Custom Hire Systems for Agricultural Machines in Southeast Asia*

— In a Rural Community in Thailand —

Masayuki Koike*1

Abstract
A distinctive feature analysis of custom hire systems is made in an attempt to clarify the process of technology acceptance in relation to demographic changes in mobility at the frontier in the western part of Thailand. Field surveys reveal that the mental component to agricultural mechanization varies from one community to another. There was a comprehensive settlement scheme at the study site around 40 years ago. Farmers suggested that a custom hire service would constitute a reliable tool for implementing specific farming practices and obtaining a reasonable income. To cope with the difficulties involved in securing a cheaper workforce and the necessary operating capital convinced the farmers that a professional custom hire business would be useful for achieving sustainable agriculture.

[Keywords] custom hire system, settlement, technology acceptance, agricultural mechanization, rain-fed, Thailand

I Introduction
The Lam Phachi watershed, which flows into the Greater Mae Klong river basin, has been continuously developed over the past 100 years or more thanks to the government’s financial support. However, the rate of progress on the infrastructure has been slow owing to topographical disadvantages, and hence this area is designated a frontier region. At the same time, it should be noted that this area used to practice rain-fed farming for growing rice, pineapples, cassava, corn and vegetables. The arrival of modern technology has naturally meant that farmers have adopted mechanized approaches that they have adapted to their own ways of farming. In addition, this area has been categorized as a settlement community since it was established roughly 40 years ago.

When it comes to the pattern of machine ownership, custom hire systems are a potential target of investigation with a view to facilitating an analysis of an acceptable mechanization scenario. The objectives of this study are to discuss a custom hire system in relation to the degree of technology acceptance by undertaking a questionnaire survey.

II Study Site and Methodology
1. Brief description of study site
The resilience and marketability of mechanized farming systems in a settlement community have not been discussed in detail. This is because most of the people who moved to this study site had little knowledge of farming practices. Naturally, there were no farming tools, implements, or machines in or around the homestead. This study attempts to identify the degree to which farmers depend on custom hire systems with respect to conventional farming practices.

The upstream region of the Lam Phachi river in Rachaburi Province in the western part of Thailand includes several tributaries. One of these tributaries is part of the watershed of the Huai Tha Khoei river, and the study site is located in the community of Mooban Ton Maka, King-amphur Bankha, Changwar Rachaburi.

The main crops cultivated in gently sloping fields include sugarcane and cassava. Pineapples are grown in steeply sloping fields, and rice and vegetables in lowland fields. Around 15 years ago, large forest clearance scheme was implemented to provide farmland. As a result, the pineapple cultivation initiated by the public sector was severely damaged by soil erosion. What is more, there were scarcely any paddy fields even in low-lying depressions with gentle gradients from the elevated periphery to the bottom. In particular, it is interesting to note that no farmers have engaged in rice growing at this study site, despite Thailand being a major rice exporting country.

2. Questionnaire Survey
This field survey was conducted in July 2001 and March 2002. A questionnaire was prepared to gather basic information from respondents. The questions covered the
personal history of both the farmer and his/her ancestors, family structure, the history of cropping patterns over the past two decades, the cultivated acreage, the ownership of agricultural machines and the annual operating hours, the availability of custom hire services and/or group farming systems, annual income, and other related topics. The total number of residents, number of farm households, and the total area of the study site were 270, 53 and 560ha, respectively. The number of respondents was 32, and hence a certain level of reliability in terms of the qualitative adequacy of the interviews obtained with such a small total population can be confirmed.

### III Status of Mechanized Power Utilization in Thailand

The use of mechanized power sources in agriculture is believed to relate closely to economic development in rural communities. However, certain technical and social difficulties tend to occur during the mechanization process. In some cases, farmers install a fully mechanized system while others are satisfied with a basic level of mechanization. Various aspects of mechanization reflect farmer’s mentality as well as the components needed to manage the machinery.

