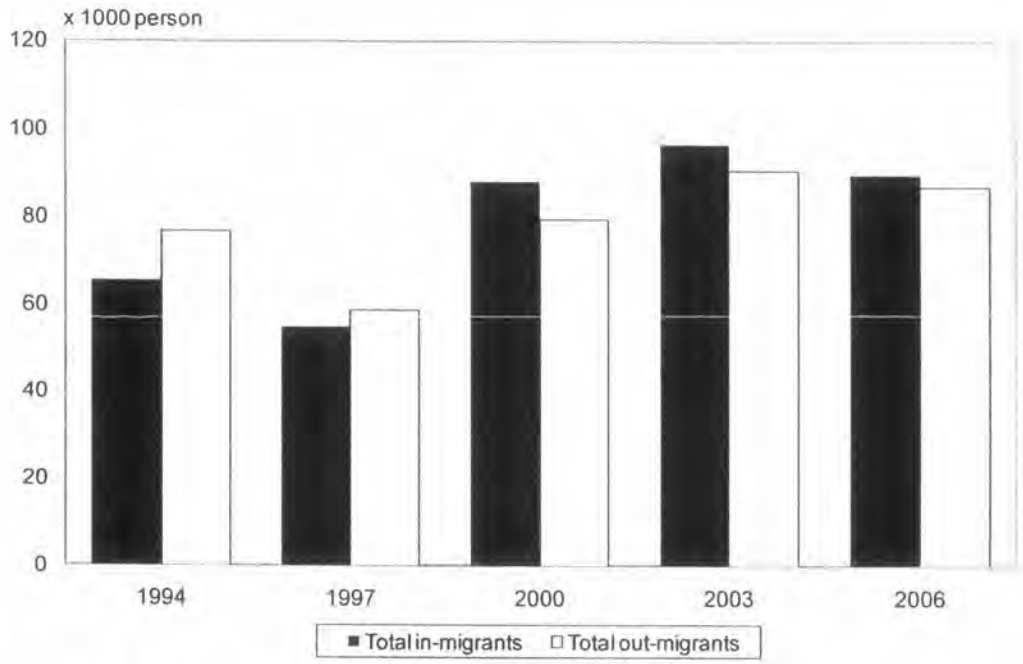
GDP decreased sharply in 1997 due to the lack of control on rapid capital outflow initiated by short-term borrowing from international money markets to finance the private sector. In June 1997, this massive capital outflow caused Thailand's, and more broadly, Asia's, economic crisis. A direct impact was rising unemployment, particularly in the non-agricultural sector. A labour force survey conducted by the National Statistical Office (2007) shows unemployment trends from 1977 to 2006 (Figure 4.4). Suhadhira (2004) estimates that "around 59% of the migrants returned to their northeast rural villages once the economic crisis occurred".



Source: National Statistical Office, Ministry of Information and Communication Technology, Bangkok.

Figure 4.4 Unemployment trends in Thailand (1977-2006).

Changes in the numbers of in- and out-migrants for Ubon Ratcahthani province from 1993 to 2006 reflected this situation; the number of out-migrants became lower than in-migrants once the crisis took effect (Figure 4.5). But the rapid recovery of migration flows was seen again in 2000, and has since continued to the present.



Source: Department of Local Administration, Ministry of Interior, Bangkok.

Figure 4.5 Evolution of numbers of in- and out-migrants in Ubon Ratchathani province, Thailand (1994-2006).

Previous studies have shown that the most dominant migration stream over the last three decades was a 'rural area to rural area' pattern. But this migration stream became less prominent due to the decline in the availability of land (Goldstein, 1987), which has been considered an important factor stimulating Thai migration (Cochrane, 1979). Part of the flow to rural areas had been spurred on by a government sponsored resettlement scheme. Later, the migration stream changed to a rural-urban flow as a result of national policy that promoted export-led growth via the industrial and booming service sectors. These labour migration transitions explain the recent migratory context in relation to spatial and temporal mobility, as well as national policies implemented to deal with labour migration.

