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Brakes on Growth: Infrastructure Bottlenecks and Thai Industry

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INTRODUCTION

Since the Fifth National Economic and Social Development Plan (1982-1986), a major thrust of Thailand's economic and investment policy has been to diversify or "decentralize" industrial development to areas outside of the heavily concentrated Bangkok Metropolitan Area (BMA). Despite these efforts to direct industries to provincial areas and to encourage economic growth in regional cities, the BMA continues to be the dominant economic, social, and administrative center of the Kingdom and is expected to continue to absorb a large percentage of the growing migrant labor force as Thailand continues to industrialize over the next decade (TDRI 1991).

One of the primary problems with "decentralizing" growth, however, is the fact that infrastructure facilities in targeted regions as well as in the BMA itself are severely lacking. Indeed, as Thailand's economy has grown very rapidly during the past decade, doubts have arisen as to whether the country's basic infrastructure facilities, such as electricity, water, telecommunications, transport, and other related services, can adequately serve the current industrial expansion in both the BMA and other areas. At present, the general consensus is that demand for infrastructure facilities does indeed outstrip supply.

Of particular concern here is whether or not public sector investments in infrastructure will be able to meet demand for these services in the future. As the experiences of other rapidly expanding economies show, failure to respond adequately to meet demand for infrastructure services not only adversely affects industrial productivity but also negatively impacts on quality of life for the general population.

This study analyzes the current status of Thailand's industrial infrastructure by focusing on the demand-side pressures as well as the supply-side shortcomings of infrastructure services. In addition, we look at the constraints that such shortcomings place on economic growth, specifically in the manufacturing sector. In order to comprehensively assess the current state of infrastructure provision in this sector, we incorporate results from a survey made of manufacturing firms located in Bangkok, the BMA and the northern provinces of Chiang Mai, Lamphun, and Lampang. Finally, this study outlines the roles of both the public and private sectors in infrastructure investment, emphasizing the need for regulatory and institutional change and recommending avenues for more efficient planning and delivery of infrastructure services.

SURVEY OF INFRASTRUCTURE PROVISION IN THE MANUFACTURING SECTOR

In order to elucidate "demand-side" aspects of infrastructure development, this study conducted a survey of manufacturing industries in Thailand. Specifically, the survey was designed to shed light on three issues: 1) the effects of inadequate services on firms' operation (and hence on productivity and economic development in general) 2) the options available to infrastructure suppliers for more efficiently providing and maintaining the delivery of various infrastructure services and 3) potential cost savings from improved services.

A total of 300 manufacturing firms (with twenty employees or more) were selected from a list of manufacturing establishments made available by the Department of Industrial works and the Department of Industrial Promotion, both under the Ministry of Industry. Of the respondents, 48.7 percent (146 firms)

were located in districts within Bangkok, 34.6 percent (104 firms) were located in districts in the BMA, and the remaining 16.7 percent (50 firms) were based in the northern provinces of Chiang Mai, Lamphun, or Lampang. Surveyed firms produced a variety of manufactures, namely: textiles, wearing apparel, basic fabricated metal products, chemical products, food and beverages, and wood or wood products.

Results of the Survey

At the aggregate level, the results of the survey definitively show that infrastructure deficiencies impact on industrial productivity in a number of ways. Firstly, with respect to a firm's initial choice of a site for production operations, firms generally choose to operate where they can most easily meet their needs for various infrastructure services. Respondent firms indicated that the selection of location of a factory depended very much on the availability and quality of infrastructure services in addition to other factors such as land price, proximity to supply of labor, and proximity to markets.

With respect to actual provision of infrastructure services, the study's major findings are broken down by sector. In the electrical sector, for example, manufacturing firms in the BMA and firms in regional cities responded that electrical supply was adequate although the quality of the electricity was inconsistent due to voltage fluctuations and occasional power outages. Furthermore, results suggested that electricity supply deficiencies resulted in greater production losses for firms in the BMA than for firms located in regional cities. Notably, when asked if back-up generators were an option during power interruptions, a mere 4.3 percent indicated that they have at least one back-up generator while the remaining firms indicated that on-site generators were not economically feasible options.

As for provision of water, this survey found that although more than 85 percent of the firms surveyed reported that they had access water works authority services, a majority of firms reported that relative to all water consumed from various sources, a very small proportion (4.1 percent on average) of their overall water needs were supplied by public waterworks authorities. The survey also found that the farther firms located from the city of Bangkok, the more likely they were to rely on private sources of water such as private wells or bore holes. Of note, however, is the fact that the majority of firms surveyed indicated that their industrial processes were not water intensive (i.e., the costs of water used in production processes amounted to less than one percent of total input costs).

