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Proposed Highway Maintenance Evaluation

The highway maintenance "sector" has received considerable attention in the Brazil lending program. Although it is still too early to make an evaluation of these projects, it seems clear that some have already run into considerable difficulty, and that others, still in their infancy, are not going to fare well. (A few of the projects seem to have taken.) This result is not at all surprising: the "maintenance problem" cuts across most sectors in most developing countries; it is one of the toughest underdevelopment problems to crack.

The following observations constitute the type of evaluation that could be of value before, as well as after, such a project is undertaken. I have observed the designing of the AID maintenance projects in Brazil, but have not had a chance to look closely at their implementation. The following suggestions, therefore, can only hint at the kind of information that such a study could yield.

It should be stated, first of all, that the failure of a state government to produce its promised maintenance appropriations is not necessarily the cause of the failure of an AID highway maintenance project; more likely, it is the symptom of that failure. It means that there was not enough interest, or pressure upon state politicians and officials to make sure that they came up with the money--a common enough occurrence with projects in developing countries. When Minas Gerais, for example, fails to come through with its promised contribution to the highway maintenance project because it is "bankrupt," this is not the answer to the question, but rather its context. Minas, bankrupt as it is, is nevertheless investing large sums in electric power through the state-owned CEMIG company, at a time when the power supply situation is not anywhere near as critical as the maintenance problem. CEMIG, for part of its financing, holds a firm grasp on a portion of the state's taxes; but this only accentuates the fact that highway maintenance does <u>not</u>.

Perhaps the highway maintenance problem should have been approached by AID with a greater degree of bewilderment. Highway maintenance is not just one more sector that lacks investment and know-how in Brazil; it is, rather, one more case of an activity that is chronically unable--in almost all sectors in the developing countries--to muster ongoing interest and appropriations, no matter how great the original injection of machines and technical assistance man-hours. There are signs all over a country like Brazil of an "unmaintaining" economy--buildings, parks, libraries, etc. The central question to be answered--or more important, asked--by any highway maintenance loan proposal is how it intends to impose a sequence (construction followed by maintenance) to which developing countries are highly resistant. Any program suggesting a combination of machinery and know-how which will bring the roads up to some acceptable design standard merely begs this basic problem.

What is the peculiar plight of highway maintenance? It not only is isolated from strong political pressures (discussed below), but good maintenance brings no particular rewards (especially if managed by the state); bad maintenance, on the other hand, bears no serious penalties. Takes, in contrast, the Brazilian airline Varig, which has recently acquired an excellent reputation for maintenance, because the survival, literally, of the company, its personnel, customers and fixed capital depend on a maintenance standard that allows no latitude. Lagging highway maintenance, in contrast, bears no such penalties; improved maintenance, on the other hand, brings nothing like the increased sale of a product, or winning away somebody else's share of the business. The users of highways, moreover, are too disperse a group to be able to bear pressure on the maintenance problem (in Brazil, for example, much truck transport is carried out by unorganized truckdrivers who own their own trucks).

A contrasting case of the existence of potential user pressure is the power industry. The relationship of power distribution to generation is in a sense analagous to that of maintenance to construction: distribution construction is like an activity in comparison to generation, in that the former is carried out in very small steps, almost at an ongoing pace. Like highway maintenance, distribution lacks appeal in comparison to generation, and is often left behind in a power expansion program. It is not uncommon, however, when a large generation plant is almost completed and the distribution system is not ready to receive the power, that a last-minute hue and cry is raised by the industrialists who have long-term contracts with the power company, and who are threatened with serious production losses if the distribution system is not sufficient to channel the new power. This last-minute furor has often

from the delaying legislatures or financial institutions the appropriate actions and funds. In highway maintenance, there are no such concentrated losses to be suffered by a powerful group of users. Highway maintenance, in sum, suffers from a ruinous "isolation;" an understanding of this must underlie any approach to the problem.