4.2. Recent Context of Labour Migration

Because the decision to migrate is a complex one, it is essential to understand labour migration patterns and potential migrant characteristics. Also, in this particular case, relevant migration policies launched by state agencies attempting to curb or redirect the migration flow need to be examined.

4.2.1. Definitions of Migration in Relation to Spatial and Temporal Dimensions

In Thailand, around 2.6 million people migrated between regions in 2002 in search of off-farm and non-farm employment (National Statistical Office, 2002)F. Labour migration in this study refers to the mobility of people seeking employment by crossing the provincial boundary from a place of origin (residence) to a place of destination, and staying there for longer than five months. It is necessary to refine the classification of migratory patterns by integrating this spatial movement with its temporal dimensions. A suggested typology of migrations proposed by Kok et al. (2003) has been adjusted to present existing migratory patterns found in Thailand and is presented in Table 4.1.

Table 4.1 Typology of spatial and temporal migrations encompassing circulation and permanent mobility.

		Temporal dimension		*Spatial dimension*		
Broad category	*Example*	*Description*	*Change in place of residence?*	*Description*	*Migration defining boundary crossed?*	*Classification*
Circulation	Daily work trips	Short-term circular moves with no change of residence	No	Short distance moves	No	Daily commuting
	Return to place of residence to work on the migrants' farm in particular during rice-growing season and migrate to work at the place of destination when rice-growing season ends	Short-term circular moves that do not necessarily involve a change of home address but involve a change of place of residence	Yes	Long distance moves	No	Local weekly commuting
					Yes	**Short-term seasonal migration**
	Labour absences from home: usually return home only for visiting and return to place of employment after a period of stay at the origin	Long-term circular move. A move taking place at the beginning or end of an extended migrant-labour period	Yes	Long distance moves	No	Local long-term labour mobility
					Yes	**Long-term more-permanent migration**
Permanent move	New family settlement	Short or long-term residence at place of destination	Yes	Short or long distance moves	No	Residential mobility
					Yes	Permanent migration

Source: Adapted from the typology of spatial mobility by Kok et al., 2003.

In particular, two patterns—short-term seasonal and long-term more permanent labour migration— are emphasized in this study because they strongly influence the fluctuation of available family farm labour at places of origin at my study site. In my case, permanent migration becomes irrelevant since a family usually prepares itself to encounter permanent labour change, and therefore discontinues its farming activities. In this study, all analyses regarding labour migration refer to a place of origin and destination of specific migratory moves within the country. It is often defined as interregional labour migration, which is the dominant migration stream in northeast Thailand (Chamratrithirong, Archavanitkul et al., 1995). All forms of forced or compulsory migrations are excluded in this study.

4.2.2. Characteristics of Potential Migrants in Relation to Migratory Patterns

According to the Migration National Survey (Chamratrithirong et al., 1995), the definition of a potential migrant is based on demographic characteristics, education, and current occupation. Migration peaks at the age of 20-24 for both men and women, but this peak largely reflects the single-move migration pattern, usually a result of a new family settlement or education. Seasonal migration is fairly constant for men aged 15-34 and women aged 15-24. These periods indicate that men are more likely to migrate than women, especially in terms of short-term moves at older ages. This may be due to childbearing and increased family responsibilities among women aged 25 and over.

Married men are much more likely to migrate seasonally. Persons living with their spouse are less likely to migrate, especially for women; however, men undertake a fairly high rate of seasonal migration. Unmarried men and women have stronger intentions to migrate. A person with an education greater than primary school level is likely to be a more permanent migrant because they are perceived to be more highly skilled workers; non-farming economic sectors demand their labour. Most seasonal migrants are marginal and small farmers at their place of origin (Paris, 2003).

