

**Economic Lift-Off, Boom and Bust:
A System Dynamics View of the Bangkok, Thailand Economy 1980 - 1992**

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Abstract:

“The East Asian economies have enjoyed breathtaking growth during the past three decades. Never before have countries expanded so fast within a single generation. What is the true secret of their success and what are the lessons for the rest of the developing world?”
-*The Economist* October 2, 1993

The World Bank has recently published a 390 page study, “The East Asian Miracle” to try to shed some light on the role of government intervention in the development of East Asian economies. Could we better understand this phenomenon through a system’s perspective? The authors recently have had the opportunity to participate in an extensive study into the factors behind the Bangkok, Thailand real estate boom from 1986 - 1992. To better understand the data and emerging trends in the Thai economy, we developed a casual loop diagram to help explain the factors responsible for the boom and the eventual slow down. This process revealed some of the leverage points where the Thai government has made a difference in shaping its economic destiny. With a similar process of understanding, the lessons learned should be applicable to other developing nations.

Emergent Factors

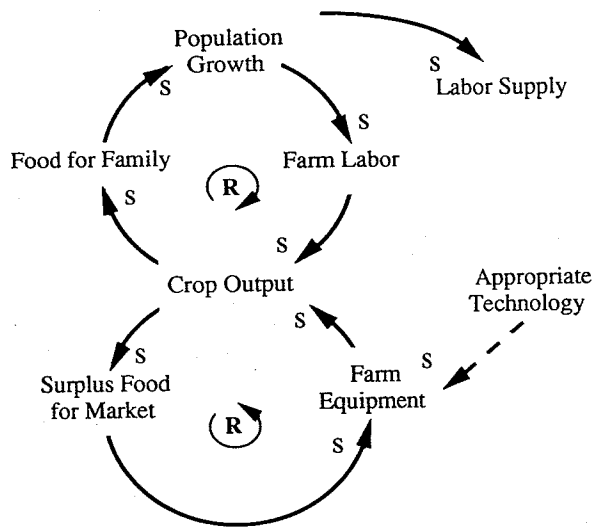
Much has been written of the recent economic rise in the newly industrialized countries (NICs) - Singapore, Hong Kong, Taiwan and South Korea. The following provides a framework to understand the economic dynamics behind the next group of countries to join this club - most notably Thailand. Over the past twenty years Thailand has been among the five fastest-growing countries in the world. In Thailand, industry has surpassed agriculture as a proportion of GDP and its share of world trade and foreign investment continues to grow.

The forces at play are in some ways similar to those which transformed the economies of the current industrialized nations. After the industrial revolution took hold in about 1780, England needed 58 years to double its real income per head; from 1839 the United States took 47 years to do the same; starting in 1885, Japan took 34 years; South Korea managed it in 11 years from 1966; and most recently, Thailand has done it in less than a decade. While the pace of economic development has risen due to the increased transfer of existing technology, the underlying trends are similar.

Necessary conditions for economic transformation include an abundant supply of both labor and food. Most lesser developed countries (LDCs) have rapidly growing populations which are unfortunately and inextricably tied to the land in a form of agrarian subsistence. The feedback loop underlying this subsistence can be seen in Figure 1. Population begins to grow exponentially when a region’s crop output increases the food

available for families, which allows family size to increase, which increases the farm labor available for each farm, increasing the crop output. However, it is only in those rural economies where the production of food begins to outstrip the population that the economic transformation can begin.

Figure 1: Agricultural Revolution



With the introduction of modern, efficient farming techniques, crop output can increase beyond the immediate needs of the farmers. Surplus crops are sent to the local market providing cash so the farmers can start buying farm equipment; such purchases are initially modest. In nearby Vietnam low-cost Chinese-made engines are being sold to farmers, who adapt them to water pumps, tractors and even light trucks. As this equipment supplants the traditional hand-held plows pulled by water buffalo, farmers see their crop output rise significantly.

