Latin America: Is Imported Technology Too Expensive?

The purchase of patents and the payment of royalties is too expensive for underdeveloped countries. Scientific colonialism deepens the differences between countries and keeps systems of international domination in existence.

—LUIS ECHEVERRÍA, President of Mexico, December 1970

Mexico and the rest of Latin America have been importing technology hand-over-fist from the United States and Europe for well over 20 years now, and the results are beginning to show. From Buenos Aires to Mexico City, huge new industrial complexes are churning out such technological marvels as automobiles and petrochemicals, color television sets, and freeze-dried coffee. While it is true that much of the region's new industrial capacity is heavily concentrated around only a few major cities in three countries—Brazil, Argentina, and Mexico—manufacturing has replaced agriculture as the single most important sector in the overall economy of Latin America, in terms of both size (contributing 25 percent of the gross domestic product) and annual growth (8 percent in 1970).

Within this bright picture of booming development, however, some subtle and unforeseen blemishes have appeared. A small number of influential economists, whose research has been sponsored mainly by the Organization of American States (OAS) and the United Nations, have accumulated a body of evidence suggesting that the massive and unregulated flow of technology from the economic superpowers to less-developed nations has brought with it some serious economic ills. As the evidence of economic side effects has mounted, so has the belated suspicion in a number of capitals that the corporate purveyors of Northern know-how have been driving some very bad bargains for a long time on a monumental scale. The upshot is an incipient attempt in Latin America to regulate what has been, up until recently, an almost completely laissez faire market in the lifeblood of development, imported technology.

Not the least of the unexpected side effects appears to be a profound negative impact on Latin America's balance of payments in world trade, a key indicator of economic health that weighs the region's trade income against its expenses. The total *direct* cost of patents, trademarks, and technical advice pouring into Latin America (including Mexico) is believed by some authorities to range between $800 million and $1 billion a year. Some analysts also believe that the total bill for such gringo secrets as how to build a Volkswagen, put soup in a can, and make plastics out of petroleum is growing by 20 percent a year, faster than any major sector of the economy. In addition, other *indirect* costs that are usually tied to the purchase of technology should be added in but cannot be reliably estimated yet.

By comparison, the total value of manufactured goods exported from Latin America is now only a little over $1 billion a year; the region as a whole runs a trade deficit of $3 billion. What with the cost of technology rising, the situation shows every sign of worsening before it improves.

On top of this, an increasing number of Latin American opinion leaders —Mexico's President Echeverría among them—have expressed concern, in varying tones of bitterness, that the terms under which corporate owners of patents and trademarks sell their names and know-how are, in large measure, unreasonably onerous. This attitude, combined with a deteriorating balance of payments and an upsurge of economic nationalism in Mexico and South America, has made the topic of "technological dependence" as hotly debated a public issue in some quarters as the energy crisis is in America.

The two issues are similar. As the huge multinationals—long the object of xenophobic suspicions—have broadened and deepened their penetration of the most vigorous economies, many Latin Americans have grown increasingly uneasy in the knowledge that, as one Mexican science official expressed it, "major technological decisions affecting our destiny are being made in foreign corporate boardrooms." The official lamented that Americans do not understand this anxiety, but in fact it seems little different from the impotent outrage many Americans have come to attach to the political ambitions of Arab colonels and the price of gasoline.

One important difference between the two issues, however, is that Latin America's distress at the cost of foreign technology is moving beyond the talking stage. Last April, for instance, Mexico —where officials say the bill for technology now exceeds $180 million a year—put into force a law adopted last December that grants the government sweeping new authority to regulate the terms under which technology is traded in the country. Under the new law, all agreements affecting a transfer of expertise between businesses must be reviewed by a government agency that is empowered to nullify any contracts whose costs and restrictive conditions are deemed too harsh. Although the government promises "flexible" enforcement, several hundred U.S. firms face the prospect of having to modify their technology contracts during a 2-year period of grace. Similar measures have been taken in Brazil and Argentina.

So far, there are no indications that the new regulations in these countries will be enforced harshly enough to impede development, but a good many businessmen here and in Latin America regard them as, at best, a high-handed way to treat a goose that has been laying golden eggs for so long. The attitude of an increasing number of governments, however, is that the cost of feeding the goose has been exorbitant and that not all of its eggs have been as golden as advertised.