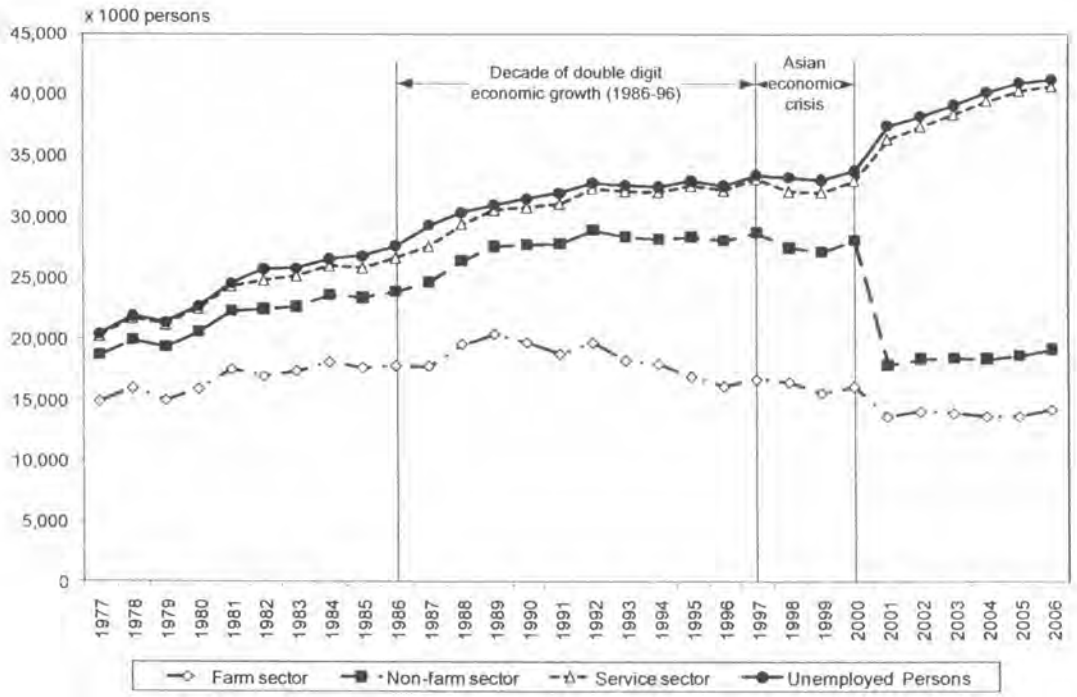
Beyond internal characteristics, external socio-economic factors also potentially motivate labour migration. Both men and women migrating to cities are often driven by the need for additional income in order to send remittances and because of unavailable job opportunities at their place of residence. Social contact at

destination is a determinant in the facilitation of the eventual movement to the destination. In the Thai context, migrants often find employment and lodging near, or with, relatives and friends for better accessibility to information and sponsorship (Fuller, Lightfoot et al., 1985). Experienced migrants play an important role in attracting and facilitating new migration flows between sending and receiving regions.

4.2.3. Migration Related Policies and Direction of Interregional Migration at the National Level

Migration-related policies in developing countries usually aim toward limiting the volume of movement (Skeldon, 1997). By and large, labour migration itself can act to alleviate poverty in the rural sector. Policies aimed at restricting population migration may be counterproductive and not in the best interests of the rural poor. In the context of Thailand's economic growth, many rural dwellers were encouraged to work in non-farm economic sectors, causing a rapid transfer of labour from agricultural to industrial and service sectors (Figure 4.6). To keep wages low, a key comparative advantage of the country in modern, competitive international markets, Thai governments managed to keep the price of staple foods at affordable levels for these labourers. Such state policies became a bedrock of labour migration in this country (Richter et al., 1990).

Concerns around the issues of migration were prominently addressed in the fourth national plan (1977-1981). The main concept was to redirect migrants to intermediate-sized towns, in accordance with a growth-pole strategy. However, the evaluation of this policy showed that this strategy was not successful. There was little impact on the reduction of migrant volume to Bangkok because disparities in regional incomes and job opportunities between Bangkok and designated regional hubs, such as Khon Kaen and Nakhon Ratchasima provinces, were still too large (Ad Hoc Sub-Committee of Population, 1981; Matsumura et al., 2003). Moreover, the mismatches between the demand for educated and skilled labour in these regional hubs impeded such a move by many unskilled or semi-skilled workers originating from the northeast region (Feeny, 2003).