One possible approach to highway maintenance could have been the following: it is a truism of development experience that construction--of any edifice, including highways--is a much more interesting and politically attractive activity in comparison to maintenance, which is not only bereft of appeal but also considered a downright nuisance. As a result, maintenance is not only left by the wayside, but more construction is often carried out than need be--especially in the case of highways--because of the sheer political force behind such projects. Highway construction, therefore, often eats into revenues that ought to be fed into day-by-day maintenance.

The political appeal of construction is obvious: it provides lucrative contracts for local firms, it employs many persons, and it leaves a highly visible mark of the politician's deeds on the landscape--both during and after construction. The political appeal of highways, as opposed to other construction, may be particularly great because of the sheer breadth of the area that the men, machines and finally constructed edifice touch.

The idea of the AID highway maintenance loans was to treat maintenance as a "sector" separate from construction, precisely because the former was so neglected that it needed separate treatment, and because the latter was getting more of its share of investment funds anyway. If highway construction is so politically compelling, however, and rewards so many interests, might it not be wiser to bind maintenance more closely to construction--rather than to sever the two? This could endow some of the magnetism of construction upon maintenance, or sneak in a little of the unappealing activity as a price for the over-generous award to those interests who will profit from the appealing activity.

This is not as utopian a task as on first sight it may appear: by looking at other sectors not so ridden with follow-through problems, or sectors which have good maintenance records (e.g. airlines, electric power), or even the cases in which highway maintenance programs have been successful, one can get an idea of what makes maintenance run well in some places, and in others not. One then studies the highway-construction/maintenance syndrome in an attempt to arrange sequences analagous to those in the successful sectors.

A few examples of such an approach follow:

1. The prodigious building of roads that goes on in the Northeast--and of poor roads that always seem to disintegrate when the rains come--was discussed in Antonio Callado's, O Tempo de Arraes. Callado notes that it was much to the political and economic interest of the Northeast usineiro, and other employers of seasonal peasant labor, if there were guaranteed off-seasonal employment opportunites for this labor which complemented the usineiros' own needs. Road-building, in a sense, was the perfect answer: it could be done at any time of the year, could be started and abandoned at any pace, and therefore could dovetail nicely with the usineiros' seasonally set needs for abundant labor. This same off-season employment, moreover, kept the growing mass of peasant labor employed and fed throughout the year; it diminished the spectre of a restless, starving unemployed mass, and warded off socio-political pressure on the usineiro to mend his ways. Furthermore, the peasant who secured off-season employment in road-building was less likely to leave the region, and therefore would be available in abundance for the next season's harvest. And finally, it was not against the usineiro's interest that the roads were built poorly, for this meant that they were an eternally renewable source of employment: after every rain, the road needed rebuilding.

From the point of view of the engineers, this is a case of supreme inefficiency in roadbuilding; from that of the social reformer, like Callado, this represents a vicious locking-in of the peasant to the usineiro's exploitation. But from the point of view of our inquiry, this is a spectacular success story in highway maintenance: maintenance, in this Northeast, was as ongoing as the harvest.

The lesson of this Northeast story can be noted and applied elsewhere, without necessarily repeating the setting of social repression and technical inefficiency. Because it was to their interest, the usineiros supported state "maintenance" programs of a quality that would alarm the most tolerant of highway maintenance advisers; imagine, then, how much easier it might be to muster such support for a more effective maintenance program, if the same kind of interest-serving were built into the program.

(This classification of constant road-re-building as "maintenance" may seem rather curious. But the distinction between construction and maintenance that is central to the appeal of the former and the neglect of the latter is precisely

that construction is a once-for-all "happening" with a well-defined beginning and end, and with a product to show for it to boot; whereas maintenance, in contrast, is an ongoing activity which adds nothing concrete to the landscape. The perennial rebuilding of the washed-out Northeast roads is a perfect case of this ongoing activity--rather than once-for-all construction--an activity which one certainly would not have expected to receive continuous state budgetary support in the poorest and most regressive part of the country.)

