
論說

Substitution in a War-Affected Economy: Southeast Asia, 1941-1945

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At the beginning of the 1940s, Southeast Asia's six main countries of Burma, Thailand, Malaya (including Singapore), Indonesia, Indochina and the Philippines were thought by many influential Japanese strategists and planners to hold a treasure trove of resources. The expectation was that, after Japan gained control of Southeast Asia in May 1942, the region would now contribute this wealth of resources to the war effort. In reality, Japan gained little from Southeast Asia apart from oil, bauxite and some rice. Nor was Southeast Asia able, even for its own self-sufficiency, to provide much in the way of manufactured goods.

A well-known reason for the paucity of the Southeast Asian contribution was Japan's shortage of shipping which hindered, and by the spring of 1945 almost entirely prevented, the transport of goods back to Japan. Even at the start of the war in December 1941 Japan's merchant fleet was too small to meet the needs of the home economy as well as the logistic requirements of her forces in the Pacific.² By mid-1943, shipping availability began dramatically to worsen due to heavy losses inflicted on Japan's merchant fleet.

Two further reasons for a lack of goods obtained from Southeast Asia are less appreciated than the problem of shipping. One is that Southeast Asia consisted of a collection of mono-economies highly specialized in the production of just four main primary commodities: rice, rubber, tin and sugar.

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All these commodities were produced in far greater quantities than Japan could use.

The second consideration is how remarkably little industrialized Southeast Asia was. In 1941, none of its six countries even remotely approached self-sufficiency in textiles; all relied on selling to the world market the commodities in which they specialized and using the proceeds to buy nearly all basic consumer goods and medicines.

In wartime Southeast Asia, strong incentives to manufacture local substitutes for previously imported goods resulted from shortages, a falling availability of rationed items and spiralling prices. Japanese military policy to achieve self-sufficiency wherever possible provided a yet further impetus to import substitution industrialization. So too, did the combination of Japan's unwillingness and, in a war-stretched home economy inability, to send goods to counter supply shortfalls.

Nevertheless, new wartime Southeast Asian industrialization was slight even when its instigators were Japanese and its chief purpose was to support the war effort. Raw material inputs and the capital goods needed to set up import substitution industries were often lacking because they had previously come as imports and were unobtainable under wartime conditions. When this was not a constraint, the region's minimal pre-war production of even simple manufactured goods and consequent lack of an industrial heritage constituted a major barrier to industrialization. A Southeast Asian industrial platform of engineers, technicians and skilled labour was woefully inadequate to launch any substantial new industry.

Limited import substitution and restricted imports of raw and manufactured materials left Japanese and Southeast Asians alike often reliant on imperfect, makeshift adaptations and substitutes. The main aim of this article is to explore

the extent of wartime scarcity in Southeast Asia's war-affected economy and some of the substitutes that were devised to try to counter this. Analysis shows the ingenuity of occupiers and occupied alike in adapting materials at hand.

Substitutes

Three features are apparent in much of the substitution in Southeast Asia. First, substitutes were frequently poor replacements for unavailable goods. Second, the production of substitutes was often highly labour intensive and could require, even for commodities in extreme surplus like rubber, unrealistically large amounts of locally available raw materials. While this partly reflected the low cost of labour and large oversupply of a few commodities, it was also explained by limited industrial machinery and technical knowledge in pre-war Southeast Asia. Third, Southeast Asians and Japanese alike, constrained by near-total autarkic economies, had to make do with on-the-spot materials. The range of these was quite narrow. That helps to account for the use across Southeast Asia of different inputs to produce substitutes for the same good.

Of the numerous items that were essential but difficult or impossible to obtain petroleum products, including petrol, lubricants and kerosene, and textiles were the most important. Petroleum shortages reduced GDP through constraining economic activity, plagued the Japanese military, and affected almost all Southeast Asians by restricting the transport of goods for civilians. Textile shortages, chiefly reflected in a lack of clothing and thread to repair it, were less serious for the military than for civilians. The military could requisition whatever textiles were available; few civilians wove their own cloth and most had to look to the market, including black markets, or relied

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on rations. By the latter part of the war, the chance of obtaining textiles from either of these sources was, for the majority of Southeast Asians, almost nil. The general Singapore ration in early 1944 for cotton textiles of one yard per person per year was, as a Japanese research report observed, 'so small that it is virtually useless'.³ In Manila, a wholly inadequate textile ration led to a brisk business in old clothes. Clothing marts appeared at Bambang Street in Sta. Cruz and Dart Street in Pakò.⁴ Rugs and scrap cloth were collected in Indonesia to make clothing.⁵

Other basic items in acute shortage nearly everywhere included soap, matches, cigarettes, paper and medicines. In Malaya, a tobacco industry mushroomed overnight into a 'considerable undertaking' to replace pre-war cigarette imports.⁶ Matches, however, were not easily made because good substitutes for chlorate of potash and other chemicals important in match manufacture had previously been imported and were unavailable locally.⁷ In the Philippines, where chemicals had been imported from Sweden, splitting matches in half economized on their use. As this required some skill, others made a wicker lamp from a tin can filled with coconut oil or, in the provinces, went back to the flint-and-tinder of earlier times.⁸