Source: National Statistical Office, Ministry of Information and Communication Technology, Bangkok

Figure 4.6 Labour force working in three main economic sectors in Thailand (1977-2006).

Some business interests have also encouraged workers to seek overseas employment, and following the Asian economic crisis, this became a government policy. One reason for promoting overseas work has been to increase the level of remittances (Hewison, 2004). However, this policy has a serious drawback in that it may cause increased indebtedness of these potential migrants. People who invest their money through a job broker often encounter the risk of being exploited. This situation was illustrated by a renowned Thai lawyer, Thongbai Thongpao, in the following newspaper article:

Farmers face collateral damage

Like the majority of the people in Thailand, the residents of Ban Koyang, Prasart district, Surin Province, lower northeast, earned just enough to get by but not enough to improve their way of living in a substantial way due mainly to droughts. In 1986, Suchai, a local rice farmer, was convinced by the light at the end of tunnel. Seeing his neighbours who went to work aboard were able to send home hefty paychecks, Mr. Suchai decided to follow suit through a job broker in Surin Province. The commission of 40,000 baht was demanded. His family had to pledge the land as collateral against such amount of money. After a year Suchai never got sent to work aboard. He reported the job broker to the police and a public prosecutor filed a lawsuit with the Surin court against the job broker for violating the Job Seeking Act. In 1994, the Surin court found the job broker guilty as charged but an appeals court later reversed the ruling and dismissed the case.

It turned out that the job broker used his land title, as well as of others, as collateral to borrow from Krung Thai Bank around 200,000 baht at an interest rate of 15 percent per year. Under the loan contract, if the job broker failed to repay the debt, Suchai's land could be seized and put up for sale to repay the debt. As can be expected, Suchai had no way of repaying such a huge sum and his land, as well as of others, was finally seized and will be put on the block at the end of this month. And it is quite imminent that land put on the block is generally snatched up quickly at a very low price by wealthy people, to be returned to farmers or resold for a handsome profit. The same thing is happening all over the country, in direct challenge to government's asset-capitalization policy and war against poverty.

Bangkok Post, 15 May 2005 by Thongbai Thongpao

Previous policies to manage labour migration have not been successful because the motivation to earn an income, and the perceived lure of job opportunities at industrial sites around Bangkok and the Eastern Seaboard, is still high. Moreover, the migratory behaviour of former and potential workers shows that they always look for a job in places where they have worked before, or where their relatives and friends are present. Therefore, the labour outflow from the Northeast remains unchanged. To better understand this labour flow, it is essential to look closely at the migration decision-making process.

4.3. Migration Decision-making Processes

Several studies have exclusively examined and modelled the cause-effect relationship of migration through the lens of economic incentives and disincentives. It has been suggested that economic factors are the root causes of migration. However,

the decision to migrate is a complex process dealing with multiple factors. Economic determinants only are not enough to completely explain this process. But these economic-based migration studies have provided a foundation in the formation of later migration theories integrating non-economic determinants.

4.3.1. Migration Models Based on Economic Factors as a Cause of Action

The neo-classical school of economics, or equilibrium, model suggests that migration is caused by geographic differences in labour supply and demand, and by the resultant wage differentials (Kok et al., 2003). According to this theory, an individual migrant makes his decision based on an assessment of such differentials as push and pull factors. Unlike neo-classical economics, the new economics of migration suggests that migration decisions are seldom made by isolated individuals (an assumption central to the micro-economic perspective), but rather by families. In the northeast, the decision about migration usually involves all family members (Hewison, 2004; Richter, Guest et al., 1997). In order to self-insure themselves against income, production and poverty risks, or to gain access to scarce investment capital, households send one or more workers into the labour market (Chantavanich et al., 2000). The shortcoming is that this model does not preclude migration to areas with a minimal or negative wage differential. Moreover, it is seen to simply assume that all individuals within a household have the same interests.