A number of economic studies have fostered this attitude, but several analysts have been particularly influential. Among them are Constantine Vaitsos, a Greek economist and something of an *éminence grise* to the Andean Pact, a nascent common market in northern South America; Raul Prebisch, an economist in Chile; and Miguel Wionczek, a Mexican economist with close ties to elements of the nationalistic left in the President's cabinet. In Washington, Máximo Halty Carrére, the assistant deputy for policy planning and studies of the OAS, has contributed research of his own and has also been instrumental in getting the OAS to support the work of others.

The pattern of the studies thus far

has been to treat technology (embodied mainly in manufacturing licenses, trademarks, and technical service contracts) as a commodity flowing into Latin America through two channels: (i) direct investment by a foreign company to form a wholly or partially owned subsidiary and (ii) the sale of licenses, trademarks, and services to unaffiliated domestic companies.

In analyzing the terms of these technology transfers, four basic questions are being asked: How much is Latin America paying for imported know-how, and are the prices commensurate with the goods delivered? How appropriate is the incoming technology to economic and social needs? Are restrictions placed on its use fair and reasonable? What effect has the flood of foreign expertise had on Latin America's ability to do its own R & D?

The findings gathered to date are generally admitted to be fragmentary, and they have yet to be fully weighed against the obvious benefits of foreign technology. Nevertheless, some of the emerging answers are rather disturbing. The gist of them is that a great many Latin American manufacturers—both the subsidiaries of multinational companies and the unaffiliated licensees—have been paying inflated prices for technology that is sometimes obsolete, often maladapted to local markets, and very often laden with restrictions and conditions of use that, in the United States, would be illegal under prevailing antitrust laws.

Moreover, there is substantial evidence that American and European exporters of technology have habitually jacked up royalty rates and service charges as a means of siphoning off extra returns on their investments without having to pay extra income taxes or abide by legislated limits on the "repatriation" of profits. Eventually these disguised earnings show up on the deficit side of a country's balance of payments ledger and probably help inflate the prices of consumer goods.

Finally, the wholesale flow of rented technology is widely viewed as having a stifling effect on research and development throughout Latin America, rather than invigorating it as might have been expected. Although the strengths and weaknesses of research establishments vary tremendously from one country to the next, OAS and U.N. analysts see a general pattern of debilities that lies at the heart of "technological dependence."

The syndrome of *dependencia* is considered to have its roots in the traditional isolation of Latin American universities from the practical problems of the surrounding world, an isolation that evolved in large measure in the early part of this century as a defensive reaction to chronic political chaos. The cloistered universities, according to this analysis, developed even less of a taste for applied research than most in the world. Infant domestic industries could rarely afford to set up technical units capable of adapting foreign wizardry to local needs, or of advising on how and where to shop for it; and the universities, regarded as bastions of eccentric and useless *científicos*, offered no help. Domestic manufacturers thus found themselves relying as heavily on foreign know-how as the subsidiaries of foreign companies, but with considerably less technical bargaining ability at their disposal.

Vicious Circle of Dependence

Today, Máximo Halty and others estimate that Latin America imports about 95 percent of its manufacturing technology. Industrial research is still at an incipient stage, and much of what does exist goes on in small government laboratories. At the beginning of the 1970's, Argentina, Mexico, and Colombia each spent about twice as much on outside technology as they spent on their own R & D establishments, all of which are heavily oriented toward basic research; the figures for Brazil are about equal. By comparison, France, West Germany, and Japan each spent 6 to 10 times as much on their own R & D as on foreign know-how.

"The heart of our problem is a vicious circle of dependence," Halty says. "The more that industry looked outward for its technology, the more foreign technology bypassed our research systems and the more alienated and isolated they became."

No one seems to disagree that Latin America is almost totally dependent on developed nations' know-how. But business leaders on both the buying and selling ends of the technology pipeline tend to regard as grossly overdrawn the accusations that unfair advantage has been taken of this weakness. They acknowledge that royalty gouging and other abuses probably do occur, but, they insist, not nearly with the frequency the economists suggest. Moreover, it is pointed out that the most common form of restriction written into technology contracts—partial or global prohibitions on export of a licensee's product—is not illegal under U.S. antitrust laws, and is often necessary to protect the parent firm's other markets.