As improved farming techniques reach the countryside, the sons and daughters of farmers are available to move to the city in search of the new industrial jobs. This migration from the agricultural countryside to the city is evident in the fact that until the 1970s, Thailand was almost exclusively an agrarian economy, while today less than 60 percent of the population lives in rural areas and only 40 percent are expected to do so in the year 2010. The abundant supply of labor at modest wages resulting from this change provides a great catalyst for economic growth.

Figure 2 shows that as the surplus food in the country's overall market increases, agricultural exports begin to rise, which increases the foreign capital coming into the country. This capital can be re-invested to increase the acreage under cultivation, raising the total crop output. Clear cutting of forests has opened up a great deal of land for farming. Cultivated area went from

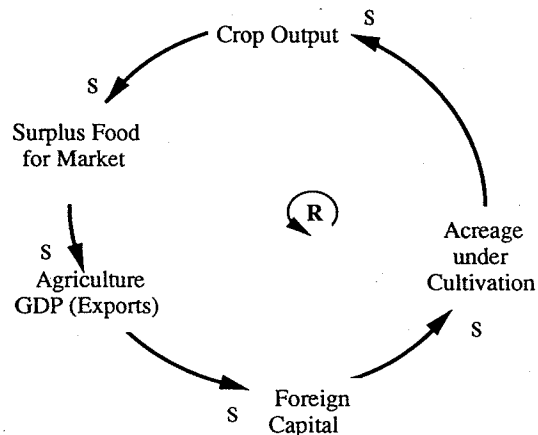
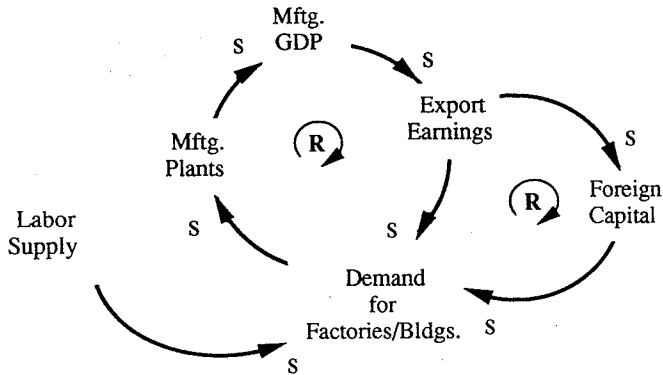


Figure 2: Agricultural Export Boom

63 million rai in 1960 to 110 million rai in 1984, turning Thailand into an agricultural powerhouse.

Figure 3: Manufacturing Export Boom



Growth Dynamics

As shown in Figure 3, the rising demand for exported Thai agricultural products began a manufacturing boom prompted by the building of manufacturing plants for food processing. The establishment of an agricultural manufacturing base, together with the availability of low wage labor began to attract more entrepreneurs to manufacturing. The increase in manufacturing plants, first in food

processing, then textiles, followed by apparel and footwear, increased the manufacturing GDP of the country, leading to more export earnings.

The profitability of domestic investments began to catch the eye of foreign investors, who started investing capital into more factories and buildings. Their export earnings encouraged still more foreign investors to enter the market. As this investment has grown, the value-added content of Thai products has risen. Today, automobile assembly (with as much as 58% local content), consumer electronics and simple electric appliances, and computer parts are recent additions to the manufacturing base.