The range of locally available materials with which to produce substitutes was sharply limited by Southeast Asia's mono-economies; by a lack of appropriate machinery; and by an inability to import intermediate inputs fundamental to the production of final goods. Materials which found the most varied use in making substitutes frequently corresponded to the main Southeast Asian exports. There was, however, a premium on improvisation with whatever could be found, as in Malaya where spoons and forks were fashioned out of sheet aluminium salvaged from the wreckage of downed Zeros and Flying Fortresses.⁹ In response to a law that private individuals could not hold tin,

Singapore traders and speculators had the metal turned into spoons. These were used in coffee shops and private homes.¹⁰ Guerrilla forces, operative in much of the Philippines, found numerous ways to adapt and innovate. One unit in Leyte had to compensate for the lack of a printing press, printing papers and ink with which to print their own currency. They utilized wooden blocks made by local engravers and ink concocted by a resident chemist, and printed on wrapping paper, grade three notebook paper or whatever other paper could be salvaged.¹¹

Substitution for metals, all in chronic shortage, was particularly difficult due to a lack of capital equipment. Scrap metal of any sort became valuable and existing structures were cannibalized. By September 1943, large numbers of homeowners in Manila had begun to tear down their dwellings in response to high prices for galvanized iron, roofing nails, lumber and other building materials.¹² In Malaya, Japanese firms turned old barbed wire and wire-ropes into wire-nails of up to three inches long for trade-packing and light construction work.¹³

The inputs most commonly used by Japanese and local industries to create substitutes were rubber, rice, sugar, copra, pineapples and some tropical plants. In Malaya and also Burma, oil extracted from rubber was a common petrol substitute but had the disadvantages of yielding less power than petrol, emitting a foul smell when burned, and soon clogging engines.¹⁴ While rubber oil alone worked poorly as a fuel, mixing it with benzene improved performance.¹⁵

Nor was gasoline efficiently made from rubber. Before the war, Malaya consumed 83,000 tons of gasoline. Fully to replace this volume would have required 1.7m tons of rubber, three times Malaya's normal yearly production, as well as building many more liquefaction factories.¹⁶ Singapore traders carried rubber oil, made locally in large quantities and readily available on the open

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market, to Thailand where it could be exchanged for rice. Several Japanese factories in Malaya made rubber oil as did some Indochinese enterprises.¹⁷

Rubber was, however, just one of many possible fuel substitutes. Taxis in Singapore ran on charcoal.¹⁸ So too did some cars in Indochina, possibly mixing anthracite with charcoal to improve performance.¹⁹ Charcoal, when made from mangrove as in Malaya, yielded a fuel hot enough to make pig iron assaying at 70% to 78%.²⁰ In Burma, petrol was manufactured from the sap of kanyin trees and from rice, as well as from rubber.²¹ The Philippines produced no oil and beginning in August 1942, buses fuelled by coconut-charcoal were introduced in Manila.²² Motorized transport in Indochina depended chiefly on fuel distilled from rice; cane sugar grown in the Philippines was used to try to mimic high-grade fuel and also to produce paper.²³ Motorized transport in Indochina depended chiefly on the distillation of rice for fuel. Chemists in Indochina concocted rice, maize or sugar into a substitute for aviation fuel, although one with octane levels that only allowed airplanes to operate at relatively slow speeds.²⁴ By contrast, sugar was scarce in Malaya and people began profitable businesses in tapping the alcoholic drink sweet toddy to obtain it as food.²⁵ A kerosene replacement in Indochina consisted of a mixture of oils derived from fish, copra and groundnuts.²⁶

During the later stages of occupation, growing shortages of lubricants hindered raw material processing and industrial production by causing machines to seize up. Heated cotton seed oil substituted as a lubricant in the Philippines. In Indochina, lubricants were derived from local vegetable oils.²⁷ Crude red palm oil, mixed with foreign-made oils and greases to add strength, was used by Malayan mines, factories and transport workshops.²⁸ At the beginning of 1944, castor oil plants were grown along Indonesian roadsides and on all available idle land to increase the supply of lubricating oil for airplanes.²⁹

Rubber found a number of uses apart from providing a raw material for fuel oil. None could absorb more than an insignificant amount of the surpluses piling up in Southeast Asia's rubber-growing regions, even though rubber was a principal material incorporated in the manufacture of rubber boats, horseshoes, canteens, rice cookers and asphalt substitutes intended for airport runway and other surfaces. In Burma, Japanese technicians made rubber into a leather substitute for belts and bayonet, cartridge, signal lantern cases. Because of a lack of gunnies part-rubber bags were used to transport rice and all-rubber bags to carry mineral oils.³⁰ A lack of equipment to manufacture inner tubes led to the appearance of solid rubber tyres on cars and bicycles although wood tyres might have to make do in areas where rubber was not in surplus.³¹

