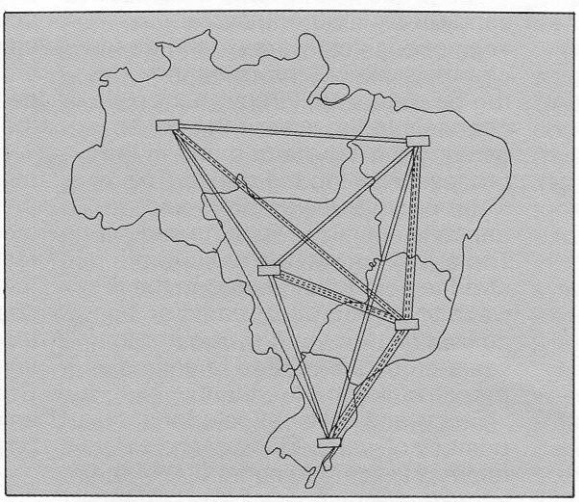
(l to r) Michael Glorian, project co-ordinator, Jean-marc Rousseau, Sang Nguyen, Nelio Pizzalotto, and Teodor Gabriel Crainic.

AT THE CROSSROADS

A TRANSPORTATION STRATEGY FOR BRAZIL

RAYMOND LEMIEUX

Brazil. A country of 8.5 million square kilometres, it covers half the South American continent. With such a vast territory, commercial transportation plays a vital role in the country's economic development. But the trains, trucks, and ships on which Brazil depends are now feeling the effects of energy dependency and past industrial instability. The transportation system needs to be reorganized. But how, and to what end? "It's a question of the right tools and the right approach," claim researchers at the University of Montreal's Transportation Research Centre.



Freight exchanges in Brazil: the southeast is heavily traficked.

In 1979, the Science and Technology Centre of the Pontifica Universidade Catolica do Rio de Janeiro and the Montreal research centre agreed to participate in a co-operative project. "A challenge," says Michael Florian, co-ordinator of the project. Eight other researchers from the two countries round out the team — Brazil is providing the data and statistics, Canada the analytical methods and data processing experience. "It's easier and cheaper to build and test a new railway on a computer before starting on the real thing," adds Prof Florian.

The use of data processing technology was deemed an absolute necessity, since Brazil's commercial transportation system is so complex that it would be impossible to process the data otherwise within a reasonable period of time. And time is of the essence, because freight transportation has to keep pace with the economic and population growth forecast for Brazil in the coming decades. So it was that the many possible strategies and options for transport in Brazil were traced out on the cathode screens at the University of Montreal by Canadian researchers — together with their Brazilian counterparts who come to Canada for regular training sessions.

"Railways offered the most promise," says Jean-Marc Rousseau, director of the Transportation Research Centre, who is also participating in the project. "Trains consume little energy and rail transportation is relatively inexpensive — two big advantages." The figures given by the Brazilian ministry of transportation indicate that it is in fact three-and-a-half times less expensive to ship goods by train than by truck.

RESEARCH PARTNERSHIPS

Canadian research resources are being called upon more and more to work on certain aspects of projects undertaken by research institutes in Third World countries. The following is a sampling of the type of co-operation established between research institutes in Québec and research teams in the Third World through IDRC's Co-operative Programs Division.

Tunisia – During the 1970s, the Tunisian economy experienced strong growth based on its petroleum resources; however, these resources are dwindling rapidly and Tunisia needs to plan a new strategy for economic development. To this end, the University of Montreal will be lending its assistance to the Institut d'économie quantitative de la Tunisie (Tunisian institute of quantitative economics) in order to formulate economic development hypotheses for the postpetroleum future.

India – Hundreds of different languages still thrive in India, but linguistic pluralism poses serious problems in such areas as education and literacy. The International Centre for Research on Bilingualism at Laval University in Québec City and the Indian authorities responsible for the decennial census will be working together to gather fresh data on language use. The research will enable the Indian government to achieve better planning in the areas of education, teacher training, and literacy.

Jamaica – Sharing second place in Jamaica's economy after agriculture are bauxite mining, alumina production and, tourism. The process used to extract alumina, however, has a disadvantage in that it produces large quantities of waste, a caustic "red mud" that is harmful to humans, animals, and plants. At the current rate of alumina production, it is estimated that the area needed to store this waste will continue to grow by three square kilometres a year. For an island country the size of Jamaica, this may mean a serious loss of productive agricultural land, thus affecting another mainstay of its economy. The University of the West Indies and McGill University are therefore carrying out a more detailed analysis of the characteristics of red mud in order to develop methods of eliminating it.

