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BALDWIN

Project Appraisal Course: 1963
Economic Development Institute



MEASURING THE BENEFITS OF AN AGRICULTURAL FEEDER-ROAD PROJECT

A Hypothetical Illustration

by

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&

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Measuring the Benefits of an Agricultural Feeder-Road Project
A Hypothetical Illustration

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This paper illustrates in simplified form the general principles involved in measuring the economic benefits produced by road projects. No attention is paid to the project's costs or to its possible rate of return. The example used is hypothetical: it is not based on any actual project, the initial values used have been assumed. But the values used reflect the normal working of economic forces - e.g., the behaviour of consumer demand in response to lower prices and higher incomes, the effect of cost reductions in extending the area of supply, the effect of competition in spreading economic benefits among different groups, the effect of changed profit margins on production incentives, the shifts in resource use brought about by changes in demand and supply conditions, etc.

The case represents a very common type of road project: a poor-quality, unimproved road leading from an agricultural region to a city is made into a much better road. As a result of this improvement, the unit cost (e.g., the cost per ton-kilometer) of transporting agricultural goods to market is reduced significantly.^{1/} These savings mean that the same amount of work can now be done with a smaller use of resources than before (e.g., fewer trucks, less gasoline and lubricating oil, fewer repairs, less labor-time, less wear-and-tear on tires, longer vehicle life and hence lower depreciation charges, etc.). These savings are benefits for the national economy. The question of how these benefits will be distributed to various groups in society (their incidence) is a separate question. In the Bank's own project analysis it is assumed that "a benefit is a benefit" no matter how it may affect different groups in the economy.

Any project that reduces costs automatically changes relative prices and hence incentives. As a result of such changes, people change their economic behaviour. The present example is typical of the way road projects affect production and consumption: lower transport costs lead to higher realization prices for farmers and lower prices for consumers. Producers have a new incentive to increase production. Consumers are

^{1/} In this example no account is taken of the project's effects on the volume of goods hauled from the city back out to the agricultural regions. This traffic is bound to increase for two reasons: (1) lower transport costs mean that goods can be delivered to the villages at lower prices; this will tend to raise demand (price elasticity effect); (2) The increase in farmers' cash incomes gives them more purchasing power (income elasticity effect). The resulting rise in "back-haul" traffic would increase the benefits produced by the project.

stimulated to buy more at the lower prices. When the farmers' higher output is offered in the market this may push down the market price even more. But as prices go lower buyers are willing to take larger and larger quantities. Some of the increased supply will be bought by people who were already consumers at the old, higher price: at lower prices they want to increase their consumption. But some of the increase will also be taken by new consumers who enter the market for the first time. As a result of the process back-and-forth interaction of these forces the economy gets two main benefits, (1) transport savings, and (2) increased production and trade. The task of measurement is to estimate, in advance, how large these benefits will be. Without an estimate of benefits there is nothing to compare with the costs. No estimate is possible of the project's rate of return and there is no way of judging whether this road project is better for the economy than some other road project - or some railroad project, or an agricultural bank, or a port, etc., etc.

The case identifies and measures three types of benefits: (1) savings in transport costs, (2) increased production and trade, and (3) increases in producers' and consumers' surpluses (these two terms are defined later on). No attempt is made to discuss how the values (prices, costs, profits, surpluses, traffic volumes, etc.) might be collected in actual situations. We simply make certain arbitrary assumptions; all the other values then follow automatically.

Which of the three types of benefits is the best one to use? None. There is no "best" in all circumstances. Different emphasis is given to different benefits according to the particular problem the project is designed to solve. For example, if the aim is to build a "penetration" (or "development") road that will lead to increased production, then most time and energy would be given to the measurement of production benefits. On the other hand, if the main problem is to relieve congestion around a city (where transport costs may be rising because of delays, excessive fuel consumption from much stopping and starting, and high accident rates) then the main objective may be to reduce costs to road users. If a particular stretch of road (e.g., mountain road) has high maintenance costs, then road improvement to reduce both maintenance costs and road-user costs may both be important. Where there is a given volume of traffic to be handled regardless of transport costs, the main appraisal problem is to examine alternative engineering standards, see how much each one costs, and then select the one with the lowest total costs that will still handle the required volume of traffic. This might be true, for example, of a country wanting to minimize investment in transport so as to have more resources for investment in other sectors. The same objective (choosing the minimum-cost alternative) would exist for a mining or logging company needing a service road to a port or out to a main highway or railway. Finally, we have the common objective represented by the type of project used in this case - a road improvement designed mainly to reduce the costs of moving goods from one place to another, knowing this will have benefits for both producers and consumers.