Conditions of use that would violate U.S. antitrust laws (such as the so-called "tie-in" clauses requiring a licensee to buy machinery, technical services, and intermediate parts and raw materials from the parent company) are said to be necessary to ensure quality control and to protect the parent's good name.

Apart from all this, groups like the Council of the Americas, a New York–based organization of some 250 firms trading in Latin America, have put out their own studies purporting to show that the net economic effect of foreign investment—counting employment, payment of local taxes, and so on—is overwhelmingly to the region's benefit. Critics of the technology exporters concede some such benefits, but they regard such studies as flawed and biased.

"The situation now," says Robert Goeckermann, an official of the State Department's Agency for International Development who watches Latin American R & D affairs, "is that we have two groups talking to the same audience but not to each other. One claims great benefits of imported technology, the other talks about enormous costs, and no one in between is trying to synthesize these points of view."

As the war of economic statistics now stands, however, the critics have most of the ammunition on their side, although it must be said that any economic data from Latin America constitutes a rough estimate at best.

Whatever the precise numbers, though, the conclusion seems inescapable that more than a few domestic manufacturers have been willing customers to some stunningly bad deals in the technology trade. Studies by Wionczek and others paint a dismal picture of unsophisticated businessmen signing themselves up for "packages" of technology that roll engineering design, plant equipment, and technical and management advice all into one expensive contract with a binding lifetime of 15 years or more. There are also indications of an increasing fad of buying costly American and European "name" brand trademarks for everything from toothpaste to lightbulbs; little technology is actually transferred to the licensee, toothpaste and the like being easy to make, but the prospect of soaring sales is often enough to lure the Latin American businessman into buying not only the name, but also a package of technical assistance that he doesn't need.

Careful examination of such contracts, says Mauricio Campos, an economist with Mexico's ministry of industry and commerce, reveals that many such service agreements are "nothing more than added channels for sending profits back to the parent company.

"If you're making candy or shirts and simple things like that," he adds, "you may need technical help for the first few months, but not for years and years."

No one really knows how prevalent such overselling is in Mexico, for the statistics are just starting to come in from a new registry for technology contracts set up this year. Some think such guile is rare, and any suggestions to the contrary, one Mexican businessman declared, "is an insult to our intelligence."

But it does happen. One illustrative, if extreme, example is provided by a small Mexican-owned company making gas stoves that decided several years ago to buy a prominent American trademark in hopes of spurring its sales.

For the privilege of sticking the American nameplate on its product, the Mexican company agreed not to export the brand, and to pay the American firm a royalty of 5 percent of its expected net sales plus an extra sum for technical assistance. As things worked out, though, the assistance was never used, the American name was virtually unknown and therefore useless in Mexico, and the company soon stopped making its American stoves. It is still paying the 5 percent royalty, however, and will until its 5-year contract expires.

Along with everything else that was wrong with the deal, a good many Latin American authorities would say that the size of the royalty was outrageous. Any judgment about the fairness of prices on technology, of course, contain a large element of the subjective; technology is not produced primarily to be sold, and once it is produced it is an inexhaustible good, capable of being sold and resold without depleting the supply. "A company can't really be sure what to charge," Campos notes, adding that "I've never found a company that can tell me precisely why they charge as much as they do."

In the end, the prices seem to be set by what the market will bear. Several studies, including one done for the OAS in 1971 by the science policy research unit of the University of Sussex, England, indicate that royalties of 5 to 6 percent are commonplace and occasionally reach 15 percent of net sales in Latin America's pharmaceutical industry, virtually all of which is controlled by the giant drug companies of Europe and the United States.*

By comparison, royalties paid by U.S. firms to one another typically run at about 2 percent of sales. It is worth noting that the U.S. Atomic Energy Commission recently set a 3 percent royalty on uranium enrichment technology that the AEC will make available to private industry in the United States.

Obviously, enriching uranium is a more recondite and expensive technology than most of the know-how bought in Latin America. What, then, accounts for the apparent difference in prices? A weighty report on the economics of multinational companies published last February by the U.S. Tariff Commission† corroborates the critics' suspicion that technology payments are a handy way of spiriting hidden profits out from under the noses of foreign shareholders and tax collectors. The technique works this way:

> An MNC [multinational company] whose affiliate is partly owned by foreign citizens or government could rig the profit split in its own favor by overcharging the affiliate for technology or management services. Royalties and fees remitted abroad come off the top of the income statement as costs, thus reducing the eventual declared profit on which tax must be paid, and out of which foreign shareholders must be recompensed with dividends.