Senegal – Until 1980, the existence of peat in Senegal was completely unknown. But since the discovery of this potential energy source, a development project has been established in the Niayes region. Indications of peat have also been found in other regions. The Senegalese government has decided to call on Canadian expertise to evaluate the energy development potential of this resource. Consequently, the Société d'Ingenierie Cartier Ltée (Cartier Engineering) of Montreal will be collecting data and conducting evaluations for the Compagnie des tourbières du Sénégal (Senegalese peat company). In addition to permitting the Senegalese government to make more informed decisions, the co-operation project will help to strengthen local expertise in this area.

HAPHAZARD DEVELOPMENT

On a map of Brazil, the railway network stretches like a spider web into every corner of the country. Placed end to end, the track would extend nearly 30 000 kilometres, enough, almost, to circle the world. "At the turn of the century, the country had the third most extensive railway in the world, despite the fact that it didn't produce a particle of steel," notes Prof Florian.

There is, however, one major problem. The railway's historic development was haphazard, dictated solely by the industrial interests of an earlier period. The result: "There is absolutely no integration. You can't really call it a railway *system* as such," contends Nelio Pizzalotto, a Brazilian researcher involved in the project. "Each industry built its system independently, for the transport and export of its own mineral or agricultural products." When these industries collapsed, they sold all their supporting transportation networks to the Brazilian government — problems included. There are, for example, three different gauges of railways, ranging from one metre to 1.6 metres in track width.

ROADS TO THE FUTURE?

Although the researchers tend to favour rail transportation, the fact remains that in Brazil 70 percent of the goods are transported by truck. According to the research group, this is an exceptional case, contrasting with most other countries, where rail and marine transportation usually predominate. This emphasis on trucking means a heavy demand for petroleum derivatives, "which largely explains Brazil's dependence on crude oil imports," says the team. Once again, the problem is a historical one. At a time when "black gold" was relatively inexpensive, Brazil, the world's fifth largest country, embarked on highway development projects of unprecedented scale. A few years later, the energy crisis hit — and hit hard. The Brazilians set to work and came up with a new fuel: alcohol. However, as Prof Pizzalotto observes, "alcohol can only be used in light vehicles." Even today, half of Brazil's foreign currency goes to petroleum imports. "We are conducting research to develop a type of fuel from heavy vegetable oil, but the results to date are uncertain."

Trucking also provides a livelihood for some one million Brazilians. "We have to examine the effects of any shift in policy," says Jean-Marc Rousseau. "Increasing the capacity of the railways will have a definite effect on employment. There are social implications to be considered too."

The competitiveness of cargo transport by ship — another piece of the transport puzzle — has really suffered. "At the present time, we don't have adequate loading equipment in the ports," notes Prof Rousseau. "Some of the harbours need to be deepened in order to accommodate larger modern vessels." Prof Pizzalotto points out that "it might have been interesting to use barges to transport goods by river to the ocean ports — if only the rivers flowed in the right direction."

A SYSTEMATIC APPROACH

To simplify the task, the team of researchers has concentrated on the southeastern region of the country, partly because the most accurate data available is on this area, and partly because two-thirds of the country's products are transported through it. "But we're keeping a multiregional perspective," insists Prof Florian. The project's computer modelling will be based on a simulation of Brazil's transportation system as a whole.

"Possible changes in the railway, trucking, and port infrastructures will have a direct impact on the development of each of the regions," claim the researchers. But which means of transportation should receive primary attention? "Simulation" and "approach" are the key words in this Canada–Brazil project. Because of the broad range of information to be collated, the group is storing data and mathematical models in a bank. Software will then be developed to manipulate this data bank and create simulations of transportation systems. The advantage is that the software will be transferable from one computer to another and thus from the University of Montreal to the university in Rio. "In the final analysis," says Prof Florian, "it's not up to us to impose solutions. Once we've provided a method for evaluating the strategic options, the Brazilians can choose their own scenario."

Established in conjunction with Rio Prof Luis Gomez, the three-year project will wind up in April 1985. At that time, the researchers hope that the strategic planning tools they have developed to evaluate changes in the transportation system and their impacts will enable a successful overhaul, and bring Brazil's transport out of the last century and place it firmly in the next. □

Raymond Lemieux is a freelance journalist with a special interest in development.