These examples are enough to show that no one benefit is best under all circumstances. If a project offers large benefits of the type primarily wanted then it may not matter if it offers few other benefits. On the other hand, a project which offers large road-user savings^{1/} for suburban traffic might not be as beneficial to the economy in the long run as a different project with lower returns but where the returns took mainly the form of increased production and trade.

The notes that follow are intended to explain the concepts and computations found in the hypothetical case. Readers should move back and forth freely between these notes and the arithmetic example, which begins on page 13.

^{1/} The term "road-user savings" appears frequently in the appraisal of road projects. This refers, of course, to reductions in costs paid by those who are the direct users of roads, i.e., vehicle owners. Whether or not these savings increase the incomes and profits of commercial carriers is another question: competition usually forces down the level of transport charges, thus forcing carriers to share their savings with other groups (producers, merchants, and consumers). Thus "road-user savings" should be regarded primarily as a convenient measure of cost savings to the economy as a whole and not as a private benefit accruing only to vehicle owners.

Notes on the Arithmetic Example

I-A-B We begin by assuming a market price of \$100. At this price consumers would buy 10,000 units. The normal law of demand is that more units will be sold as the price falls. Here the assumption is that 50% more will be sold if the price falls 10%. The calculations assume a gradual reduction in price, each \$1 reduction increasing demand by 500 units (the increase comes from both old and new customers). This particular assumption determines the calculation of "consumers' surplus" which is the difference between the price consumers would be willing to pay and the actual price they can buy it for.

I-D The merchants get 10% of the proceeds from retail sales. This covers their costs (including minimum profit) plus any surplus above this level.^{1/} What remains is available for transport and production. "Realization price at source" is the amount received by farmers.

I-E At "A" a few producers can produce at \$50 per unit but most output costs \$60. The higher costs at "A" compared with "B" and "C" reflect the higher costs of land and labor near the city. But "B" and "C" must bear higher transport costs. No supply comes from producers whose production costs are greater than what they will receive after paying transport costs.

I-F-1 This shows the total value of final (retail) sales and how this value was distributed among those who helped produce it. Table F-1 might have been written as follows:

<u>Value produced</u> (or gross national product)	<u>Payments to Persons who</u> <u>produced the GNP</u>
Agricultural output \$1 mn.	Farmers \$550
	Carriers 350
	Merchants 100
	<u>\$1,000</u>

The two sides are just two ways of looking at the same thing: the national product and the distribution of an equivalent amount of values as income to the owners of the factors of production.

^{1/} When we use the term "costs" for merchants or carriers or farmers we do not assume that all merchants, etc., have the same costs. Some will have higher costs than others. Over time, the high-cost producers tend to be forced out of business; the resources are shifted to other uses where their owners hope they can earn a more satisfactory return. But in the short run the level of charges at each stage in the production process (farmers, carriers, merchants) tends to reflect the higher-cost producers - the marginal enterprises who are just on the edge of being unprofitable. These are the enterprises that do not earn any "producers' surplus". Producers whose costs are lower than the marginal costs are those who earn varying amounts of producers' surplus.

I-F-2 The notion of "producer's surplus" (or "factor surplus") is quite different from the ordinary kind of commercial profit that shows up in accounting records. Its meaning is this: assume that each producer (farmer, carrier, merchant) has some minimum income he considers necessary to draw his resources into a particular use. This minimum may refer to a minimum rent on land, or a minimum wage, or minimum truck operating profit, or minimum wages-plus-profit from merchandising activity. This "minimum income" is determined mainly by what a man thinks he can earn if the resources he owns are devoted to other uses. This "minimum income" may be considered the true "cost" of using resources; anything earned above this amount is called a "producers' surplus". The concept thus involves subjective standards about the minimum earnings the owners of the various factors of production are willing to accept. The concept applies to wages, rents, interest, profits - i.e., to all forms of income earned by "producers" (owners of any factor of production). (Where strong competition exists, it tends to drive "producers' surpluses" down to zero). In the present case, it has been assumed that merchants and carriers earn a "producer's surplus" of 5% of their gross revenues. In agriculture, the producers' surplus is derived from the column on production costs found in I-E. For example, the producers at "A" whose costs for 1,000 units were \$50 still received \$60 for their output - a surplus of \$10 over their costs. Similarly, for the 1,000 units produced for \$40 at "B", where each unit had a realization price of \$50. The total of these producers' surpluses in agriculture is \$20,000.

