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The Thai Telecommunications Equipment Industry: Obstacles and Opportunities

Sumeth Vongpanitlerd*

Prior to a few years ago, telecommunications equipment manufacturing was a relatively obscure sector in Thailand's electronics industry. To begin with, the number of firms manufacturing electronics in Thailand before 1986 was small. Only 50 projects had received Board of Investment (BOI) promotion and these represented almost the entirety of the industry. The remaining handful of very small firms contributed only marginally to the industry's total output.

The majority of these BOI-promoted firms during that period were concentrated in the consumer electronics sector, producing radio, television and electronic parts, in response to the government's import-substitution policy. In the 1970's came component manufacturing, primarily in circuits for export, followed by computers and peripherals in the early 1980s.

The most conspicuous presence in the Thai telecommunications equipment field was radio transceivers, produced by seven Thai firms, each with a history of over 20 years. This group has since dwindled to only two. Production was mainly for the local market, with a small fraction for export to neighboring Southeast and South Asian countries. In addition, one foreign subsidiary assembled telephone sets for the Telephone Organization of Thailand (TOT) and one Thai firm made small satellite antenna dishes.

As in most countries, the much underdeveloped telecommunications equipment industry was the result of strict regulations imposed by the Thai government through the Post and Telegraph Department and TOT. Changes to these restrictions only began in 1984, following deregulation of telecommunications services in the U.S.

SOME RECENT KEY DEVELOPMENTS

In October 1986, TOT took the first steps in liberalizing the telecommunications equipment market by allowing consumers to purchase equipment for their own premises, initially telephone sets and, more recently, facsimiles. At the same time, TOT began to seriously build up a much needed telephone network to cope with the surging demand for telephones, and to shorten the long waiting list of almost half a million applicants and reduce the waiting time of several years. As Table 1 shows, from 1986 to 1990 a total investment of over 33 billion baht was used to double line capacity from 830,000 to over 1.6 million lines and to raise the telephone density from 1.19 to 2.40 per 100 population.

TOT's expansion was substantial and rapid, considering that, when the organization was set up in 1954, it had a mere 10,000 line capacity for the whole country. Even so, TOT is still unable to adequately meet the continual rise in demand and the official waiting list remained at 451,063 as late as 1989. At the present rate of capacity expansion, it takes an applicant about three years on average to obtain a telephone. This inability to meet the rising demand for telephones basically stems from lack of sufficient internal resources on the one hand, and imposition by the Ministry of Finance of a maximum foreign loan ceiling of US$ 1.5 billion on the other.

In spite of various significant developments resulting from the opening up of the huge U.S. telecommunications equipment market, as well as TOT's rapid infrastructural expansion in the local market, the local industry has not significantly benefitted, probably because the industry is in much too weak a

position to respond. There has been no substantial increase in the number of new firms in the telecommunications industry, including related parts and component manufacturers, nor of the necessary supporting industries.

The product range offered by the small group of firms in the telecommunications field is thus narrow and concentrates on a few products, based largely on imported CKD (completely knocked down) parts aimed at small local markets. Despite their lengthy existence, firms remain small and incapable or not willing to undertake costly technological investment. They are consequently weak in terms of technological endowment and capability (Akrasanee, 1991). Thus, barriers to entry remain substantially high, even for such relatively unsophisticated products as telephone sets. This is evident from the import and export statistics in Table 2 which show that Thailand's export volume, though increasing, remained meagre at 86 million baht in 1986 compared to imports, which continued to rise substantially from 1,991 million baht in 1985 to 4,540 million baht in 1986.

Major beneficiaries of the U.S. deregulation were initially the Asian NIEs (newly-industrialized economies), Korea and Taiwan in particular (Mody, 1989). Following a sharp appreciation in the currencies of Japan and the Asian NIEs, coupled with the rapid rise in production costs and the loss of GSP (General System of Preferences) privileges, labor-intensive manufacturers in these countries began to relocate their production processes to take advantage of lower labor costs elsewhere, such as in Thailand.