Before embarking on a detailed discussion on this topic, I reviewed the economic situation in four different regions in 1999 (Koike et al., 2002). According to the Office of Agricultural Economics of the Thai Government, rain-fed farming still accounts for a high percentage of the farming being undertaken in the four regions, i.e. northeast 84%, north 74%, central 67 % and south 92 % respectively. The average cropping intensity ranges from 0.92 to 1.20.

The unemployment is certainly an indispensable indicator when assessing the mobility. After the economic recession in 1997, the unemployment rate increased to as high as 5.1 % in 1998, and then declined, demonstrating a robust recovery. This social phenomenon related to a labor shortage may be directly connected with mobility, and this affects the requirements for mechanized power in place of human or draft animal resources.

The debt status of individual households is another factor related to the motivation behind machine selection. In general, farmers want to own machines only when they have additional income from non-agricultural sources. In contrast, with such a familiar explanation, the National Statistics Office (Koike et al., 2002) reported in 2001 that most farmers have little surplus cash in proportion to their annual income. Although they are more or less engaged in agrarian work, their business scale remains very small and their livelihoods are maintained on a hand-to-mouth basis with a heavy reliance on credit.

About three decades ago, one community in the vicinity of the city of Nakhon Pathom was home to many young farmers who had the firm intention of engaging in farming. Some of these farmers subsequently shifted from rice to fruit or vegetable cultivation to increase their profits. Concurrently, people started noticing that part-time farmers were forming long lines at bus stops early in the mornings to wait for vehicles to transport them to a sugarcane factory. Some worked all day in the sugarcane fields as seasonal laborers. Later, most of the young laborers moved from their homes to the suburbs of Bangkok, and those who remained in the rural community including women, middle-aged or elderly people could not find alternative choice to engage in miscellaneous tiny businesses. Currently, the number of comparatively large-scale rice growers who own more than 4.2 ha is steadily increasing. This means that the traditional concept of “a rice-growing society” is no longer appropriate for describing today’s rural Thai community.

### IV Results and Discussion

#### 1. Field observation of custom hire systems

The study site was an area where dense tropical forests were thrived until about 40 years ago. Then, after the formulation of a settlement policy advocated by the Thai Government, an agricultural development and consolidation scheme was implemented accompanied by the selection and cultivation of locally adapted crops at a very fast pace.

The original inhabitants are believed to be the Karen tribe. They traditionally employed a slash-and-burn method for growing upland rice, chili, sorghum and vegetables. As the settlement program progressed, the local inhabitants were first encouraged to engage in upland cultivation. In parallel, there was a substantial settlement mostly consisting of the Karen people and inhabitants were recruited from neighboring areas. It can be assumed that a certain level of technological interchange between the Karen and the migratory group was naturally generated by various exchange activities in daily life. As regards indigenous farming tools, very few simple devices are used in the field including a sickle for harvesting and a flail for threshing. To undertake such farming work, human or draft animal powers was selectively used as a power source when assimilating the different types of farming technology that had been popular in the Central Plain area. The livelihood of the Karen appears to rely on a barter system in the local markets. Following this unique daily discipline based on pious behavior, the Karen gained confidence from the migratory group without the occurrence of any serious social friction between them.

By analyzing the data gained from the questionnaire
surveys, it was confirmed that custom hire systems were not regarded as a reliable technology, but as a set of machine management packages capable of generating profit. This is an invaluable finding for characterizing the features of technology acceptance. When any farmer plans to request a custom hire service from a professional contractor, the local inhabitants contact to the contractor directly or ask the village chief for help and then fix the work schedule.

2. Responses obtained from respondents

Selected results of the questionnaire survey are provided as below, along with some discussion.

(1) Case-1: A farmer

Basic data (1 rai = 0.16 ha; 1 baht = 3.2 Japanese yen):
- Husband (44 years old)
- Dependents: Wife (37 years old), Three children
- Father (Chinese citizen), Mother (Thai citizen)
- Migrated from Nakhon Pathom in 1982.
- Acreage under cultivation: Two plots as described below,
  - Plot of 100 rai is rented. Rent is only 500 baht/year and tropical trees are being grown.
  - Plot of 5 rai is used to grow some vegetables.