II We now move to the new situation, soon after the road was built. Production has increased because farmers can now earn higher incomes. Why do they earn more? Because transport costs have been reduced by 50% and some of these savings reach the farmer in the form of higher realization prices even though the retail price is lower. The higher level of output is not sold at the old equilibrium price of \$100. Larger supplies have gradually brought the retail price down to a new equilibrium of \$90. At this price the number of units producers are willing to supply just equals the number that buyers are willing to purchase (this is the meaning of "equilibrium").

In II-A you will see two figures given for "values of retail sales". Which is the best measure of the true value to the economy of the 15,000 units, a measure based on the actual new price of \$90 (the current price) or one that has not changed (the original or constant price)? Note that we are not talking about any change in the value of money - no inflation or deflation. We are dealing only with changes in individual prices arising out of changed supply and demand conditions. The use of current values is probably better since the particular economic changes we are interested in would not have occurred if the original prices had remained in effect (there would undoubtedly have been changes, but different ones).

Notice that the reduction in transport costs benefits the more distant producers more than those closer to the market. The realization price at "C" has gone up \$16 (40%); at "A" the realization price rose only \$6 (10%). As a result, more of the increased output comes from "C" than from either "A" or "B". This is typical of many actual projects: a major effect of transport projects is to extend the area of supply out from the center of consumption.

III

This section (consisting of parts A, B & C) analyzes in detail the overall results shown in section II. "A" shows the increase in GNP and the distribution of this added value among the three levels of activity that contributed to it. In each case the values are shown in both current and constant prices. In current prices the increase in GNP is \$350,000. The carriers' total charges were actually \$72,500 less after the road improvement than before - a net reduction in transport values counted in national product even though the savings in transport charges are counted as an economic benefit. Savings in the use of transport resources have freed an equivalent amount for use in other sectors. The total receipts of farmers rose \$387,000. Merchants' receipts rose \$35,000. The sum of these (III-A-5) accounts for the \$350,000 increase in GNP.

"B" shows the effect of the project on agricultural, transport, and distribution costs. The figures come from sections I and II. The analysis of costs leaves out of account the effect of the project on producers' surpluses (III-C-1); when the latter are combined with the cost increases we account for the total increase in GNP (\$350,000).

The cost increases refer to increases in total costs, not unit costs. Normally we expect it to cost more (i.e. to use more resources) to increase production of an item by 50%, especially since we assume no change in production techniques except in the transport sector. In the latter, the road project is a form of technological change that permits carriers to handle a higher volume of traffic at lower total costs - i.e. with a smaller input of resources from the economy.

The change in market prices and costs affect the surpluses of producers in all three branches of activity. As III-C-1-d shows, most of the increase in surpluses occurred in agriculture: farmers' surpluses increased about six times. Distributors' surpluses increased least. Note that the transport sector had a substantial (nearly 60%) increase in surplus even though total revenue of the sector declined: costs fell even more than revenues.

We come now to the point of central interest, the measurement of economic benefits, using the data we now have before us. Three types of benefits are analyzed:

1. Savings in transport costs (section IV)
2. Increases in Production and Trade (GNP) (Section V)
3. Increases in producers' and consumers' surpluses (Section VI)

IV Transport savings: These take three forms:

- a. Savings for the national economy
- b. Savings for the owners of vehicles (the carriers or "road users")
- c. Savings for the users of vehicles (shippers)

The first is not simply the sum of "B" and "C" (the savings to vehicle owners and users) since part of the owners' savings is passed on to shippers (the farmers) in the form of higher realization prices (competition may force them to do this). Do not try to move back and forth among Formulas 1, 2 and 3. Consider each as a separate calculation.