Could this same type of powerful "glue" between construction and maintenance be built into an AID maintenance project? Take a similarly agricultural state like Sao Paulo or Minas Gerais: one would expect to find off-season unemployment too, in these areas, and therefore the same type of pressures available to give constant backup to a maintenance program drawing on this labor. The AID maintenance program, however, provided for

1) the ugrading of the skills of maintenance workers so as to make maintenance practices more skill-intensive and, at the same time, less labor-intensive (the number of persons employed would decrease)

2) the retirement of maintenance equipment according to the same standards by which equipment is retired and replaced in the United States; and

3) included a program of once-for-all ugrading of various roads considered of sub-standard quality ("road betterment").

In light of the lessons from the Northeast case, these features might be reversed: in order to make maintenance seasonal and extensive enough an activity to employ a large force of seasonally unemployed, one would want to

1) diminish, or leave as is, the skill intensity of existing maintenance practice

2) substitute increased maintenance of maintenance equipment for its replacement--i.e. substituting labor-intensive equipment maintenance for capital-intensive equipment replacement. The resultant economizing on scarce capital is not the major point; rather, this approach would seek to be lavish with a more abundant resource, labor, because its employment would result in important feedback pressures to maintain the maintenance

program in the state budgets. (Though I am proposing a more labor-intensive and less skill-intensive approach, I am not basing the argument on Brazilian capital scarcity and labor abundance, but, rather, on the resulting political and social pressures that the labor-intensive approach could generate in support of the program. If the capital-intensive solution generated the same kind of support (see Section2. below), I would consider that a strong argument in favor of it, even though it would go against the grain of relative factor endowments.)

3) the Northeast story suggests that perhaps roads should not be upgraded to the standards suggested--so that more maintenance will be required than is normal. It may be that only in this way will it be possible to offer the amount of off-season maintenance employment, at an adequately unskilled level, that is sufficient to dovetail one's program with the rhythm and magnitude of seasonal unemployment. There is probably some minimum employment threshold before which the employment-generated pressures to support state maintenance programs would not come into play; only after that threshold were passed would the labor-intensive approach yield the desired effects.

This proposal, looked at in another way, is an attempt to steal a little bit of the thunder of highway construction. The dramatic increase in employment that it provides, that is, is sure to be looked upon with great favor and relief by state governors, and exploited to the fullest for its political propaganda value. (The Kubitshcek Government's photograhic propaganda on the highways leading to Brasilia always emphasized the sheer number of bodies hacking away at the roadbed.) The AID maintenance program could not have benefited from this type of appeal, since it was presented as "rationalizing," "Skill-upgrading," and "featherbed-reducing."

The suggestion I am making attempts to blur somewhat the marked difference between maintenance and construction: construction becomes more like maintenance in that the initial effort is less demanding and the final product, therefore, is less permanent, for the road is built to require lots of maintenance. Maintenance becomes more like construction in that it is more demanding, and more spectacularly employment-intensive. The answer to the maintenance problem, in short, may be to increase the need for maintenance--to construct things so that they deteriorate even more rapidly.

The specific suggestion above—linking maintenance to off-season unemployment—is probably visionary. I was more interested, however, in taking apart the elements of the Northeast "success" story in order to show why it worked, and to suggest that we be aware of such forces and the possibilities they open, in designing our own projects.

2. The above-suggested "evening-out" of highway construction and maintenance may be desirable for a completely different reason. The previous section dealt with support for maintenance that might be generated outside the highway sector—from employers and politicians. Another important component of the success of any maintenance program, of course, is the state agency doing the job. Are they strong, alert and efficient? Are they aggressively trying to maintain their share of the budget, as well as the highways? Are they politically well-connected? More often than not, the answer to the question is "no," and this also explains the easiness with which the state fails to hand over the revenue.