History of crop cultivation:
- In 1982, pine trees were planted and corn was grown.
- In 1997, the main crop was pineapples.

Custom hire systems:
- Service charges for primary tillage, secondary tillage and furrowing work are 250, 250 and 300 baht/rai respectively.
- Prior to settlement, this family used to grow coconuts and chili, and they bartered them for rice with local inhabitants. They decided to migrate after obtaining detailed information from their relatives who had migrated earlier. Likewise, kinship affected the consequence of decision-making in enhancing quality of information. After settlement, they acquired a basic understanding of farming practices from their neighbors. The quality of the tillage provided by a custom hire service was fairly good, just as expected. They were most aware of such factors as the potential physical damage caused by soil erosion in a sloping field after tillage and ridge formation work.

To our surprise, this family began new small business as a kind of cottage industry. The parents performed two different roles, namely, the husband was responsible for growing the vegetables, while his wife engaged in a red-rattan handicraft business. As their livelihoods were at a subsistence level, they decided to try to increase their income, and help realize educational opportunities for their children.

(2) Case-2: A farmer

Basic data:
- Husband (67 years old)
- Dependents: Wife (Deceased), Three children
- Father (Chinese citizen), Mother (Chinese citizen)
- Migrated from Nakhon Pathom in 1970.
- Acreage under cultivation: Two plots as described below,
  - Plot of 23 rai is used to grow Chinese radish and eggplant.
  - Plot of 50 rai is used to grow pineapples.

History of crop cultivation:
- In 1970, rice, watermelons and pineapples were the main crops.

Custom hire systems:
- Service charges for primary tillage, secondary tillage and clearing/renovating work amounted to 250 to 300, 250 to 300 and 300 baht/rai, respectively.
- The husband was 32 years old when he moved from Nakhon Pathom province. His parents used to grow rice and vegetables and, bartered them for rice and pork with the local inhabitants. Information about the fertility of the soils likely led him to move here.

Cultivation work conventionally has three stages. The first stage involves buying the residues of the previous crop, which is scattered on the field surface. The second stage is to dig over the surface and subsurface soils in accordance with ordinary practical field preparation. The third stage consists of ridging work. Chemical spraying also used to be requested as an external service. To cope with the competition in the local market, he installed a sprinkler in the field to produce good quality crops. Since the field plots are located in a flat area, there is little concern about soil erosion.

(3) Case-3: A farmer

Basic data:
- Husband (70 years old)
- Dependents: Wife (59 years old), Four children
- Father (Citizenship unknown), Mother (Citizenship unknown)
- Acreage under cultivation: Six plots as described below,
  - Plot of 68 rai used to grow pineapples.
  - Plot of 20 rai used to grow pineapples (Owned by wife).
  - Plot of 20 rai used to grow pineapples (Owned by daughter).
  - Plot of 13 rai used to grow pineapples (Owned by first son).
  - Plot of 13 rai used to grow pineapples (Owned by second son).
  - Plot of 13 rai used to grow pineapples (Owned by third son).

History of crop cultivation:
- In 1992, cassava and corn were initially cultivated.

Custom hire systems:
The service charges for tillage, planting and harvesting relating to pineapple cultivation amounted to 200 baht/rai, 1200 baht/10000 items and 2000 baht/10000 items, respectively.

This farmer undertook serious study before deciding on a plan. On this occasion he collected technical information regarding soil fertility to allow him to reach a proper judgment. When he started farming, he encountered severe decline in the price of pineapples. Reluctantly, he returned to his hometown for a certain period and then returned after confirming that the economy had recovered. He is continuing to follow a sound management policy, and is making a serious effort to employ stable farming practices. In addition, he owns several hoes for use at harvest time. And so, a considerable number of harvesting jobs still employ human power.