A large influx of foreign direct investment (FDI), predominantly from Japan and Taiwan, poured into Thailand throughout the latter half of the 1980s. From 1987 to 1990, BOI approved 430 electronics projects, with a combined investment of 106 billion baht, as compared to only 50 projects, with a combined investment of just 16 billion baht, during the two and a half decades from 1960 to 1986. As a result of this influx of foreign investment, some 30 telecommunications equipment and parts manufacturers are now in operation (Sripaipan, 1990). In addition, a small number of Thai firms have recently entered into the small PABX market.

From an initial narrow range of products, many new items are now being produced in Thailand, including cordless telephones, telephone answering machines, key telephones, small PABX, facsimile machines, as well as an increasingly wide range of parts and components. Practically all of these products, however, are exported; the main reason for relocating to Thailand in the first place was to take advantage of the country's low labor costs, promotional incentives, GSP privileges, and to side-step looming trade friction. At the same time, cumbersome procedures and the complicated records required to keep exports separate from local sales for import tariff and tax settlement purposes, greatly discourage these manufacturers from selling part of their quota on the local market. Exports of telecommunications products grew dramatically from just 86 million baht in 1986 to over 5,000 million baht in 1990, while imports more than doubled—from 4.5 billion baht to 10.8 billion baht in the same period to meet growing domestic demand (see Table 2).

In spite of the recent high growth due to the influx of FDI, a recent TDRI study (Akrasanee, 1991) concluded that the local industry has not gained substantially from technological spill-overs and other benefits associated with a strong FDI presence. Domestic firms have yet to achieve a strong export capability. At the same time, although the investment momentum appears to have weakened considerably, as yet, it has not completely halted. The next section discusses a number of major causes now at work.

MAJOR OBSTACLES

The Case of Below Par Technological Spill-overs

FDI has contributed significantly to the recent economic boom in Thailand and still remains of considerable benefit to the Thai economy. FDI not only generates employment and provides capital, it can also be a source of acquiring foreign technology and opportunities in the export market.

Two obstacles prevent Thailand from realizing the fullest possible benefits from FDI and, furthermore, are

likely to discourage and limit future new investments if left unresolved. The first is an inadequate supply of technical manpower, both in quantity and in quality. The second is a general lack of linkages between the parts and components industry, including various other supporting industries, and the equipment and finished products industry. These are important ingredients for the transfer and diffusion of technology—both production and design—and management skills from foreign investments, thereby substantially increasing the benefits a country can gain from FDI over and above just export earnings and employment generation. Increasing linkages and subcontracting would lead to less reliance on importing parts and components, as well as encouraging more local Thai suppliers. In turn, the stronger presence of Thai firms would generate greater technological spill-overs.

Infrastructural Bottlenecks and Policy Constraints

The sudden surge in foreign investments has also created a number of problems. Notable among these are bottlenecks in the country's physical infrastructure—transportation, power supply, port facilities, and telecommunications services.

While a highly-qualified technical workforce is certainly essential for absorbing technology transferred through foreign investments, an adequate supply of skilled labor is also necessary to meet increasing demand and to maintain production levels of quality products. Another important element for ensuring quality control and diffusion of technological knowledge is an adequate technological infrastructure which involves, among other things, basic metrology, improved standards, certification and product testing capabilities, and a good information system on technology and market trends.

Though low production costs and high quality are certainly major factors in international competitiveness, another important factor has emerged as a result of rapid technological change and shortening product life cycles: the need for rapid delivery times. This certainly calls for good support infrastructure, efficient transportation, simpler customs procedures, and adequate telecommunications services. Thus the third obstacle is the generally poor technological and support infrastructure, presently reigning throughout the country.

These various problems are not confined to the telecommunications equipment industry. They apply to the electronics industry as a whole and indeed to most other industries. Another main issue, specifically relevant to the industry under discussion, is the government's telecommunications regulations and policies.

EMERGING OPPORTUNITIES

Currently TOT is undertaking a massive expansion of the nation's telephone network. As TOT's own investment capability—already pushed to the limit in doubling its network capacities during 1986 to 1990—is not able to meet the ever-increasing demand for telephones, the government has taken another drastic policy change in allowing TOT to award concessions on a B-T-O (build-transfer-operate) basis to TelecomAsia (formerly CP Communications), a private Thai firm, to install two million lines in the Bangkok Metropolis within five years. A similar deal for one-million lines in the provincial areas is to be awarded in the first quarter of 1992. These, together with TOT's own annual investment, should bring the present telephone density of just under three per 100 population to about 10 per 100 population by 1996, a target aimed for in Thailand's Seventh National Plan.