Throughout the 1980s, the flow of foreign capital allowed the government to begin investing in the necessary infrastructure of a modern economy. These projects, such as roads, phones, ports, hotels, and electricity, increased both the availability and demand for building sites in and around the Bangkok region. As the access to Thailand from the rest of the world was improving, more foreign firms and investors were attracted in. Foreign investment funded the construction of hotels, restaurants and apartment high-rises for the newly located expatriate workforce. Access to amenities such as roads, hotels, and electricity encouraged the tourism industry. The tourism that began more than two decades ago with American GIs on R&R from the Vietnam War has blossomed into an \$8 billion industry

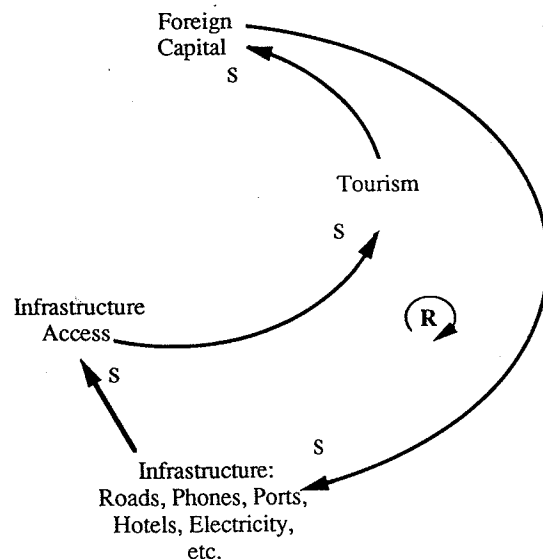
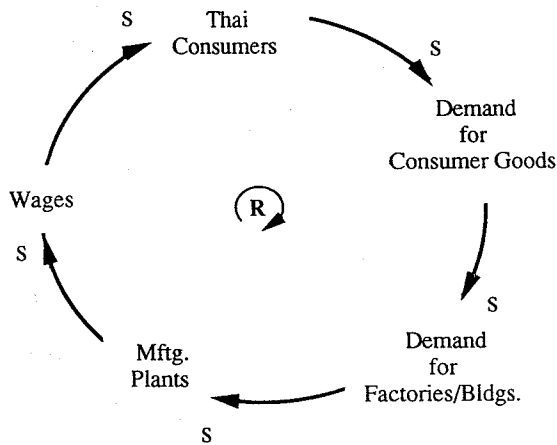


Figure 4: Tourism and Infrastructure

and has become the leading source of foreign currency to the economy (Figure 4).

Figure 5: The Rise of the Thai Consumer



While the initial boom in Thai manufacturing was export driven, the boom today is fueled by the rise in the urban middle class. The boom in manufacturing plants and jobs caused the average wage to increase. Today, the GDP per capita is greater than \$2,000, or \$8,000 for a family of four. This rise in incomes allows Thai workers to afford and demand more consumer goods, leading to still more investment in factories and buildings. (Figure 5).

Concurrent with the rise in the agricultural, manufacturing, tourism and infrastructure construction sectors of the economy was a boom in the local real estate market. Rising demand for building sites for the new commercial and residential construction projects sparked a boom in land prices. In 1980 the price of land in Bangkok was roughly 6,600 Baht per square meter. By 1992, the same land cost roughly 192,000 Baht, nearly a thirty-fold increase! In response to high land prices, new construction began to favor multi-story buildings. In Bangkok many areas of the city are built out to a floor area ratio of 10, the maximum allowed by the building code. These higher density buildings allow for more intensive use of the land, reducing the demand for new building sites - in the short term (Figure 6).

Limits to Growth

Within the dynamics of the Thai economic boom were sown the seeds of its inevitable slowdown. The most apparent limit to growth is seen in the notorious traffic in the streets of Bangkok. The very response of the market to high land prices has exacerbated the traffic problem. As the building density rose in the centers of commerce in