(4) Case-4: A contractor
Basic data:
Husband (43 years old)
Dependents: Wife (35 years old), Two children
Father (Thai citizen), Mother (Thai citizen)
Migrated from Nakhon Pathom in 1976.
Acreage under cultivation: Two plots as described below,
Plot of 180 rai used to grow corn and pineapples.
Plot of 80 rai used for planting mango trees.
History of crop cultivation:
In 1976, corn was adopted as a promising crop.
In 1979, bananas were added for stable production.
In 1999, pineapples completely replaced the other crops.
Custom hire systems:
As a machine in service, one unit of the Ford 5500 tractor was introduced (Engine horsepower 43.4 kW, Purchase price 40000 baht). Concurrently, one set of implements including a three-way and a seven-way disk plows were employed to speed up farming operation.
A four-wheeled tractor was employed to undertake heavy-duty tillage. In fact, the custom hire system did not always result in improved profit. Here, eight workers were fully engaged in the contracting business. All were from Udon Thani province. Persistent persuasion by the manager to them was considered effective in recruiting them to business.

Interestingly, the manager bought farmland at 3000 baht/rai with the help of a bank loan in 1995. The value of this land rose to 70000 baht/rai after the end of the settlement scheme. He is currently one of the few rich members of the community.

Price fluctuations in the marketplace caused the pineapple growers serious dismay. For example, the factory bought pineapples at 5.4 baht/kg in 2001, but in 2000 the price was only 3.0 baht/kg. Obviously, it is of difficulty for the growers to predict long-term trends in the market price.

(5) Case-5: A contractor
Basic data:
Husband (47 years old)
Dependents: Wife (Age unknown), Three children
Father (Citizenship unknown), Mother (Citizenship unknown)
Acreage under cultivation:
Total acreage of 1000 rai.
Custom hire systems:
As a machine in service, one unit of the Ford 6600 tractor was introduced (Engine horsepower 57.4 kW, Purchase price 500000 baht). The same implements as those owned by the previous contractor, namely, a three-way and a seven-way disk plows, were mounted on this tractor.

This contractor operated his business on a comparatively large scale with an entrepreneurial approach. He repeatedly emphasized that this custom hire service was not profitable because of the excessive expenses. Then, the service charge amounted to 250 baht/rai for tillage. And the annual operating coverage in service is as much as 400 to 500 rai. This service charge was usually paid in kind by a customer at harvest time. His motive for pursuing this business was heavily influenced by the advice of relatives and colleagues in his hometown.

Altogether 13 workers from Ubon Ratchathani province joined this business voluntarily and engaged in the custom hire service on a full-time basis. Also, another 10 workers were ready to be recruited temporarily from the surrounding community when the business volume exceeded certain capacity.

Since this contractor also acts as a middleman in the pineapple business, it seems likely that henceforth he will be able to expand his business volume and customer network steadily.

3. Inherent features of custom hire systems
When this study site inaugurated its settlement scheme in 1977, there were only 20 households or roughly 100 inhabitants. Of these, six households were Christian. Provided the land price is reasonably low, this type of infrastructure-related environmental condition tends to attract people from wider areas. As this presumption suggests, the land price at the study site was definitely much cheaper than normal, and cost an inhabitant only 30 to 40 baht/rai. Some inhabitants have received a college level education and worked at leading enterprises before joining the settlement. Such a group with heterogeneous backgrounds may be
expected to enthusiastically produce a new philosophy with respect to rural development. It is interesting to note that people selected the custom hire system to implement mechanized farming as if it were quite natural. From the viewpoint of technology acceptance, it can be considered that the local inhabitants placed a higher priority on realizing a cost-saving management system than on realizing an energy-saving one. Since no official assistance program has been set up for agricultural mechanization, this selection seems to be appropriate and realistic.

During the process of promoting mechanized farming, one issue arose among the stakeholders. At the beginning of the settlement program, the individual income level or property size was the same for every inhabitant. Or, everyone was undoubtedly poor. But, after two decades or more, there was large income gap in the members of the community. People tend to view this as a normal phenomenon. However, many had expected to live in an ideal community with a smaller income gap, particularly in the new settlement. People might be discouraged when they realize the current real economic situation. It is clear that one factor that is closely related to becoming a rich farmer is the custom hire business. This is widely regarded as a rather easy and profitable business. When it comes to the sound development of agricultural mechanization, any stakeholder is invited to propose appropriate way to share the benefits among the people concerned. To tackle this pending issue, an institutional framework is being considered that will deal with the incumbent problems by applying interdisciplinary approaches.