Apart from investment plans, several other major telecommunications development plans of both TOT and the Communications Authority of Thailand (CAT) are expected to materialize in the near future. They include a national ISDN (integrated services digital network), at least one teleport, national and international optical fiber networks, and a satellite communications network (Sripaipan, 1990).

An ISDN is a modern telephone network capable of providing various services using the same telephone line. A single ISDN can offer such services as telephone, facsimile, data communications, and a range of new services, such as cable TV, video-phone, video-conferencing, videotext and other telematics. A number of countries have experimented with, or are already operating, an ISDN. TOT plans to introduce

the service within 1992.

The teleport project aims to initially complement the Eastern Seaboard Development Plan, for which an investment of 1,466 million baht on the part of TOT and 670 million baht by CAT is called for. TOT will install two ISDN exchanges, one each at Mab Tapud and Laem Chabang with an initial 5,000 ISDN lines. CAT will install 1,000 trunk circuits for an international transit switching center at Sri Racha. These investment are to be carried out during 1991 and 1992.

Presently, CAT has only one coaxial-cable linking Thailand to Malaysia, and then on to Singapore. With the growing traffic in international calls, CAT plans to build a new submarine high-speed optical-fiber cable to Malaysia by 1993. Another project involves a joint-venture between TOT and the State Railway of Thailand (SRT) to install a 3,000 kilometers optical fiber cable network along the four railway routes to the North, Northeast, East and South of the country by 1995.

Thailand currently uses INTELSAT satellites for international communications and Indonesia's PALAPA satellite for television broadcasting and domestic communications. By 1994, the country is expected to have its own satellite with at least 12 transponders capable of handling 2,000 telephone circuits per transponder. The Shinawatra Computer Group will invest 4 billion baht under a 30-year concession to operate the system on a revenue-sharing basis.

With the above major telecommunications investment plans over the next four to five years, a host of new opportunities will be certain to arise. They can only help strengthen the local telecommunications industry.

Take, for example, the massive 100 billion baht project to install two million telephone lines in Bangkok. The cost breakdown estimate is 57 percent for switching and transmission equipment, 33 percent for outside plant equipment, and 10 percent for customer support service systems. Thus the bulk of the cost goes to electronic switching and transmission equipment. Outside plant equipment comprises copper cables, metal cabinets and ducts, and civil works. Customer support service systems include both computer hardware and software. Since only a few of the top telecommunications corporations in the world are capable of producing switching equipment, the local industry could be expected to supply only some 5 billion baht worth (or 5 percent of the project cost) of products, mostly for PCBs, PCBAs, electronic components, wires and cables, and subscriber loop carrier products (Vimolvanich, 1991).

The greatest benefit, however, lies not with the actual project implementation itself, but in the subsequent supply of such customer-premise equipment as telephone sets, PABX units, and facsimile machines. This is where the greatest emerging opportunities lie. An estimate of the likely demand for customer-premise equipment associated with the availability of an additional three million phone lines is given in Table 3. A question naturally arises: How can some or all of the obstacles facing the industry be overcome so that manufacturers, particularly local ones, can capitalize on these forthcoming opportunities? The next section attempts to provide some development strategies that may partly answer this question.

STRATEGICAL OPTIONS FOR DEVELOPMENT

- **Promote FDI and encourage OEM (original equipment manufacturing) subcontract manufacturing.**

In the next three to five years, Thailand should continue to attract foreign investors in telecommunications-related industries, particularly in the parts and component manufacturing sector and supporting industries. This should be a first step in enlarging the value-added chain, and building a strong parts and components and equipment industries, as well as boosting exports.

At present, the industry is largely engaged in assembling final products or intermediate goods, with heavy reliance on imported parts and components. While there is a lack of breadth in the support industries, including parts and components, there is little evidence of any substantial backward linkages between whatever support industry there is and the final product assemblers (FIAS 1991). Measures should be

designed and introduced to promote greater backward linkages, as well as OEM manufacturing for foreign firms, to obtain as many spill-over benefits as possible.