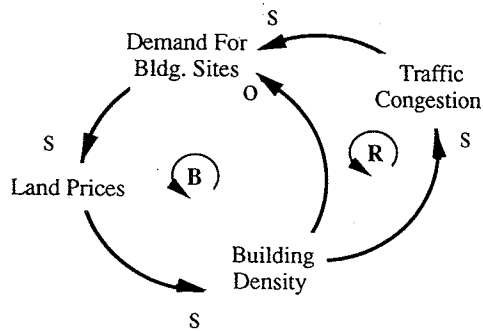
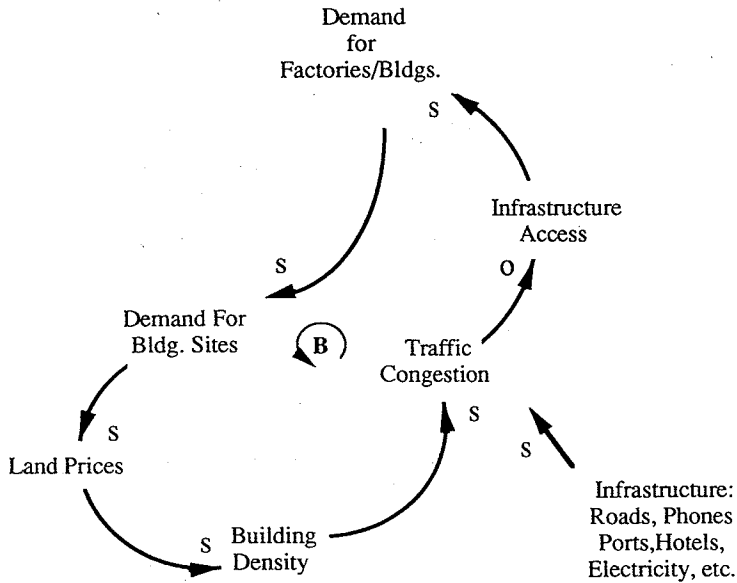


Figure 6: Building Density and Traffic

Figure 7: Infrastructure Overload



Bangkok, more activity and auto trips was generated for every acre of land, leading to higher traffic congestion. As the city streets became more clogged, the demand for downtown sites increased as building occupants tried to locate closer to their customers and suppliers, creating even more traffic congestion. Today, the road traffic in the inner city is moving at an average speed of seven kilometers per hour during the peak hours - slower than walking. The traffic problem is so acute, it has fueled the sale of consumer products such as the "Comfort 2000", which allows the automobile driver to relieve himself in the privacy of his own vehicle.

The development boom that leads to a high building density also leads to more congestion in all aspects of the infrastructure. Higher congestion leads to lower access (brown-outs, shortage of phone connections and port space, etc.). Lower access to infrastructure grinds the city to a halt and reduces the demand for new buildings (Figure 7).

The rapid pace of development is changing the culture of the Thai people. The change from an agrarian society to a capitalist and market-oriented one has shattered the traditional values of the Thai people. This has created a great rift in the political views between the rising urban middle class and the families they have left behind in the rural villages. Rising land prices have made it attractive for farmers outside the city to sell their land to developers. The converted farm land both increases the land available for buildings (reducing land prices) and decreases the total acreage under cultivation. Large scale farmland conversion and the loss of traditional livelihood creates the potential for political unrest as the rural populations see all wealth and benefits of industrialization go to the urban population (Figure 8). In neighboring China, which is experiencing a similar development boom, about 1 percent of total arable land, or 2.7 million acres, fell out of production in 1994.