Transportation costs are among the most important factors of production for industries aside from raw materials costs, labor costs, and electricity costs. This survey queried firms on two aspects of transportation: transportation for personnel and for freight. As for personnel transport, this survey revealed that more than 90 percent of surveyed establishments do not provide transportation for workers due to the fact that local transportation services are sufficient for commuting needs of workers. Furthermore, just over half of the workers among the firms surveyed take some form of motorized transport to work while approximately 45 percent of workers walk to work. As for freight costs, the survey found that approximately 82 percent of firms invested in their own freight vehicles, reflecting the ability of firms to absorb the capital costs of private provision. However, regardless of whether firms are using their own vehicles or subcontracted vehicles for transporting personnel and freight, the severe traffic congestion in the BMA impacts on firms in terms of the opportunity costs of workers and freight arriving late. Approximately 8 percent of surveyed firms reported quantifiable losses as a result of workers arriving late due to traffic problems. In 1991, for example, these firms faced losses of 467,000 baht in production and expended 1.06 million baht in total overtime wages. The loss in total output when production was interrupted because of transportation bottlenecks, such as delays in input delivery or other problems was valued at 115,000 baht per year, a relatively small loss as compared to losses on the production side.

Telecommunications is one of the most important public infrastructure services for modern industry. A majority of the surveyed firms indicated that telecommunication services (i.e., through provision of the Telephone Authority of Thailand (TOT) or through the permission of the Communications Authority of Thailand (CAT)) remained insufficient. While TOT service generally meets the minimum standard requirements for firms of all sizes, many firms must still rely on private provision of communication services, such as mobile telephones and motorcycle couriers. Larger firms reported that they still needed

more telephone lines in order to fulfill their business obligations. Thus far, however, TOT has been unable to meet this demand, as evident in the long waiting times associated with obtaining additional telephone lines reported by firms. Firms located in regional cities, in particular, reported shortages of facilities as well as of reliable service.

Waste treatment and disposal remains a major problem, according to firms surveyed. Less than half of the firms indicated that they were served by the government sewage system while the remaining firms reported that they used 1) on-site waste water treatment facilities 2) private drainage systems 3) sedimentary ponds 4) private pick-up services or 5) industrial estate treatment facilities.

Infrastructure Deficiencies and Costs to Firms

On the basis of the above-mentioned problems, aggregate financial losses (social welfare losses) to firms from various infrastructure deficiencies were calculated using on weighted samples. As evident in Table 1, poor infrastructure in the telecommunications sector is the cause of the most significant financial loss to firms surveyed. Insufficient or unreliable telecommunications services amounted to estimated losses of more than 17 billion baht per year, or roughly 56 percent of estimated aggregate welfare losses to firms. Financial loss from water supply deficiencies ranked second, accounting for more than 6.3 billion baht or 20.8 percent of total welfare losses. This was followed by damages caused by electricity outages and fluctuations, which amounted to 4.4 billion baht, or about 14.6 percent of the total welfare losses. Transportation deficiencies caused 1.38 billion baht in losses per year to surveyed firms while floods caused by poor drainage systems, inadequate sewerage systems, and/or lack of garbage collection facilities contributed more than 1 billion baht of damages per year.

POLICY RECOMMENDATIONS

As this survey clearly indicates, across the Kingdom, measures to improve efficiency and reliability of the state provision of infrastructure are necessary. In addition, measures to ensure fairness to consumers and to promote competition (i.e., private sector participation in the provision of infrastructure) are needed in the near future. (Such measures will help ensure that state enterprises' investment needs will be fulfilled by domestic and international capital markets rather than by government guarantee loans.) Below we have outlined specific recommendations for several of the key infrastructure sectors.

Electricity

The Electricity Generating Authority of Thailand (EGAT) is responsible for electricity production and transmission in Thailand. Delivery of electricity, however, is done through the Metropolitan Electric Authority (MEA), which purchases electricity from EGAT to distribute in Bangkok, Samut Prakan, and Nonthaburi, and the Provincial Electric Authority (PEA), which distributes electricity to the remainder of the Kingdom. To maintain the reliability and continuity of power service and to provide electricity services capable of sustaining current growth, EGAT must upgrade, in terms of capacity and efficiency, its electricity delivery systems. This can be done by, for example, replacing low voltage transmission equipment with high voltage transmission equipment. Furthermore, in order to reduce unplanned outages and inefficiency in its power generating plants, EGAT could invest in upgrading technical capacity and maintenance programs for both power plants and transmission systems. For example, EGAT's state-of-the-art system control centers, on-line since 1992, could be expanded to cover all of EGAT's regions to ensure better planning for generator and transmission operation. Such planning would arguably incur less financial loss to industries as outages for maintenance could be scheduled and thus planned around.