As the industry matures, comparative advantages will gradually shift from low cost of production workers to low cost of engineers (based on engineering and design capability) and managers (based on marketing and management skills). Development strategies over the medium term (five to 10 years) should then focus on expanding the value-added chain's activities to research and development (R&D), as well as to cover marketing functions. If sufficient experience and production capability in local firms is accrued, both local firms and foreign subsidiaries alike should be encouraged to develop their own product designs and marketing capabilities locally. Longer term strategies, for the next 10 years, should aim at domestic firms finally making their own brand names and seeking opportunities to form alliances with multinational corporations, as is the case with the Thai CRT. In that respect, BOI's B.U.I.L.D. program could act as a broker to seek out and make arrangements for such alliances.

Build up an adequate technically-capable human resource base

The current acute shortage of technical manpower is expected to continue for at least the next three to five years, judging from prevailing conditions and the increasing level of foreign investments in the electronics industry. Drastic measures and actions need to be taken urgently, not only to avert further deterioration of the shortage situation, but also to prepare the country for sustainable development, in view of the natural progression from low labor cost comparative advantages to higher knowledge and skill-intensive competitiveness.

Apart from initiatives to accelerate the training of technical manpower, from skilled craftsmen to technicians and university graduates, the country should consider schemes to institutionalize some sort of certification system to rank workers without formal education according to technical skill and proficiency. Such schemes could be aimed at specific skills, for instance, general electronics trouble-shooting and PCB repair, telephone line-fault rectification, and computer literacy. Similar national certification systems in many fields, including electronics, have been a great success in Taiwan and South Korea.

- **Target segments or products of the industry and accord priority status to these for a more focussed approach to development**

As the country is encountering severe and worsening infrastructure bottlenecks, both physical and technological, plus a severe shortage in skilled technical manpower, it is essential that a more focussed approach to industrial development be adopted. Thus maximum benefits could be realized from local resources without spreading these resources too thin. Some sort of industrial development plan with more specific and measurable goals in implementation should be forthcoming.

For the telecommunications industry, selection criteria could be based on consideration of market needs for both the export and domestic markets, large linkage effects, and high value-added. A detailed study, for example, taking into account the country's short and long term telecommunications infrastructure expansion plans (on the demand side) and the domestic telecommunications and related industries (on the supply side), on both current and future prospects, could be undertaken to target segments and products.

- **Use government procurement in telecommunications expansion projects as an instrument to promote local industry**

The government should consider procurement for future telecommunications expansion to help nurture local firms, promote industrial linkages, access and acquire foreign technology, and maximize spill-over effects.

In a recent World Bank study (World Bank, 1990) on the role of government in the development of the electronics sector in four developed economies (U.S., U.K., France, and Japan) and seven developing economies (Brazil, China, India, Korea, Taiwan, Singapore, and Hong Kong), nine of the 11 countries have

made extensive use of government procurement guarantees for specific products. The two exceptions are Singapore and Hong Kong.

Government procurement should, however, be used as an instrument to promote local firms and must be designed to nurture local firms, promote the use of inputs manufactured by the country's highly-competitive parts and components suppliers (mostly FDI firms), access and acquire foreign technology, and diffuse and adapt such technology.

The government should also encourage more private sector participation in TOT and CAT expansion projects, by not simply relying on a turn-key purchasing basis, but involing their own engineers, for instance, in network design and software specifications. Suppliers of major equipment should also be obliged to provide specific training programs as part of procurement deals, and so on.

In this respect, the government may consider the following immediate measures:

- announcing future telecommunications expansion plans
- releasing full project details and technical specifications well in advance
- giving greater preference to local firms able to meet the specified technical requirements
- attaching technology transfer conditions to future procurement packages, such as training programs and hardware and software design and capability building

As longer term measures, the government should consider the following measures:

- gradually increasing local content requirement to match demand with the local supply
- establishing R&D laboratories and programs, as the National Electronics and Computer Technology Center (NECTEC), TOT, and CAT have done.
- acquiring and diffusing new telecommunications technology to the domestic industry
- developing indigenous R&D by establishing R&D laboratories, or jointly with private sector firms, to meet the needs of the future telecommunications projects where appropriate, both for the telecommunications networks and the user equipment markets.

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