If one considers the maintenance problem as the other side of the excessive-road-construction problem, this may provide some indications of a remedy. Road construction may be excessive, in part, because

1) when construction and maintenance are divided administratively, roads may get built without pause because there's nothing for the agency to do in between the time one road is finished and the time the next one should normally be started.

2) when maintenance and construction are administratively combined, maintenance may get ignored simply because it's too "puny" in comparison to construction. That is, it is easier, and more to the agency's scale, to build another road than to maintain the first one, because of the miniature level of operations to which the agency would have to reduce itself to undertake only the latter task.

Thus by combining the construction-maintenance function in one agency, and "evening-out" the technical design of the two activities, one might make a direct hit on both excessive construction and poor maintenance. This approach is not really novel: a standard justification for building hydroelectric

plants in Brazil was not that demand required their installation by a certain date, but that a previous dam was just about to be completed; if work were not immediately started on another plant, the company would argue in requesting financing, this meant that thousands of unskilled workers would be released without work into the economy. The state power managers were not only interested in the propaganda value of the argument; to disband and then reassemble their teams of laborers as well as skilled workers a few years later meant quite an administrative effort. More important, the companies would be reduced to almost nothing in the years intervening between plant construction. Continuous construction work, in short, strengthened them considerably at a time when they were struggling state companies clamoring for budgetary support, and with almost nothing to do in between the herculean plant-building efforts they took upon themselves. In a sense, these companies were making hydro construction more like "maintenance:" they were turning discrete projects, normally spaced few and far between, into an ongoing activity, in order to protect and strengthen their existence.

The propensity of states to construct roads ad infinitum may be underlain by the same kind of will to exist that contributed to the power companies' sequential construction of hydro plants. If maintenance were made more like construction—and the two were brought together under one roof—the state road agency (and politician) might not feel so hell-bent on construction, being able to fill in the time between roads with their maintenance. Hence by trying to merge maintenance and construction, one might not only help to solve the maintenance problem, but, as an unexpected benefit, might deflate the road-construction problem. The state, instead of constructing another road on the heels of the previous one—in order to keep itself active—would have a strong interest in filling in the time in between road-building with maintenance; just as in construction, it could still keep its finger in the pie and thereby maintain its strength in relation to other government agencies.

This, in a sense, is a more workable solution in highways than it was in electric power. The country's power system, that is, might have been better off if the time in between building hydro plants had been filled in with the building of distribution systems. Yet generation and distribution construction—as well as operation—are too different in nature to allow a fledgling company to switch back and forth between the two. Highway maintenance and construction, however, offer this advantage over power: though, like in power, the two

operations are lopsided in their political appeal, they are, however, much more alike and substitutable (as well as geographically in the same place) than are the construction of generation plants and distribution systems.

This idea of arranging a smoother transition from construction to maintenance will be referred to again in the following section on equipment. Thus far, we have dealt with the role of two possible sources of strong pressure to carry out maintenance programs: those interested in employment, and the companies or agencies themselves that execute the construction function. The third possible source of pressure that could be exploited in favor of maintenance programs is the equipment suppliers.

3. The continuity attained by some of Brazil's public infrastructure programs in the 1950's has been pointed out as remarkable in a country that was experiencing such political, social and economic chaos. (See "Fifteen Years of Economic Policy in Brazil," ECLA Bulletin, November, 1964). This was especially true of the road construction and electric power projects of the Kubitschek government. In discussing this phenomenon, the ECLA article describes what happened every time the Brazilian Congress threatened to cut the appropriations for a highway construction program. An army of angry local contractors and highway equipment manufacturers--or their representative associations--descended upon the capital and lobbied vigorously to make sure that the funds would not be cut.