The neo-classical and the new economics models view migration as a rational calculation process of individuals and families in response to the labour market. Segmented or dual labour market theory considers the economic structure of highly industrialized regions as a pull factor of migration (Kok et al., 2003). This theory states that labour migration is demand-driven, since the demand for migrant workers results from the structural needs of the industrial economy, while wage differentials are neither necessary nor sufficient for labour migration to occur.

Historical structural theory addresses the historical economic development of any receiving region, determining its present economic structure; it is the present economic structure which creates conditions for migration. (Baldwin-Edwards, 2008). Economic factors perpetuating migration can be found in migration system theory (Massey, Arango et al., 1993). This theory examines all dimensions of the relation

between emigration and immigration regions. It recognizes the close links between flows of people, capital, commodities and technology from less intense and stable areas to relatively intense and stable ones. This model encompasses the whole migratory process. It combines many existing approaches in order to create a more comprehensive and inclusive model of migration study.

The Thai cultural context, the sets of interpersonal ties connect migrants, former migrants, and non-migrants, in both origin and destination areas, through ties of kinship, friendship, and shared communities of origin (Chamratrithirong et al., 1995; Massey et al., 1993). Making migration decisions depends on their (or their relatives' or friends') migration experience, their social connections with other migrants, and their households' collective input into the decision making process itself. This leads to another theory, culture of migration; the theory states that as a result of the knowledge and experiences gained from the first migratory attempt, people are likely to migrate again (Chantavanich et al., 2000). Even if these social networks seem to take non-economic parameters into account, key reasoning behind the migratory move is still driven by economic differentials.

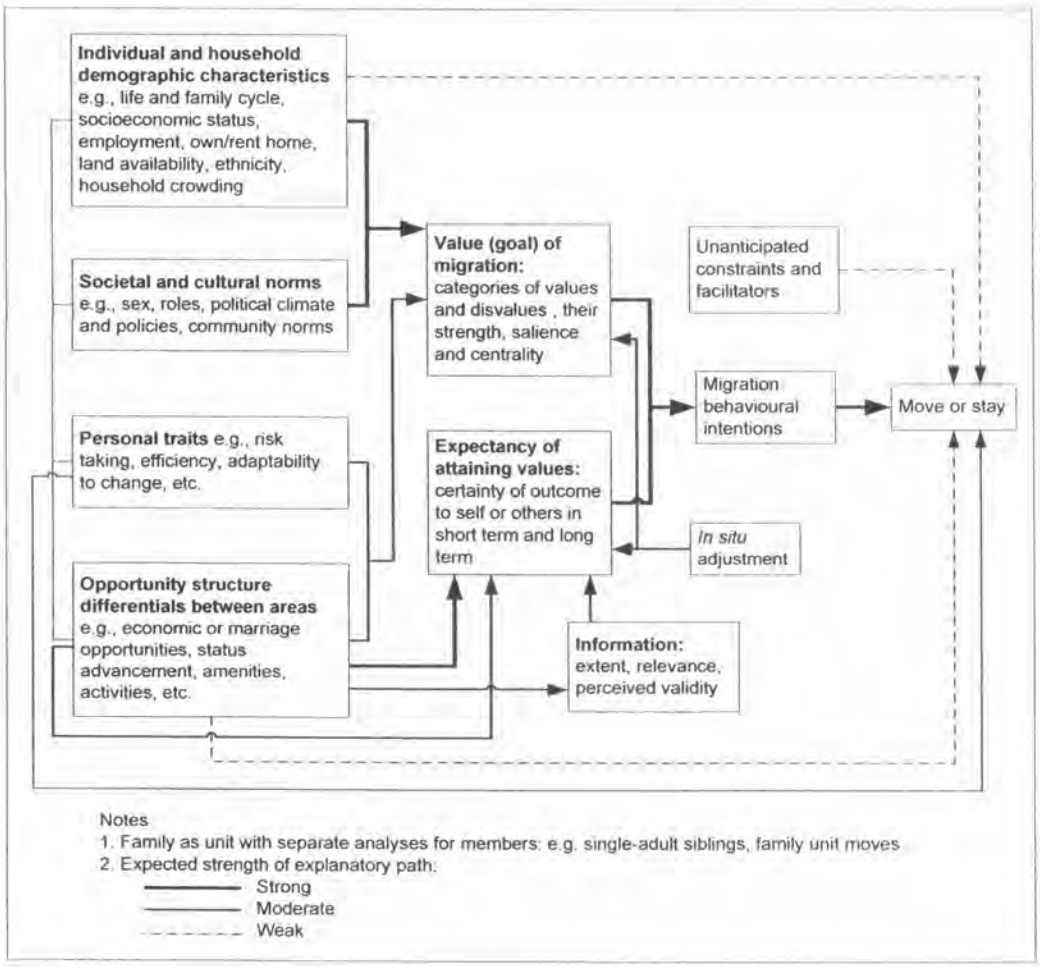
A drawback in applying these macro economic- or social network-based theories is that migration is considered an independent variable, which not only regulates other societal changes, but controls itself (Kok et al., 2003). In this study, it is important to understand that the migration decision-making process involves interactions between economic and non-economic factors, essentially occurring at micro (household or individual) level.