Gunny sacks, although in short supply for shipping rice or sugar, were the most usual Southeast Asian cloth substitute, despite the drawbacks of itching badly and harbouring lice. In Java, shorts made from gunny cloth were a prize for the delivery of 15 rat tails.³² Some Burmese complemented gunnies with jackets of mosquito netting.³³ Clothing substitutes in Indochina, Malaya and Indonesia, generally more exotic than practical, included kapok and pineapple leaves, banana and fan palm plants and sisal hemp fibres.³⁴ The bark of fibrous trees provided the material for clothing in parts of rural Indonesia and was used in that country's Bakken province to make rope.³⁵ Sheet rubber was adapted as sarongs for some Indonesian women.³⁶ In mountain Java, people clothed themselves in old tyre tubing.³⁷ Even so, it was not uncommon for people in rural areas to go naked for want of clothing. In Malaya, Japanese firms manufactured clothing and blankets for the military from rags and waste materials. Discarded cigarette butts yielded the raw ingredient to produce a dye in Indonesia after the nicotine content had been extracted to manufacture insecticides.³⁸

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While a passable substitute for toilet paper proved a challenge, writing and other types of papers were a less difficult proposition. Paper was variously produced from slang grass, rice husk or coconut husk (South Borneo), pineapple fibre or bamboo (Malaya) and straw or sometimes cotton and rice stalks (Indonesia).³⁹ Japanese in Malaya made paper from locally collected waste paper.⁴⁰ Coconut husk waste yielded a form of cardboard in the Philippines.⁴¹

In war economies, labour and raw materials often substitute for capital, as is evident from a number of the substitutions already described. In some instances, however, the extremity of substitution, encouraged by cheap labour and Japanese access to unlimited currency, was notable. Although constrained by a shortage of production materials, the Japanese nevertheless pushed ahead with tyre-manufacturing in Thailand. In June 1944, it required 14 days for four workers to produce one solid rubber tyre; the manufacture of four tyres a day would use 14 tons of rubber.⁴²

While garments had to be mended until they literally fell apart, cotton thread was hard to obtain. Plant fibres afforded one thread substitute and also had several other uses. In Singapore, the fibres of pineapple plants were used to make fishing nets, belt conveyor hoses and tyres. The fibres were extracted, in a process remarkable for its highly labour-intensity, by women scraping the pineapple leaves with small knives. A woman could glean just four to five ounces of fibre a day. It was estimated that Malaya could produce 2,000 tons of fibre a year by employing 36,000 female workers and using 250,000 pineapples daily.⁴³ In Pontianak, rope was made from pineapple fibres.⁴⁴

Soap could be made with many possible ingredients. Coconut oil was perhaps the most usual. It was mixed with mangrove ash in Borneo.⁴⁵ In the Philippines, where thousands of small Chinese soap manufacturers appeared, tobacco ash or various plant barks were used.⁴⁶

Substitutes for medicines were a particular stumbling block. In Selangor in Malaya and also in Indonesia, rubber oil mixed with kerosene was sprayed on mosquito breeding areas in the hope of reducing the need for quinine as an anti-malarial agent.⁴⁷ Aristonius copris substituted for quinine in the Philippines.⁴⁸ People in Singapore produced shark oil to provide, as a dietary supplement, a sort of medicine.⁴⁹ Japanese medical research in Malaya found that tinctures could be extracted from a local shrub.⁵⁰ The basis for vitamin B and C pills was extracted from rice bran and tangerines in Indonesia.⁵¹ However, in the Philippines, starch manufactured into aspirin tablets was nevertheless labelled by local sellers as *diyenwain* pronounced ‘gen you wine’ in Tagalog and an alliterative play on ‘genuine’.⁵² In 1944, Burma’s government, after concluding that the country must turn increasingly towards indigenous cures, set up a committee and engaged Japanese experts to study Burmese medical roots and herbs.⁵³ Lacking medicine, the population of Borneo increasingly resorted to appealing to medicine men and the spirits.⁵⁴

Conclusion

Looking back, a high-ranking Japanese official tried to explain reasons for acute World War II shortages, or in a number of instances the unavailability, of many basic manufactured goods and the difficulties in starting local production. He reflected that: ‘I really only understood the nature of a colonial economy, and how different it is from an independent national economy [after I came to] Indonesia, where there was not even a single ironworks, chemical factory, or carbide factory, and even the necessary technology and attendant facilities such as electricity, radio communications and medicine production were lacking’.⁵⁵

Although under such circumstances, and given the region’s highly

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specialized economic development to the exclusion of even many essential goods, import substituting industrialization might be unrealistic, necessity and high and escalating prices for absent or hard-to-obtain goods nevertheless led to attempts to devise some manner of substitutes. This article has drawn attention to a few of the many, often seemingly unlikely, substitutes that emerged in Southeast Asia. Often these substitutes were, as the article has shown, rather imperfect. Nor, since substitution alone could not have sustained those in Southeast Asia, was it the whole story for the Southeast Asian consumer economy.

While substitution efforts were largely a market response to shortages, rationing was necessary as a government response. During the war it functioned as a principal means of regulating the distribution of numerous basic consumer goods. Substitution was, to some extent, a palliative to wartime shortages. Rationing was essential if those in charge in Southeast Asia were to try to provide all Southeast Asians with at least a minimum standard of living and preserve civil order.

Notes

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