The Tariff Commission went on to say that this technique may result in "heavy repatriation of disguised profits to U.S. parents," and may be so prevalent as to make the $2.3 billion earned by U.S. companies each year through royalties and service fees a "considerable overstatement" of the actual amount of technology shipped abroad.

During an interview in May, a prominent business consultant in Mexico City confirmed that this was in fact a common practice, although he said that it had tapered off since the Mexican government slapped heavy taxes on royalties and service fees exceeding 3 percent of sales. "All the big boys did it," he said. "They just shipped *tons* and *tons* of money out of here under the cover of technology payments."

Some analysts, however, think the direct fees for licenses and technical assistance amount to only a shadow of the full price paid for foreign technology. Among them is Ronald Muller, an economist at American University in Washington, D.C., who has spent the past 3 years researching a book on the economic motives, strategies, and effects of multinational businesses. In the book, to be published by Simon & Shuster next year, Muller and coauthor Richard Barnet argue that the "real cost of technology" to Latin American and other developing regions is embedded in the tie-in clauses found in most contracts, requiring the licensee to import parts, materials, and equipment from the parent firm. (Other clauses prohibit or restrict export markets, or allow the parent firm to set prices of goods exported by the subsidiary.) By manipulating the prices of these imports and exports, Muller contends, MNC's operating in Latin America have been able to realize returns on their investments averaging nearly three times the 15 percent a year typically claimed. "We've done some studies in pharmaceuticals, rubber, and electronics industries that show a rate of return of 40 percent or more on the average, and as high as 990 percent in 1 year," Muller says.

Obviously if there are winners in this kind of international shell game, there must be losers, and it is reasonable to suspect that the ultimate loser is the consumer. A few studies tend to confirm this—prices for some medicines in Mexico, for instance, are said to run five times higher than the world average—but consumer price information is still sketchy at best.

It remains to be asked how Latin American businesses could allow themselves to be gulled into such external expenses. Technical naiveté and a consequent lack of "bargaining power" is the most common answer, but it is also becoming accepted that the high

---

* The relatively high cost of R & D in the drug industry may partially account for such high royalties. But pharmaceutical firms are widely suspected of inflating the prices they charge their Latin American subsidiaries, not only for the right to use the parent firm's processes, but also for the raw and intermediate chemicals that the subsidiaries are obliged to buy from the parent. A 1971 study for the OAS by Constantine Vaitsos, for example, alleges that prices charged to Colombian subsidiaries of foreign drug companies for these intermediate products average 155 percent of the free market cost of the same chemicals. The juggling of import and export prices between a multinational and its subsidiaries —a technique termed "transfer pricing"—is considered by the U.S. Tariff Commission to be the "chief strategy of tax minimization by multinational companies," wherein goods exchanged among branches of a company in different countries "are rigged to give the parent or subsidiary a special benefit." The practice is prohibited within this country by the Treasury Department.

† U.S. Tariff Commission, *Implications of Multinational Firms for World Trade and Investment and for U.S. Trade and Labor*, report for the Senate Committee on Finance, February 1973 (Government Printing Office, Washington, D.C., 1973), 930 pp., $8.50.

tariff barriers that Mexico and a number of other Latin American countries erected in the 1950's to protect domestic enterprise from foreign competition have also helped. Foreign companies deftly leaped the barriers by setting up subsidiaries and letting licenses; once inside the barriers, companies found it relatively easy to raise consumer prices without fear of outside competition.

In searching for remedies to their technology problems, Brazil, Argentina, and, most recently, Mexico have struck on what amounts to antitrust legislation designed to regulate the free-wheeling technology trade. Particulars vary from one country to the next, but the trend is to follow the advice of U.N. groups and the OAS: Set up contract registries, screen technology agreements for especially onerous terms, and provide advice to small and medium-sized companies in bargaining with the purveyors of know-how.