4.3.2. Model of Micro-level Migration Decision Making

While macro and aggregate models of migration provide broad perspectives for the planner, the micro approach offers more insights by focusing on the decision-making behaviour of individuals (Hoong and Chang, 1981). Motivations are the basic elements of a micro-level theory on migration decision-making. These motivations are usually goal-driven and often refer to personal or situational strength of goal-oriented behavioural tendencies (De Jong and Fawcett, 1981). Besides, macro factors can be examined at a micro-level by integrating these factors into individual decision-making processes (Gardner, 1981). A particular approach, called the Value-

Expectancy (V-E) model, is proposed to represent migration behaviours. The V-E model has been empirically used to study migration decision-making in many developing countries, including Thailand, by De Jong (1997; 2000; 1981) and Gardner (1981). These authors have shown that the important causes of migration at both micro and macro levels operate indirectly through people's values and expectations.

The V-E model is derived from cognitive theories and decision-making approaches in psychology, aiming at a better understanding of how individuals evaluate their residence in relation to personal needs, values, and aspirations (Figure 4.7). The concept is based on a combination of goals that people have in mind and expectations that one wishes to achieve if they decide to stick to their goals.



Source: De Jong and Gardner, 1981.

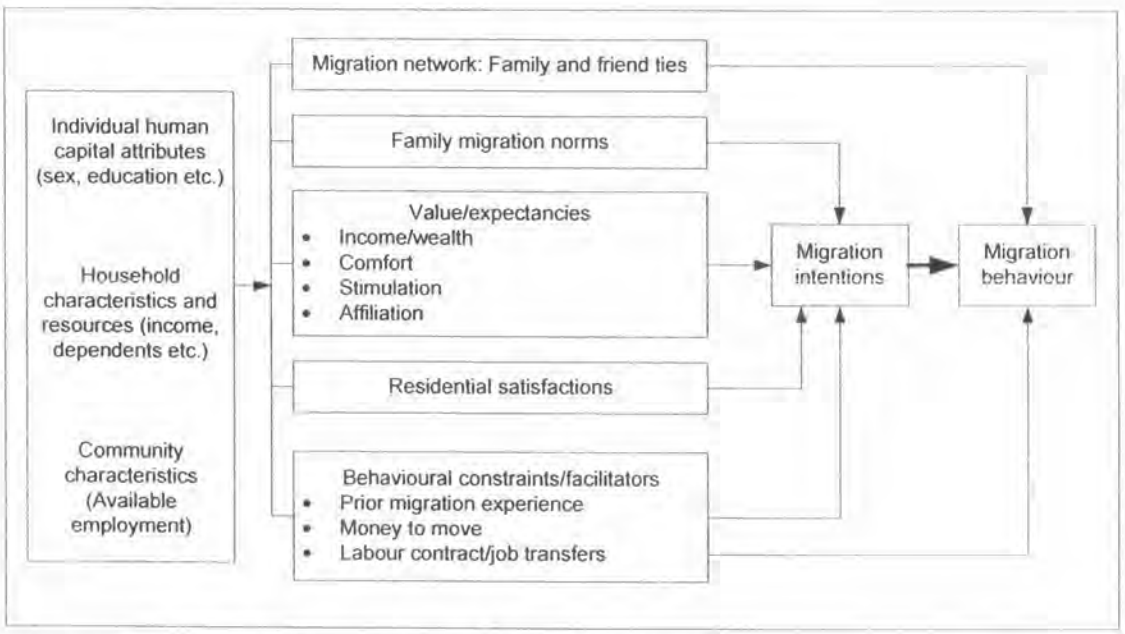
Figure 4.7 The Value-Expectancy model of migration decision-making.