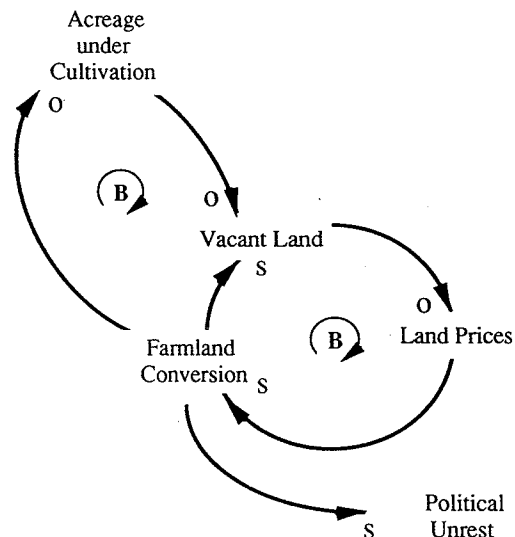
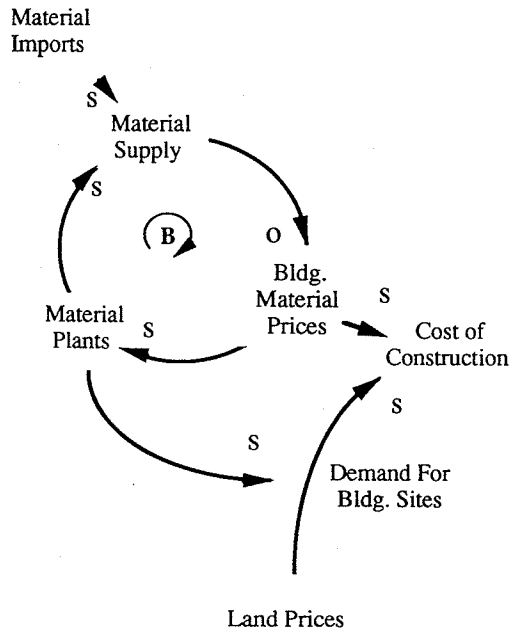


Figure 8: Conversion of Farmland

Figure 9: Building Material Shortages



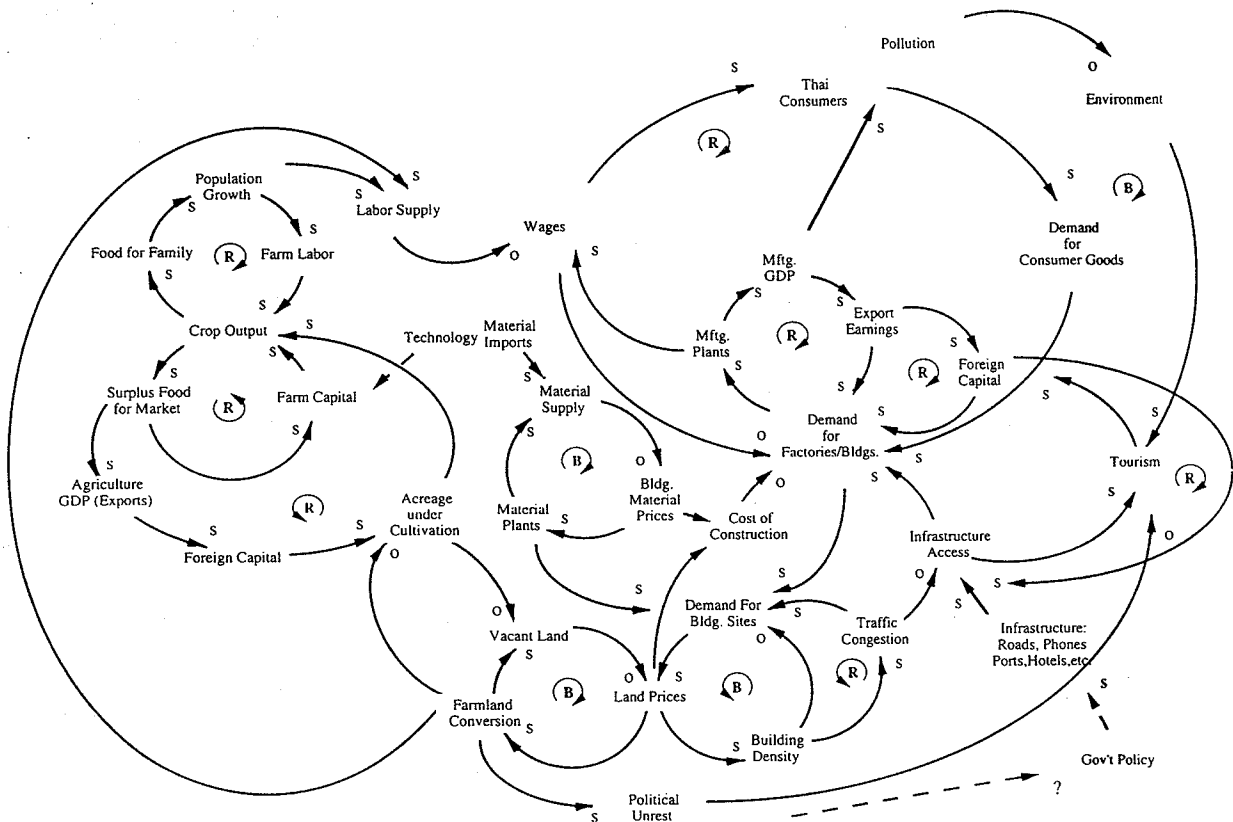
A large limiting factor to the growth of the Thai economy became a growing shortage of basic building materials. Construction activity in Thailand during the late 1980s was considerable. In a four year period the rate of new construction increased nearly three-fold, from 10.1 million square meters built in 1986 to over 29.7 million square meters added in 1990. This boom in construction created a voracious appetite for building materials of all types. The demand for cement rose from 7.9 million tons in 1986 to 23.6 million tons in 1992. Local manufacturers could not build new plants quickly enough. In one year prices nearly doubled from 1,800 Baht per ton in June, 1990 to over 2,800 Baht the following April as

