# Skills Development in Thai Informal Manufacturing Sector: Development of Appropriate Technology and Role of Apprenticeship

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## Introduction

The purpose of this paper is to shed light on the complimentary relationship between skills formation and appropriate technology development in Thai small-scale engineering industry by exploring the entanglement of social relations, technology and market, which conditions both of the learning of trades and the development of technology.

Skills formation has attracted a wide variety of interests from social sciences. Since skills formation occurs in socially organized productive activity and involves culturally mediated learning, the research on it has been located at the intersection among education, anthropology, industrial sociology, economics, economic history and psychology. Although the interests in these disciplines vary considerably, they commonly emphasize the mutual relationship among technologies, markets and social relations. For instance, Doeringer and Piore's internal labor market theory discusses the co-evolution of technologies and organizations of labor, or what they coined internal labor markets. The key element in the mutual relationship between technology and organization they delineate is skills formation, which itself is structured by the condition of the internal labor market that allocates workers into different tasks as well as the technical system of the enterprise or the industry. In addition, they also pay attention to apprenticeship in their argument on the variety of internal labor market. Although it has not well been developed in subsequent literature in this field, they proposed the notion of *craft labor markets* as an important sub-category of internal labor markets. In contrast with the notion of *enterprise labor markets*, which subsequently became a major conceptual tool in labor economics and industrial sociology, a few researchers

have paid attention to craft labor markets. Craft labor markets are decentralized social organization to allocate skilled workers to specific occupations such as carpenters, construction workers and so on. A typical craft labor market consists of regional community of skilled labors, informal network or formal association to coordinate mobility of workers and apprenticeship to submit skills (Doeringer and Piore 1971).

Interestingly, their argument based on rich observations in contemporary American economy seems to be applicable to a wide variety of actual cases of apprenticeship in non-Western contexts. In fact the mutual relationships among markets, social relations and technologies are widely observed in ethnographic studies on apprenticeship done by anthropologists (Coy 1989). However, the attempt to bridge labor economics and anthropology is largely undone, and potentiality of craft labor market as an analytical tool to explore mutual relations among the three supposedly separated domains remains unexplored. Moreover, although flexible specialization thesis of Sabel and Piore (1984), which can be regarded as a subsequent development of the internal labor market theory, was widely introduced to the development literature in the 1990s (Rasmussen, Schmitz and van Dijk 1992; Cadène, and Holmström 1998), few attentions are paid to the role of apprenticeship and craft labor markets in industry and technology development.

This paper aims to contribute to the exploration of this untouched possibility by presenting ethnographic materials on small-scale engineering industry in Thailand. It discusses the way in which the skills in this industry are formed by focusing on the mutual relationship between technology development and social relations.

**History of Engineering in Thailand**

Let me explain history of the Thai small-scale engineering industry first. Although Thailand today is well known as the world's production center for the multinational companies, the country has unique tradition of mechanical engineering that stretches back to the end of the 19$^{th}$ century.

Commerce and industry in Thailand during the pre-modern period were closely related to the Chinese tributary system. As the trade with China expanded since the 18$^{th}$

century, a great number of Chinese immigrated to Thailand as merchants, agricultural laborer and artisans. Those Chinese artisans played important role as the bearers of Western technology after the advancement of Westerners in the mid 19$^{th}$ century.

Chinese workers started to learn engineering by working in steam rice mills owned by Westerners. Most of them are Cantonese who were predominant in artisans at that period. They established their own machine shops at the turn of the centuries and started to manufacture parts and equipment used in rice mills. The society of mechanics at that period was small and organized around the traditional Chinese guild based on the Cantonese language group.

However, the industry changed drastically since the 1960s. The expansion of commercial farming led to the introduction of trucks and farm tractors into rural area. The succeeding expansion of the demand for auto repairs further stimulated the development of machine industry. In this period, the number of factories dramatically increased. A considerable number of newly appeared mechanics acquired their skills informally outside the traditional Cantonese guild. Thus, the more industry expanded, the more it was informalized.

The industry has developed their own technology independently from foreign manufacturers that have continuously increased their presence particularly after the 1980s. Although most of local factories are small and medium sized enterprises and most of the workers have received no formal engineering education, the industry has developed original products for rural markets. Farm equipment such as combine-harvesters, two-wheel tractors and reassembled cars made from secondhand parts achieved a notable success in this field. In contrast to foreign factories given benefits from the government, the indigenous engineering industry has developed largely outside the state institutions and regulations.

**Technical practice and social categories**

Interestingly, the informality of the industry has also affected the characteristics of technology. Machines manufactured in this industry considerably differ from machines

in the developed countries. Thai farm equipment such as two-wheel tractors and threshers have no differences in their designs according to brands and models. The machines are virtually standardized and no manufacturers take patents and design registrations on their products. Some machines like reassembled cars are even manufactured in village workshops by farmers. To put it in other words, these machines are manufactured in the almost same way in which ploughs and hoes are manufactured in traditional societies.

The practice in local factories also differs significantly from the modern engineering. Instead of engineering drawings, one of the most important artifacts of the modern engineering, the indigenous engineering utilizes real parts and life-size models as medium of technical communication. They send these three dimensional artifacts to collaborating factories in order to transmit design specifications. In addition, local factories appropriate a variety of secondhand parts as materials in manufacturing process.

The difference of formal and informal sector is also reflected in the difference in social categories applied to the practitioners. The mechanics working at the local factories are called *chang*. The Thai word *chang,* being informally defined as "those who have practical expertise", can be applicable to almost all kinds of people who have some kinds of practical abilities. Thus types of *chang* are virtually innumerable because a new kind of *chang* will come into the world when a new technology or a product introduced into Thailand. This informality of the mechanics contrasts sharply with *Witsawakorn,* the Thai word for "engineer", which is only coined to those who graduated from engineering schools of universities and licensed by the state-sponsored "Council of Engineers".