Mexico's new law, for example, lists 14 conditions under which a contract can be rejected—ranging from prohibitions on research by the licensee to global prohibitions on export of his product. In enforcing the law, however, the ministry of industry and commerce will have to tread a thin line between self-defeating laxness and damaging stringency that discourages foreign investors.

The same could be said of the rest of Latin America. The rules of the technology trade are changing, but if many businessmen regard them as a demand for a free lunch, others see the new rules as an omen of stability. "At least the rules are being defined and laid on the table," a commercial counselor in one Mexico City embassy noted, "and that is an improvement." In the long run, Máximo Halty says, businessmen should recognize that what is good for the Latin American economy is good for them. "Technological independence means a higher level of development," Halty maintains, "and that means newer and larger markets."—ROBERT GILLETTE

RESEARCH NEWS

Slow Viruses (II): The Unconventional Agents

Slow viruses have been implicated in the etiologies of a number of severe neurological disorders of man and animals. These disorders—as required by the definition of "slow" infection—are characterized by a long incubation period and then a protracted course of disease that almost invariably culminates in death. Some of the slow viruses have the properties of typical viruses except for their rather unusual behavior in the living host (*Science*, 29 June 1973); however, a group of four neurological diseases are caused by transmissible agents that are not typical viruses. These agents are sometimes called the unconventional slow viruses.

The four diseases caused by the unconventional viruses are kuru and Creutzfeld-Jakob disease in the human and scrapie and transmissible mink encephalopathy (TME) in animals. The pathological changes, and even the clinical symptoms, of these conditions are quite similar. Moreover, the physical and biological properties of their causative agents appear to be very much alike. Consequently, most of what can be said about any one of these diseases also applies to the other three.

Kuru has been found only in the Fore people and their neighbors in New Guinea. At first, it was thought to be a genetic disease; however, in 1966, D. Carleton Gajdusek and Clarence J. Gibbs, Jr., of the National Institute of Neurological Diseases and Stroke, Bethesda, Maryland, demonstrated that the disease could be transmitted to chimpanzees by injecting bacteria-free extracts prepared from the brains of human kuru victims into the brains of the animals. They also demonstrated serial transmission of kuru from chimpanzee to chimpanzee, even with brain suspensions diluted as much as 1 to 10^7. Since then, they have transmitted the disease to several other species of subhuman primates.

Prevalence of Kuru

The incidence of kuru among the Fore people had been very high. According to Michael Alpers, of the University of Western Australia, Perth, 2,500 people—in a total population of only 35,000—have died from this disease since it was first studied in 1957 by Gibbs and Vincent Zigas, of the Department of Public Health, Papua, New Guinea. Kuru became so prevalent because it was transmitted during the ceremonies of ritual cannibalism by which the Fore honored their dead. With the cessation of cannibalism, the incidence of the disease has declined dramatically.

Although kuru would appear to be an exotic, isolated disease, Gajdusek and Gibbs now consider it to be one example of a type of neurological disease that may be found throughout the world. Creutzfeld-Jakob disease (C-J disease) is another; this disease is rare but its distribution is worldwide. It is one of the presenile dementias—a premature development of the mental deterioration sometimes seen in old age. Gajdusek and Gibbs found that it, too, is caused by a transmissible agent that can infect chimpanzees and other primates.

Kuru and C-J disease are clearly infectious; they can be transmitted to experimental animals by administering different kinds of preparations—including cell- and bacteria-free filtrates—made from diseased tissue. Nevertheless, neither their symptoms nor their pathology are characteristic of infectious disease. For example, the patients do not become feverish at any time.

The brain lesions of kuru and C-J disease are located mainly in the gray matter. Vacuoles form in neurons, certain glial cells proliferate, and the cerebral cortex takes on a spongy appearance. However, the investigators have observed no inflammation of the brain, even though it is found in other viral infections. Because the pathological changes of scrapie and TME closely resemble those of the human diseases, Gajdusek and Gibbs have designated the four conditions as subacute spongiform encephalopathies.

Scrapie has been recognized as a fatal disease of sheep for more than two centuries. Transmissible mink encephalopathy, a relative newcomer, apparently originated in Wisconsin a little more than 25 years ago. The physical, chemical, and biological properties of the animal unconventional viruses have been studied more thoroughly than those of the human agents because of the availability of more convenient (and