Formula 1: Less money is spent on transport after the project than before, even though 50% more goods are carried.^{1/} This is because the reduction in road-user costs has forced carriers, through competition, to lower their charges. (Alternatively, we might assume a state transport monopoly whose charges were reduced by administrative order). Since the difference in transport payments reflects both the lower costs on the original 10,000 units plus an increase in work done (transport of the 5,000 new units) the saving in total outlay of \$82,750 must be adjusted to eliminate the value of the new work being performed and give us a measure of savings on the original traffic volume. This is done by adding back the cost of transporting the 5,000 new units. (This figure is "added back" because it has been previously taken out of the savings figure, which had been reduced by the cost of transporting the additional traffic).

A final adjustment is made at the end of Formula 1: a 10% indirect tax is deducted (this might be a gasoline tax, or sales taxes, or city toll, or tariff, or license fees - or all of them combined). Why are these indirect taxes deducted while direct taxes are not? There are two reasons. The first is the different way these taxes affect the use of resources, the second is the distorting effect of indirect taxes on the measurement of resource use.

Direct taxes are levied on a person's property or income after the property or income has become his. Indirect taxes are levied on transactions involving particular goods and services. Money

^{1/} The problem could have been constructed to show an increase in total outlays. The analysis would proceed exactly the same way.

paid for indirect taxes is paid to the government, even though it may be collected by merchants, bankers, etc., who must turn it over to government. Indirect taxes do not get into the stream of payments reaching people as payments for their contribution to production; hence they do not act as direct incentives to use resources one way as against another.^{1/} But indirect taxes are part of the price buyers must pay and hence exert an indirect influence, through the price system, on how consumers use their incomes. The resulting savings are savings to the economy, without any indication as to whom they benefit.

Indirect taxes can easily distort economic measurements. For example, if the retail value of gasoline sales rises from x to (x plus y) this might reflect nothing more than an increase in government taxes. The actual volume of sales, and the amount of economic resources required to produce this volume, might not have changed at all. To avoid distortions in true economic values arising from this kind of tax change, we eliminate such taxes from our calculations (this is standard practice in national income accounting).

Formula 2: The road project has resulted in lower costs for truck-owners; these savings are the main form of "road-user benefits". The savings may take the form of lower operating costs (e.g., less fuel and lubrication, fewer repairs, lower wage costs per trip; lower insurance charges) plus lower capital costs (e.g., because vehicles may last twice as long, and each vehicle may make 50 per cent more trips per week, then the amount of depreciation charged on each cargo would be reduced for two reasons). The savings in capital costs mean that either the same volume of traffic could now be handled with a smaller investment in trucks and working capital or that the present investment could support a larger volume of traffic. The lower capital costs does not affect only the individual vehicle owners. The whole economy benefits from the reduced requirement for investment in vehicles and spare parts. Thus investment funds are released for use elsewhere in the economy. In most countries heavily dependent upon imported vehicles, parts, and fuels, the lower unit operating and investment requirements would also result in foreign exchange savings.

Paragraph F-2 (i) shows the actual savings on the original volume of traffic. There then follows an estimate of savings on the induced traffic. Why is only 50% of the \$92,250 taken into account? This proportion is a convenient and frequently-used rule-of-thumb for measuring the savings realized on the induced traffic. These "savings" on traffic that did not exist previously (i.e., on induced traffic) are similar to the notions of producer's and consumer's surplus. As transport costs fall

^{1/} If government services were regarded as a "factor of production", just like labor or capital or natural resources, then it would be logical to leave indirect taxes in the calculation provided that the amount of indirect taxes collected from a given sector (e.g., transport) just equalled the value of government services contributed to that sector (e.g., road construction and maintenance costs, costs of policing). In some countries governments try to collect from road users an amount equal to the costs of building and maintaining the roads. But in many countries there is no such close relationship.

each reduction in (marginal) costs generates some increase in the demand for transport services. The lower costs apply not only to each new increment of traffic but to the earlier increments as well. The earlier increments are thus carried at a price lower than people were formerly willing to pay. People using transport thus save what they no longer have to pay. The 50% factor measures (in an arbitrary but reasonable way) the average savings of everyone involved in transporting the induced traffic between the old and the new cost levels.