The following discussion is based on my fieldwork in agricultural machinery industry, which is the most successful branch of the Thai indigenous engineering. Geographically, the research is centered on the city of Nakhon Ratchasima, commonly known as Khorat, the second largest city of northeast Thailand.

**Apprenticeship and life course**

The skills formation of mechanics in this industry is mostly based on the informal apprenticeship organized at the shop floor of factories. Most of mechanics receive training based on the job categories used in local factories, that is, turner, welder, repairer and painter. However, there is no formal regulations or contracts on apprenticeship after the decline of the Chinese guilds in the first half of the 20th century.

The structure of apprenticeship has profound influence on the life course of mechanics. Most of mechanics started working as apprentices (*dek fuk ngan*) after finishing compulsory education (primary schools before mid 1990s, secondary schools after late 1990s). The training they receive for three to five years is basically informal; they learn basic skills by working with senior workers at the workplaces. The tasks assigned to apprentices include preparation and cleanup of workplaces, cleaning of machine tools and fetching and carrying. In most cases, apprentices learn basic skills such as turning, welding, painting and overhauling through working with senior mechanics without formal instructions.

Apprentices come to be called as *chang* after mastering basic skills. In most cases, they leave the factories where they are trained soon after finishing apprenticeship and travel to find new places to work. The most of mechanics say that traveling is essential for their learning because a wide variety of experience is necessary to become a skilled mechanic.

In addition to the training in apprenticeship, there is clear gap of skills between ordinary mechanics and experienced mechanics. Most of experienced mechanics either work as leaders (*hua na*) of the workplaces or establish their own factories. There is a clear difference between the job descriptions between them. While ordinary workers perform routine jobs by using their basic skills such as machining and welding, experienced workers take administrative roles and perform non-routine works such as designing and remodeling machines. Although the differences of skills according to the job descriptions still remain, there is substantial convergence of skills among experienced mechanics. They have a wide variety of skills crossing the boundaries of

the job classification and combine these skills in order to perform their non-routine tasks such as development. Thai mechanics regard a person with all-round skills who can develop a new design, manufacture necessary parts and assemble a machine all by oneself as an ideal mechanic.

**Kinship, circular migration and entrepreneurship**

The hierarchy of proficiency among Thai mechanics is organized according to their appreciation of these all-round skills. The common practice of mechanics to travel numerous factories to develop the all-round skills sharply contrasts with the narrow specialization observed in the skilled mechanics in developed countries such as Japan and Europe.

A complicated socio-technical background also lies behind the all-round skills development of Thai mechanics. Most of Thai mechanics are planning or dreaming to establish their own factory in future. Since the wage increase in local factories stagnates soon after mechanics become full-fledged, the only way to increase income for skilled workers is establishing their own factories.

A popular option for mechanics planning to establish their own factories is returning to their own or their wives' home villages. As matrilocal residence is widely practiced in Northeast Thailand, a considerable number of mechanics in this region establish their workshops at their wives' villages. They build houses in the compounds of wives' parents and jointly cultivate paddy fields with them. As the co-inhabitancy and joint cultivations tend to be regarded as a condition for the inheritance, their returns to home villages are also a strategy to secure inheritance of properties such as farmlands and compounds. In addition, establishing a workshop at one's home villages is also a secure way to start own business because the mechanic can expect income from agriculture as well as from the workshop.

The all-round skills formation is complimentary to the mechanics' strategy to start their own business in home villages. Since most of Thai villages are relatively isolated and located far from cities where most of factories are located, the owners of rural

workshops face the need to deal with a wide range of demands from villagers, from repairing automobile to manufacture simple farm equipment to remodel complex agricultural machinery. Thus developing the all-round skills is imperative for running business in rural areas.

As seen above, mechanics' appreciation of all-round skills is deeply embedded in their social life. It is an essential part of their perspectives on future, desire to start their own businesses, and hope to return to their home villages.

**The Entanglement of social relations and technology development**

In addition, the all-round skills are a crucial condition for the appropriate technology development in Thai indigenous engineering. Small factories and village workshops in provincial area have developed most of the domestically-designed machines. As local farmers bring a wide variety of demands and problems into workshop in villages, the negotiations and the collaborations between farmers and mechanics at village workshops have played a particularly important role in the development of machines suitable to local environments.

The all-round skills particularly suit to the technology development based on small factories and village workshops. Most of local factories --let alone village workshops -- are lacking enough resources for developing entire set of a machine by deploying specialized personnel. Local factories solve this lack of resource by using secondhand parts in order to save labor to manufacture parts. This also has made it possible for local factories to concentrate their efforts on designing and assembling. The all-round skills are inevitable for them to develop machines by using relatively limited resources.

Skills formation in the Thai local machine industry is entangled with heterogeneous relations such as the technical characteristics of the production system, matrilocality, circulate migration, utilization of secondhand parts and market conditions in rural area. This entanglement of social, economic and technical relations is raising a new challenge for an interdisciplinary research that requires collaboration between anthropology and development studies.

**Reference**

Cadène, P. and M. Holmström (1998) *Decentralized Production in India*. Sage.

Coy, M. (1989) *Apprenticeship*. SUNY Press.

Doeringer, P.B. and M.J. Piore (1971) *Internal Labor Markets and Manpower Analys*is. Heath.

Piore, M. and C.F. Sabel (1984) *The Second Industrial Divide.* Basic Books

Rasmussen, J., Schmitz, H. and Pieter van Dijk, M. eds. (1992) *Flexible Specialization: A New View on Small Industry?* IDS Bulletin 23(3).