

Canal would provide the motor for industrial development of the region

The construction of a new sea-level Panama Canal will have a great impact on the industrialization not only of Panama, but also of Colombia, Venezuela, Costa Rica, and the other smaller nations of Central America and the Caribbean. The expansion of ports on either terminus of the new canal will turn the canal into a major transshipment point for goods coming and going from Europe and Asia to North and South America. Industrial zones will be created on either end of the new canal, as well as in the nearby coastal areas of Colombia and Venezuela. The canal will be the cornerstone of an Ibero-American common market, serving as the most important transportation artery for trade from Brazil all the way around the northern part of South America to Peru.

However, since the canal will be located in Panama, the most profound economic impact will be felt there, and we concentrate the bulk of our report on these effects.

Pulling out of the recession

Although the world recession and debt crisis have hit the Panamanian economy hard in the last few years, much as they have the rest of Ibero-America, the Panamanian economy retains several strengths which would immediately help the economy to recover following a decision to begin to construct the canal. The literacy rate is high, having risen from 45% in 1950 to 84% in 1980 for older people, and from 78% to 95% for people now entering the labor force. And almost 50% of university graduates in 1982 were in either natural sciences/engineering or in medicine—a much higher rate of economically useful specialties than is typical of the continent.

Energy consumption per capita is also high in comparison to the continent, at 1.6 tons of coal equivalent per person (four times the Central American average and slightly above the present level of South Korea, one of the most successful developing economies in the world). Electricity use per capita stands at 817 Kwh, double the rate in the rest of Central America and greater than South Korea's until 1979. Thus, in two critical areas, labor force and energy, Panama is not too badly off.

The labor-force structure of the economy, however, exhibits the weaknesses of an inadequately industrialized society. The occupational structure of the country in 1980 is as follows:

	Percent
Agriculture	28.7
Manufacturing	10.5
Construction	5.9
Transportation	5.7
Electricity and mining	1.8
Commerce and services	47.4

Thus while agriculture is less than 30% of the total, non-productive activities (commerce and services) are almost 50%, while manufacturing is just above 10%. Construction is disproportionately large, which will be a major help in building the canal, but the economy will need to transform many of those service jobs into productive jobs in construction and manufacturing as it develops. In 1980, there were 45,000 workers unemployed, more than 8% of the total.

Agriculture is another weak spot in the economy. While tractor use is double that elsewhere in Central America (seven tractors per 1,000 hectares of land) yields are low—only 1.8 tons/hectare for rice (4-6 t/ha is considered good), 0.8 t/ha for corn (3-5 is good), and 55 t/ha for sugar cane (90 and up is good). The major reason for these low yields is undoubtedly the very low use of fertilizer, which stands at less than half the level of the rest of Central America and at a small fraction of the North American or European rate. However, consumption of animal protein, at 4.7 ounces of meat, 1 ounce of fish, and 3.4 ounces of milk products per person per day, indicates a basically adequate diet.

Since 1979, the rate of housing construction has fallen dramatically, leaving significant portions of the population without decent housing, and necessary investments in transportation and the expansion of the energy grid have not been made, all due to pressure from the International Monetary Fund (IMF).

The first two years of the canal project will be taken up by detailed engineering and logistical planning, which is required before construction can begin on a project of this magnitude. New requirements will be placed on the economies of Panama and other countries of the region.

First, to free sufficient labor for canal construction and all the new industries that will develop, agriculture must be made much more efficient, which must start by increasing yields through intensive fertilizer use. 27,000 tons of nitrogen fertilizer, a tripling of present total consumption, would bring the country up to the level of Costa Rica, where yields are substantially higher. Cattle and milk production must be made more efficient, as they are presently only 40% and 20%, respectively, of U.S. levels.

Programs to train workers for the skilled jobs the canal will require must be initiated right away. University programs specializing in various engineering and technical skills must be expanded and upgraded if the country is to be able to staff the skilled labor and engineering positions that construction and operation of the canal will create.