Pairs of the value-expectancy components have a multiplicative relationship for specific items, and the products are summed over all the items being considered in order to obtain the strength of migration behavioural intentions. Individual and household demographic characteristics are the most often mentioned factors determining migration behaviour. These factors can be used to summarize the compositional thesis of populations, some with higher and some with lower propensities to move, which explain why certain areas have higher migration rates than others (De Jong et al., 1981). Societal and cultural norms have similar impacts on migration decision-making as the demographic characteristics. Personal traits are another set of predictors for values, expectancies, and migration. However, the influence of personal traits, and societal and cultural norms, on migration decision-making is difficult to measure satisfactorily.

The differentials of opportunity structure are keys in generating expectancies for attaining goals in the place of origin compared to alternative destinations. In my case, the differential on economic opportunity plays a key role in the expectation for a better livelihood. With this approach, linkages between macro-level indicators and micro-level V-E dimensions can readily be postulated and tested (De Jong et al., 1981). Information about areas is seen as a factor that moderates the effect of opportunity structure differentials. Unanticipated constraints and facilitators may refer to abrupt change in the family structure (e.g., death of spouse, divorce, or marriage) or change in other factors such as the cost of moving. Constraints and facilitators (especially the unexpected ones) intervene between intentions and the decision to move or stay. In situ adjustment mainly indicates the causes of staying rather than moving. Migration is a purposive behaviour in which the potential migrant first makes a conscious decision on whether or not to migrate through a process by which perceived consequences are weighed and evaluated. Then a second decision is made regarding the choice of destination.

The V-E model is built to represent individual migration decision-making by integrating micro-level with macro-level determinants into the same model. In 2000, De Jong developed a general model of migration decision-making based on the V-E model and used it to study migration in Northeast Thailand (Figure 4.8). In this model, migration intentions are a primary determinant of migration behaviours, along

with migration networks, and behavioural constraints and facilitators. The values/expectancies of attaining important life goals in the rural villages compared with Bangkok, along with family migration norms, behavioural constraints and facilitators, and residential satisfactions are direct determinants of migration intentions.



Source: Adapted from De Jong's general model of migration decision, 2000.

Figure 4.8 General model of migration decision-making.

Among the value/expectancies, the income/wealth variable plays a crucial role in determining migration intentions in the case of northeast Thailand. Local residents with low income expectancies at their place of origin and less satisfaction with work opportunities have greater intentions to migrate. The comfort, stimulation and affiliation associated with the value of the living environment have a weak influence on migration intentions because essential facilities, such as schools and public health stations, are sufficiently provided in, or nearby, villages. Also, friends and family at the place of origin do not strongly influence the intentions to migrate because of better communication and transportation. In contrast, friends and family at a place of destination, who provide a source of information and sponsorship, are always positive factors in the increase of migration intentions. The presence of children or elderly dependants is an important family norm that affects migration decision making

differently according to gender. This family norm increases migration intentions for men but reduces them for women because they are usually asked to look after these dependants.

Because rural Thai migration behaviour is subjected to family control, women tend to work in villages and have low opportunities to migrate from their families. Thus, among the behavioural constraints and facilitators, prior migration experience is a highly significant predictor of future intentions for women but not for men. None of the household resources or community characteristics significantly related to changes in migration intentions, except community crop loss, which is positively related to migration intentions. The individual capital attributes regarding demographic characteristics (e.g. marriage, age and gender) are important determinants of family migration norms, while education, wage differential, and migration experience are considered to directly influence the migration intentions.