This lobbying was crucial to the initiation--and more important--to the <u>completion</u> of a major group of infrastructure investments made by the Brazilian government in the postwar period. It is true that these pressures may sometimes have contributed to the unwise choice between alternatives--or the choice of too many of them. But what is relevant for our inquiry into the maintenance problem is that these pressures were a crucial link in the continuation and termination of long-gestation projects which, because of

the inflationary erosion of appropriations, needed to be constantly refuned, long after the original burst of political enthusiasm for the project had been spent. Maintenance, in contrast, is bereft of pressures to spend lavishly--partly because there are no well-defined supplier groups which have millions to gain from expenditures on it. Maintenance, in contrast to highway construction, is not usually contracted out to private firms; it does not require the single purchase of a complete fleet of equipment.

Given the difficulty of mobilizing appropriations for maintenance, and given the excess appeal possessed by maintenance's parent activity, construction, it seems that a possible approach to the maintenance problem might be to endow this operation with the type of reward that makes friends for construction. A few possibilities are listed below:

1) maintenance might be let out to the same private contractor who builds the road (maintenance is let out to private contractors, with considerable success, in some of the Scandinavian countries).** The "under-building" of the road, suggested in the previous section, and the corresponding increased need for maintenance would be a corollary of this: the maintenance part of the deal would have to be "beefed up" in order to make a construction-maintenance contract considerably more attractive than a construction-alone contract;

2) since highway maintenance and construction are one of the few areas where considerable latitude exists as to choice of technology, such programs could be designed so as to make the two activities as <u>similar</u> to each other as possible--to make them substantially substitutable. This might mean, in contrast to the suggestion proposed in Section 2 above, a maintenance program that would be more equipment-intensive <u>in relation to</u> construction. This would help to make maintenance gain some of the vital importance for local equipment manufacturers that construction has;

3) a bringing together of construction and a beefed-up maintenance program--if not administratively, then in the appropriations process--would latch maintenance on to the drive of the equipment

lobbyists. The construction-plus-maintenance equipment order would be even more worth lobbying for; whereas the maintenance equipment contract alone might, in comparison, represent "peanuts." In economic jargon, one might say that this is a case of "institutional" investment indivisibilities: if one breaks maintenance off from construction, equipment orders for the former are too small and too dispersed to bring forth the "investment" in lobbying that is required to get maintenance permanently launched.

Note that the AID position--also in the interest of preventing the usurpation of maintenance funds by construction--was the opposite on the above points. AID attempted to draw up a list of maintenance equipment that could not be used for construction, in recognition of the state highway departments' propensities toward highway construction. Though this approach might insure that unintended construction does not occur on the sly, it might on the other hand decrease the probability that maintenance itself will occur. That is, it might deprive the maintenance program of the pressures on the appropriations process brought by the eager producers of construction equipment.

Note also that the designing of the AID maintenance projects to US standards may have been even more important in depriving the maintenance project of local interest-group pressures. Three-foot dump trucks, for example, were being commonly used in Brazilian highway maintenance, and were manufactured in Brazil; AID engineers, however, felt that the efficiency of the five-foot dump truck exceeded the three-footer considerably, and therefore should be preferred. Since the five-foot truck isn't manufactured in Brazil, it was imported for the AID-financed maintenance projects. The argument being made here is not that the business should have been given to local industry, but that the benefits of local-industry pressure should have been bestowed upon the project--given the low probability of its success in the first place.

I am not particularly attached to any of the solutions proposed above--perhaps they are all unworkable, and perhaps they seem too radical and reform-minded. My approach, however, is essentially conservative--i.e., to discover the existing openings for change, as well as the resistances to it, as a base on which

to build an aid program that will stick. Furthermore, the above suggestions do not seem any more radical than one of the premises on which the AID highway maintenance loans were based: i.e., that one of the most important, job-giving departments of the Brazilian Federal Government—the National Highway Department—would preside over its own demise by handing over most of its powers to the state highway departments and shrinking itself into a U.S.-type Bureau of Public Roads.

These suggestions, as can be seen, are based on an almost complete ignorance of the details of the AID highway maintenance programs. The paper is simply a suggested approach to the examination of AID's experience in development lending in Brazil, and to the questions that should be looked into when any project is in its infancy.