EGAT's more immediate problems lie in power generation. Demand for electricity is expected to increase by roughly 1000 megawatts annually over the next few years; at the same time, EGAT faces significant financial constraints and delays in the construction of its new power plants. Thus, in order to meet demand, EGAT must speed up partial privatization of power generation through its pre-existing Independent Power Producer (IPP) scheme and also increase the purchasing power of small and stand-by producers. This will help relieve the financial burden on EGAT, which has already borrowed heavily from

international sources and is close to reaching its government loan ceiling. Thus far, EGAT has plans to buy 3,800 megawatts of electricity between 1996 and 2000 under the IPP policy. Were EGAT to undertake an expansion of its own facilities to increase power generation by this margin, the cost (approximately 200 billion baht) would push EGAT to over its government-imposed loan ceiling. Thus, by "farming out" power generation to independent producers, it is possible for EGAT to meet demand while exercising fiscal restraint.

Possible sites for new generating facilities under the IPP program include the eastern and western coasts of the Gulf of Thailand, specifically Prachuab Kiri Khan, Phetchaburi, Ratchaburi, Samut Sakhon, Samut Songkhram, Chonburi, Rayong, and Chantaburi. It is interesting to note that the IPP sites still remain part of the EGAT entity inasmuch as they are counted on for generating a certain percentage of Thailand's total electricity needs and almost all distribution of the electricity is handled EGAT. At the same time, however, EGAT's encouragement of private producers to sell their surplus electricity to neighboring private users is a step toward creating a competitive electricity market. In the long run, it is likely that EGAT will have to further restructure its operations to allow IPPs to make bundled retail sales to specific regional areas as well as directly to the MEA and PEA in certain areas.

Similarly, rapid economic growth in the past several years has forced both MEA and PEA, the sole distributors of electricity in Thailand, to reconsider their medium- and long-term operational plans. Specifically, since 1990, MEA and PEA have shifted the emphasis of their organizations from the expansion of electrified areas (i.e., providing services to more customers) to the provision of sufficient and reliable energy supplies (i.e., providing better services to customers, especially those in the industrial sector). To achieve these goal, MEA and PEA must make concerted efforts to strengthen several existing programs, namely: 1) upgrade the power distribution system by improving system efficiency through computerized dispatch of electricity in areas where power interruption frequently occurs and in areas where severe output damage has occurred and 2) improve the efficiency of power expansion, particularly in the construction of transmission lines and substations in existing and targeted industrial zones.

Water

Not unlike the distribution of electricity, the provision and distribution of water is split between the Metropolitan Waterworks Authority (MWA), which is responsible for piped water supply in Bangkok, Samut Prakan, and Nonthaburi, and the Provincial Waterworks Authority (PWA), which is responsible for urban water supply in all other areas. However, MWA and PWA face several problems, the most critical of which is the shortage in supply of raw water from the Chao Phrya river basin during the past dry seasons. Such a shortage has alerted water authorities to the need "master plan" to guide water management policy, particularly water district zoning and water utilization. Thus far, in the absence of a master plan, water has simply been rationed for agricultural and non-agricultural uses and rarely are residential or industrial users differentiated and given priority in water rights issues.

A second major issue facing the MWA and PWA is the fact that the expansion of access to piped water has been slow and inefficient. PWA, for example, has been able to distribute potable water to less than 30 percent of the users its jurisdictions, due in part to limited financial and human resources available to cope with rising demand. On top of this, MWA and PWA subscribers complain of the unreliability of service and low quality of water.