shortages abounded. Shortages also occurred in steel, especially reinforced bar, cranes, heavy equipment and labor. As the demand for construction material outstripped the supply, the potential for low quality material and corner-cutting increased. The August, 1993 collapse of the Royal Plaza Hotel that killed more than 100 people outside of Bangkok has been attributed to shoddy building methods during the boom (Figure 9).

As is the case with most fast growing economies, Thailand's focus on new development has left environmental concerns as merely an afterthought. This approach to development has brought Thailand to the environmental state it is in today. Thailand's rivers are polluted and forests have been stripped, watersheds are degraded, and soil and air are contaminated by pesticides and sulfur dioxide. Concern has started to mount as the Thai begin to compare their country's future environment to that of Taiwan's.

Thailand's development is similar to that of Taiwan, but a decade or two behind it. Taiwan's industry was once concentrated in Taipei, much like Thailand's is now centered around Bangkok. Having pushed development to the provinces and severely degraded the entire island's environment, the Taiwanese government is now promising to spend tens of billions of dollars cleaning it up. Now is the time for the Thai people and government to begin a program to clean up and protect its environment.

Figure 10: Systems View of the Bangkok, Thailand Boom



Conclusions

In hindsight it becomes clearer what we should have done earlier. The situation with the rapid growth of Thailand is no exception. There is no question that the transformation of Thailand from an agrarian society to among one of the world's fastest growing economies is nothing short of an economic miracle.

There is still work to be done in addressing the limiting factors of growth before the Thai development model can be declared a success. The Thai people have their work cut out for them and they seem to be heading in the right direction. In a 1993 interview, the Governor of the Bangkok Metropolitan Administration outlined the important corrections that need to be made in the post-boom period. These include plans for a new mass transit system to alleviate congestion; the building of a waste water treatment system to treat the water flowing into the Chao Phraya River; the replacement of the existing garbage dump with an urban park and a number of transfer stations to bring garbage to a series of sanitary landfills; and a revision of the local zoning regulation to encourage lower density development and satellite development sites.

While it appears that Bangkok and Thailand are moving forward on the road to economic prosperity, other nations in the region - as well as the rest of the world - can learn a great deal by understanding and encouraging the dynamic forces at work. Throughout the developing world, villages are becoming towns, towns are becoming cities, and industry is crowding out agriculture at an astonishing pace. In China alone, 248 new cities have been created since 1987. There is much to learn from studying the system dynamics around the boom and subsequent slowdown of the Bangkok region.

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