Another issue is related to the human behavior that occurs when placing a service order with a contractor. Two kinds of contractors, i.e. a professional contractor who maintains an office outside the community, and a local contractor whose business is based at his/her homestead, are normally available in the field. As regards a professional contractor, any inhabitant might first place a custom hire service order with the village chief. In response to this request, the village chief delivers this message to a contractor. In this case, the village chief acts as a broker and is paid 5 % of the total custom hire charge. This is one of major roles expected of a village chief who is responsible for arranging miscellaneous matters. In some cases, the village chief collects local orders for machine services and finds an appropriate professional contractor. On the other hand, with a local contractor, people are able to place their service requests directly with him/her in an efficient manner because access is convenient. However, people know an existence of limitation in it as an inevitable shortcoming that a demand to perform another operation after first trial is quite difficult because of personal intimacy. So, the inhabitants must choose flexibly among different services.

One concept cited here to explain these behavioral characteristics. The rural community in Thailand is traditionally described as a loosely connected society. In Thailand, it suggests that a village chief does not customarily work on the inhabitants to follow an institutional activity in rigid manner. In return, people tend to respect the village chief, and the village chief supports them according to need. This relationship between people functions as a lubricant or provides a feeling of mutual reliability that makes it possible to engender good fellow feeling taking a long-range view. As a result, people are likely to make the best choice of contractors based on the customers’ personal circumstances and preferences.

According to a previous report (Chancellor, 1986), in Thailand, 95 % of large four-wheel tractors perform custom hire work, as do 80 % of the small four-wheel tractors and 50 % of two-wheel tractors. Threshers perform 95 % custom hire work. This is rather old data, but it is still useful as regards formulating future approaches.

Group farming in Japan is introduced briefly for reference. The machinery are used by groups who manage their farmland on a combined basis. Some methods are similar to the joint ownership forms. Other methods involve a village farmers’ union that owns machines, hires operators, and contracts with individuals or joint farming groups for work to be done. In some cases, large-scale or full-time farmers take charge of much of the work on land held by part-time farmers on either a contract or group-managed basis. In either case, the farmers have some influence on the productivity of the active farming unit.

V Conclusions

This paper reported the use of a questionnaire survey to investigate the salient features of technology acceptance with particular reference to custom hire systems in Thailand, and discussed them with a view to realizing further improvement. The following conclusions can be drawn.

1. In Thailand, custom hire services have been commonly used as a tool for economic farming and for streamlining various types of labor-intensive work since the beginning of agricultural mechanization in the 1960s.
2. This service was adopted by the local inhabitants at the study site and has become firmly rooted in the community.
3. Although the newly developed rural community had a positive reaction to the inward migration of nonprofessional farmers from urban areas, they were not mechanically minded as was partly expected. And hence it was somewhat natural that farming work would be performed by a custom hire service, thus avoiding the need for the farmer to own any farming equipment.
4. From the viewpoint of technology acceptance, this custom service was regarded as a set of machine management packages that was capable of generating profits.

5. Under the framework of this custom service, a village chief acts as a broker who deals with requests made by farmers. For this he is paid 5% of the total custom hire service charge.

6. The choice of either a professional or a local contractor can be made freely by the farmers based on their personal circumstances and preferences.

7. Local contractors seemingly enjoyed a greater chance of becoming rich managers. However, this situation unfortunately caused controversy in relation to the creation of an income gap between the haves and the have-nots in the community. But, this income gap was never considered during the initial stages of the settlement scheme.

8. The quality of the work and timely completion are often emphasized as critical factors that should be improved if a service is to gain a good reputation. Normally, these custom services are fragile in terms of dealing with any sudden increase in customer orders because of the small scale of the business.

9. The custom hire service is confirmed as a viable alternative to the direct ownership of agricultural machinery.

References


(Received: 18. August. 2009, Accepted: 30. October. 2009)