In order to improve quality and efficiency of service, we urge MWA and PWA to adopt the following measures:

a) To improve the efficiency of existing production, both organizations should focus on management of the raw water supply, in terms of quantity and quality. Master plans for raw water management for all river basins should be drawn up to guarantee a fair and adequate sharing of water resources among various users.

b) To control quality of piped water, the operation and maintenance of filtration plants should be reviewed

and reliable chlorinating and corrosion control systems should be introduced. Specifically, construction of a new filtration plant at Mahasawad using the raw water supply from the Mae Khlong river basin must be sped up to guarantee a more reliable supply of potable water in the western part of Bangkok.

c) To reduce fluctuations in piped water pressure (often the cause of sewage infiltration into the water line), the operation and maintenance of the distribution system should be improved. Low quality and/or corroded pipes must be replaced by quality pipes to reduce a fluctuations in water pressure.

d) To improve access to services and to create economies of scale, MWA and PWA should set as a long-term target universal household connection to potable water. In order to achieve universal connection, the agencies concerned must continue to encourage private sector participation in the form of joint investment for water supply and distribution in areas not served by MWA and PWA service networks. More specifically, privatization would involve more projects similar to the pilot project at the town of Bang Phli, which has awarded a 15-year contract to a private company to produce and distribute water. For example, MWA could contract out for technical assistance to explore the privatization potential of the Mahasawad water supply system and the possibility of expanding production from 400,000 cubic meters per day to 3,200,000 cubic meters per day.

e) In terms of investment, PWA requires a minimum of 10 billion baht to improve the production and efficiency the local water works under its jurisdiction and affect a substantial increase in water supply in these areas. In addition, an initial outlay of 3 billion baht per facility is needed to improve the production and distribution of five large facilities at Pathum Thani-Rangsit, Omn Noi, Omn Yai, Bang Pakong, and Chacheongsao.

Although these recommendations focus primarily on improving potable water services in residential areas, a master plan and similar policies regarding non-potable water aimed at serving industry should also be considered in the near future.

Transportation

As is well-known, the primary obstacle to efficiency in the transportation sector lies in traffic congestion in the BMA. The severe, round-the-clock traffic in the Bangkok Metropolitan Area raises the cost of production not only for firms within the bounds of the metropolitan area but also for those located outside of the area as they must route freight through Bangkok to Laem Chabang Sea Port for export. In order to positively affect growth of regional and provincial industries, government planners should consider the following 1) providing more primary and secondary routes to and within the BMA and core industrial centers 2) accelerating the completion of the planned mass transit electric train system in the BMA to reduce the number of cars traveling in the city 3) accelerating construction of suburban truck terminals and cargo depots to reduce the number of trucks traveling in the city 4) strictly enforcing city plans of BMA and its vicinity such that new developments/construction are accompanied by investments in adequate and efficient infrastructure systems and 5) promoting alternatives to road transportation (i.e., rail transport).

Communications

Improvements in and expansion of the telecommunications network, particularly of the Thai telephone network, are urgently needed if Thailand aspires to become a regional financial center. Improvements in telephone access, data transmission, paging, and videotext services nationwide are crucial for Thailand to succeed in not only enhancing trade and investment but also in directing that investment to the provincial areas and regional cities (i.e., decentralizing industrial development). Based on current estimates of telephone demand, Wattananukit (1991) projected that Thailand would need at least 4.5 million more telephone lines by 1998 to remain a competitive site for future foreign investment.

Solid Wastes and Sewerage Treatment

Government must immediately step up investment in infrastructure targeted at improving, sewerage

treatment facilities, and solid waste collection and disposal services in both the BMA and in regional cities to not only prevent further deterioration of the environment but also to support future industrial development. More specifically, government should 1) promote industrial estates in regional and provincial areas as a means of encouraging provincial industrialization while at the same time maximizing the provision of infrastructure facilities and services for these industries 2) enact a policy that charges polluters at progressive rates for amount of waste produced in order to encourage firms to produce less waste 3) encourage both existing and new industries to incorporate waste-minimizing technologies into industrial processes.

CONCLUSION

The Thai government has been trying, somewhat in vain, to diversify industrial development to areas away from the heavily concentrated BMA for more than a decade. This paper asserts that if the Thai government is serious about linking future growth to decentralization of industrial development, government must embrace the concept of infrastructure-led growth. That is to say that in order to effectively encourage growth to provincial areas, government, the sole provider of most infrastructure services, must first enhance the quality and capacity of infrastructure services in these areas. As this study clearly shows, the relatively poor quality of various infrastructure services, especially in areas outside of the BMA, is the cause of significant financial loss to industrial developers and cause for concern to potential investors. Thus, swift action must be taken to integrate physical planning with infrastructure investment measures, specifically in areas such as transport, water supply and waste water treatment, telecommunications, industrial location, and pollution control. At the same time, government must upgrade existing infrastructure facilities in the Bangkok Metropolitan Area in order to support the growth of existing industries.

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