F-2(i) plus F-2(ii) gives \$212,375. After applying a 10% adjustment for indirect taxes we have a measure of total cost savings to vehicle owners. These savings (\$191,140) are greater than the savings to the national economy!

Formula 3: The only difference between F-2 and F-3 is the inclusion of indirect taxes and producers' surplus in F-3, since both elements are included in transport charges paid by clients but not in true transport costs incurred by carriers. F-3 calculates the savings in the amounts actually paid for transport by customers. The difference between F-2(i) and F-3(i) is that the latter includes the "producers' surplus" - the special form of "profit" not included in our definition of true economic "cost". The final F-3 calculation shows what it would have cost to transport 5,000 additional units at the original cost as compared with actual costs after the project. Notice that this calculation uses the full savings (\$102,500) not only half of them. Why? Because this measure reflects the normal way people think of transport savings, i.e., savings in cash outlays. They are savings as seen by the people who actually pay for transport. But savings to the economy may be quite different.

V. The project has two main classes of benefits, (1) transport savings and (2) an increase in the volume of production and trade. (A third and less measurable class of benefit, the increase in producers' and consumers' surpluses, is treated in section VI). This section deals only with the increase in production and trade measured by the monetary value of output reaching consumers. We use the term Gross National Product (GNP) as our measure of production values associated with the road project. (Strictly speaking, this is a misuse of the term, since GNP refers only to the sum of values produced by all the economic activities in a country and cannot be applied to any sub-part of the system. We might have used some term such as "Gross Production Value of the Project" but we wanted to retain the language of modern national income accounting).

V-1 calculates the increase in the economy's output of goods and services after completion of the project. Since the main purpose of economic activity is to produce things for final consumers we can take the measure of increased sales to consumers as the measure of the increase in Gross National Product. The result is the same whether we make a single measurement of the values registered in sales to final consumers or whether we go back to the first stage of production (the farm) and measure the increased value of farm production and add to it the values for transporting and selling the higher output. V-1 and V-2 show different ways of estimating the change in GNP, with V-2 breaking down the total into the amounts received by people at various stages in the process of production and distribution.

Indirect taxes are again deducted: although paid by purchasers as part of the retail price, this element of value does not get through to those providing the economic services (the "factors of production") involved in production, transport, and merchandising.

All of the increase in GNP always gets distributed to the many people involved in producing it. Much of this additional payment to the factors of production was necessary to draw them into this particular activity. If these resources (factors of production) had previously been unemployed, then their use on this activity (this particular agriculture, this particular transport, this particular merchandising) would involve no loss of output on other activities. But if the increased output from our project required the use of resources that had been employed elsewhere in the economy, then the gross increase in output generated by the project would need to be reduced by the losses in output elsewhere; only the net increase throughout the economy would count as a gain. Through most of our example we ignore this problem: we treat all of the project gain as a gain for the economy. But in V-3 we show how a gross gain attributable to a project can be converted into a net gain for the economy.

V-2 shows that the change in factor payments is not the full extent of the benefits. If the project has reduced certain prices, then people who buy these things (or "services") have more money left over. They can buy more of the same thing, or of other things, or they can save. So we count any lower prices (reflected here in transport savings) as a benefit, adding them to the higher values of production delivered to the market. This yields a second possible measure of the increase in GNP (\$422,500). Who gets this benefit? \$35,000 goes to those engaged in marketing; \$387,500 goes to the farmers (these figures are derived from data used earlier in the problem).

In V-3 a third measure of the project's effect on national income is shown. It is the best of the three different measures shown in section V. Why? Because it takes into account the additional costs of producing the additional GNP. Only the difference between these two values (benefits and costs) is a clear gain for the economy.^{1/}

V-3 begins with the same increase in GNP used before. However, we deduct from the increase in total retail values the increased costs incurred in producing them. These cost increases are found by taking the difference between the production costs listed in II-C-2 and those listed in I-F-2. After deducting these additional costs of \$215,500 we arrive at a net increase in GNP of \$134,500. This is the same thing as the increase in factor surpluses (compare II-C-2 and I-F-2); the net profitability of the project shows up as higher returns to the factors of