In terms of industry, several cement plants should be built at this time, since every phase of the construction project will require cement. Cement can be shipped very cheaply by water, so a cement industry developed for the construction of the canal would find itself in an excellent position as development of the entire region continued. A new town will also be required to service the construction process of the sea-level canal, providing a communications and logistics center for the construction process, as well as a center for services and amenities for the work force. This new town could be on the shores of Lake Gatun, allowing excellent access, since it can be supplied by barge through the existing canal and the lake.

The requirements for such a center can be approximated by the development plans laid out for the industrial centers which were planned around the Carajas development project in Brazil (until these plans were halted by the IMF). One of these, Barcarena, is designed as a mini-port, supporting a population of just under 3,500. This requires, in turn, approximately 50,000 square meters of housing, 60,000 square meters of paving for roads and sidewalks, and an electrical capacity of 100 MW (peak load). The overall cost of residential and commercial infrastructure for Barcarena was estimated as \$30 million in 1981. This is cheap, not only with respect to the overall cost of the canal, but especially if the city is conceived of as a center for development in an otherwise backward area of the country.

The construction phase

The cost of construction has been estimated at \$18 billion, or an average of \$1.5 billion a year for 12 years. At least 25% of this spending, or \$375 million, will occur within Panama for labor, building materials, and ancillary services. The direct payment of wages would total approximately \$100

million per year for about 10,000 workers, 4,000 of them engineers and skilled workers. This would cut unemployment by 25% directly, while the spending of the remaining \$275 million would create jobs and wealth of several times that amount, probably cutting unemployment to negligible levels while spurring general economic growth. At \$7,200 a year, the wage levels planned will be almost double the present average industrial wage in Panama, which will create the demand for better housing and other durable consumer goods. In addition to the direct effects on the work force, and the money added by other spending, the procurement for the canal itself would tend to push the production capabilities of the economy away from the dead-end road of labor-intensive jobs in textiles or electronics assembly and toward the production of tangible goods on the high end of the technical spectrum, such as electricity, parts for pumps and trucks, etc.

The first few years of construction will tax to the utmost the skill capacities of the present labor force, as it is being rapidly upgraded. But by the second six years of construction, the infrastructure for the port cities/industrial parks should have begun, which will require electricity, water, roads and rail, and industrial capabilities, as well as the actual port facilities (much of which will have to be built after the completion of the canal entrances).

The possibilities for industrial expansion once the canal is operative will be unlimited. The design of the port/industrial zone cities will therefore have to be of the highest quality, to allow for expansion without obsolescence, in a situation where the "center of gravity" of the city will not be easy to shift. An initial design for a city of 50,000 which supports an industrial work force of 7,000 can be taken from the Brazilian Carajas project mentioned above. At 1981 prices, the building of such a city represented an investment of just over \$500 million.

The planning and engineering work which will be needed for the canal will bring together the most advanced capabilities in the world, an inestimable benefit to the future of Panama. It may be appropriate to institutionalize these benefits by the creation of an Institute of Engineering, which would initially function both in a support capacity for the project and as a transmission mechanism into the rest of the educational system.

Effects outside Panama

In other parts of Ibero-America, there will be immediate benefits from the building of the canal. Major purchases can be made from Mexico and Venezuela using the technology they have developed for oil drilling, and Colombia is the closest supplier of most metal and cement products. Brazil has major capabilities in earth-moving equipment and other heavy industrial goods, as well as experience in civil engineering projects such as the building of dams.

Even more important, the construction of the canal would signal the end of IMF-dictated dismantling of large-scale

development projects elsewhere on the continent. In Venezuela, which had begun a series of major infrastructural projects in the 1970s, paying for them with oil revenues, the IMF and the banks forced cancellation of all of these projects, with the result that industry has stagnated since 1980, construction output has declined 25%, and the economy is reeling under almost \$40 billion in debt. In Colombia, long the playground of the World Bank, heavy industry had been discouraged while the IMF looked favorably on the development of a drug economy large enough to rival the legal economy, distorting and destroying any development plans for the nation.