Value-expectancy and residential satisfaction are important predictors of migration intentions; they are significant predictors of more-permanent, but not seasonal, rural out-migration behaviours. Individuals with high migratory intentions are commonly skilled workers with migration experience, and have social networks at places of destination. These migrants are likely to have more secured working conditions. Low household income has a higher direct effect on seasonal migration than on more-permanent migration.

This general model takes into account both economic and non-economic causes of migration with the integration of V-E model to include individual, household and societal determinants of migration. It is a comprehensive migration model that has been tested with migrants from Thailand's northeast. Moreover, this model focuses on the migration decision-making processes of individuals, which is appropriate for the purpose of representative modelling of heterogeneous stakeholders. In this study, an individual having its specific characteristics (e.g. age, gender, marital status, education, and prior migration experience), and evolving over time, is a central migration decision-maker. Such an individual's migration intentions are modelled to represent consequences of the interactions between its characteristics and other components at household (migration network), and community level (employment availability). Then, the outputs of migration intentions (high, low or no

intention) are used in relation to household income and presence of family dependants to determine the migratory pattern (seasonal, more-permanent migration, or stay home) of the individual.

Because the migration of local farmers is closely related to possible labour shortage on farming households, new farming practices have emerged to cope with this problem.

4.4. Change in Farming Practices in Relation to Labour Migration

Although the northeast of Thailand is the largest rice-producing region in the country, the production still largely depends on human power. Therefore, a lack of farm labour has resulted in the emergence of new farming practices, which have been adopted by rice farmers to cope with labour scarcity. General migration impacts on both sending and receiving communities should also be mentioned.

The lack of labour during high demand periods such as RLR transplanting and harvest have resulted in the introduction of new farming practices adopted by rice farmers to cope with labour scarcity. The loss of male labour may result in the decline in farm production where only females and small children are left to look after the farm. But remittances can be spent on the farm to compensate for the loss of labour through the employment of hired farm workers for example (Shinawatra et al., 1996). On farms where the share of remittance income from relatives employed in cities and aboard is increasing, income from rice farming is becoming relatively unimportant. Such remittances are often spent on consumption, home improvement and education, while only a small portion is invested in farm production (Deshingkar, 2004).]

Changes in farming practices in relation to labour migration depend on the type of RLR management determined by the land per labour ratio. In the case of high land-labour ratio at an average of 1.9 ha per unit of labour, labour shortage is a major constraint. Well-off farmers often invest in machinery to replace human labour, but this is not feasible for RLR transplanting due to a lack of water control; moreover, the use of machinery at harvest is still limited to threshing. Combined harvesters are used in the western part of lower northeast Thailand but not in Ubon Ratchathani as yet. Farmers also grow two or more rice varieties with different durations so that they are able to better manage labour at harvest. Some farmers have also adopted the direct

sowing technique for RLR establishment, instead of the labour intensive transplanting one. Few farmers downsize their planted areas by renting-out their paddies. But such practices to cope with labour scarcity usually operate alongside the additional hiring of labourers. Thus, the availability of labourers for hire in their community still plays a crucial role in local rice production.

In the case of low land-labour ratios, ranging from 0.6 to 1.6 ha per unit of labour, a key strategy on such small holdings is to increase labour productivity through on- and off-farm employment, including migration. Many farmers adopt integrated farming systems combining diverse productions (rice, fruits, vegetables, fish etc) at a small-scale around a farm pond to meet family needs and generate a small surplus for sale. Smaller numbers rent more land to grow rice. A frequent practice to get more cash is to accept off-farm employment on larger neighbouring farms during RLR transplanting and harvest.

To facilitate the representation of these different land and labour management strategies and practices in a model, the construction of a farmer typology based on the different socio-economic objectives and management strategies of a few types of farms is a useful tool.