Both economies will be heavily involved in the Panama Canal project, and industries will be built up in both countries such as steel, aluminum, and metal manufacturing, to utilize the new canal and its industrial zone, while both countries resume their large-scale infrastructural projects.

In the Central American countries, improvements in transportation infrastructure such as ports and railroads can be combined with other specific programs for national development, premised on the immediate accessibility of a transportation hub. A multinational development force might come into being using the existing skills of various countries to upgrade the port facilities in Central America, in some cases using existing plans whose implementation has been stalled by the IMF. For example, a 1977 study describes the possibilities for upgrading 11 ports to more than double tonnage capacity.

Another focus of infrastructure development would be the repair and completion of the Pan-American Highway, to be followed by a double-track rail line along the same route. This would provide a backbone of transportation between countries and in connection with the canal ports.

Operating phase

To maintain the new canal and port city, including 24-hour service appropriate to a world-class port, will require 25,000 workers. The canal itself will require only 3-4,000, but the spin-off industries can be expected to employ at least 10,000 more. To support a work force of this size, a city of 300,000 will be required. In the port, cargo will be transshipped from bulk carriers of 70-200,000 tons to smaller vessels, which will service ports throughout Central America and on the South American coasts. Rail shipments will also be accumulated in port warehouses to make up ship loads, and relatively small shipments, moved as containerized cargo, will be distributed outward by rail and truck. Computerized warehouses, such as exist in Singapore, will allow handling of such small lots with almost no loss of efficiency. A major advantage of this port will be its design, from the start, as a fully equipped modern transportation hub where state-of-the-art technology can be applied with the greatest efficiency.

The canal will also have a major impact on industrial

activity, for example, by fostering aluminum refining and steel making, using the ample bauxite and scrap iron that pass through or near the canal along with the abundant hydroelectric power which can be developed in Panama. A recent study identified specific sites with a total hydroelectric potential of 6,600 MW, compared to developed capacity of 650 MW today. Using the Singapore model, additional processing of chemicals and textiles can also be successful.

In some cases, the processing will occur in Panama itself. Long-standing proposals exist for using the abundant coal reserves of Colombia in conjunction with the iron ore of Brazil and Venezuela. Some significant fraction of the resulting steel might well be made in Panama, where both products have excellent water access, and where further distribution either in Central America or throughout the U.S. heartland, which will be immediately possible through the Mississippi and the Gulf ports.

Effects on the world economy

With the project of building a new, sea-level canal, Panama will be placing itself in the camp of those committed to development and growth internationally. The canal will have enormous benefits for Panama, and as is right and natural, those very benefits will come largely from the value which the canal will provide for many other countries, including the war-ravaged countries of Central America.

There is presently very little trade between the Atlantic and Pacific coasts of South America, which represents a very distorted economic development pattern. The linchpin of Ibero-American development will be a continental division of labor in which intra-continental trade must skyrocket. Only a new sea-level canal can prevent the costs of this new trade from being prohibitively high. This is because the geography of the continent will prohibit significant cross-interior land transport for many more decades, and sea transport through the canal will enable critical savings in transport time and costs. The costs of the canal will be much less than those that would otherwise be required for less efficient land transport in the next three to five decades.

The new canal will of course benefit the United States, both enabling a great expansion in economical east coast-west coast trade and cheapening the costs to Asia from the east coast, and to Europe from the west. Also, the growth of the Ibero-American economies will spark much additional U.S. export and import activity that will also use the canal. Japan will also be a major beneficiary, as will Korea, Taiwan, and China, especially with the rapid growth of Venezuela's, Colombia's, and Brazil's economies. Mexico will be able to increase its economical east coast-west coast trade, as well as its trade with South America.

Without the canal, the cost of alternative routes will end up being much greater than the cost of the canal to the world economy—while the region would be deprived of this project, central to its own efforts to develop.