^{1/} If we had used the term GNP in its proper sense in sections V-1 and V-2 the adjustment made in V-3 would have been taken care of automatically, by showing lower values for GNP than we used. That is, the increase in gross production value of the project would have been offset by reductions in production values elsewhere in the economy, reductions caused by the transfer of resources into activities generated by our road project.

production, their costs being taken as constant. This "net increase in GNP" can be thought of as the same "net increase in GNP" mentioned earlier when we talked about the need to reduce increases in output directly associated with a project by reductions in output which it causes elsewhere in the economy. Why? Because if the extra \$350,000 GNP had been made possible by drawing into use resources formerly unemployed, these resources would have cost nothing, in an economic sense. Therefore whatever cost we put on them would reflect the value they could reasonably be assumed to produce if not used on this particular project (if a resource would be unlikely to find other employment, its value would be very low, perhaps zero). By charging this value-in-alternative-use as a cost against the output of a project we automatically measure the losses in production values at other points resulting from shifting resources into this project. This explanation shows why projects that draw idle resources into activity often create greater benefits to an economy than projects that involve shifting resources from one use to another⁷.

VI. It is more difficult and arbitrary to measure consumer and producers' surpluses than to measure other benefits. Also, the surpluses earned by the factors of production (producers' or factor surpluses) are included in measurements of GNP. Consumer surpluses are not included in any of the other measurements.^{1/} But to consumers, the ability to buy something at prices lower than what they would have been willing to pay is a clear gain: the "saving" represents income that can be used for additional purchases or saving. If we counted savings in transport charges as an economic benefit should we not also count "savings in retail charges" (i.e., price reductions)? Yes, we should. But we should avoid counting any benefit twice - and it is likely that part of the consumer surplus is included in the measurement of increased GNP - i.e., that part of consumer surplus that was used to buy larger quantities as the price went lower.

VII. Section VII draws together the results of the earlier calculations. Note first that the three primary measures used (A,B,C) are not all additive. We can add together certain benefits (notably transport savings and whatever part of increased production we think attributable to the road investment alone. These two benefits are combined in VII-D). But the increases in consumer and producer surpluses are partially included in the other measures and cannot be separately identified.

VII-D shows how one might select certain values from A and B and make a reasonable assumption about what proportion of the increase in agricultural production should be credited to the road invest-

^{1/} In its own project appraisal work the Bank does not attempt to measure consumer surpluses generated by its projects. But the Bank does take this factor into account qualitatively when appraising the contribution projects will make to increases in consumer incomes and purchasing power.

ment. Some of the production increase would normally be the result of additional public and private investment in the agricultural sector directly.

VII-D illustrates only a few of the many results that are possible. For example, the figure used for transport saving is \$149,000 per year. But section A shows eight different figures for measuring "transport savings" in current prices alone! The selection of \$149,000 reflects a decision to use "road-user benefits" (i.e. savings to vehicle owners) on the original traffic, measuring these in current prices. This is a widely-used measure of transport savings but, as already pointed out, it is not the only one possible. The conclusion is not that any measure is as good as any other. Rather it is that different figures represent different things that are being measured (even though they may be made to sound alike by calling them all "transport savings"); thus one has to decide what one ought to be trying to measure in each case. In the present case one could argue strongly that the figure of \$158,000 (from VII-A-1-b) is a logical one to use, on the ground that one ought to be measuring the effects of the road project on savings for the national economy, taking account of the increase in traffic.

As with transport benefits, so too do we have a number of different measures for the increase in production. B-1 and B-2 use measures of production ("GNP") that do not take into account the costs of obtaining the extra GNP. B-3 does take this into account, by deducting these costs. Which is the better measure of the true increase in GNP? If there is considerable unemployment (or underemployment) in the economy (and especially in this particular region) then the extra costs of producing more GNP may not involve much loss of alternative output, since the resources are not being drawn away from other uses (of course, the situation may be very different for different resources: labor may be unemployed while foreign exchange is very scarce). In addition, you must know whether you want to measure the increase in benefits or the rate of return. This exercise has been concerned exclusively with the measurement of benefits, not with rates of return. Obviously project A may have larger benefits than some project B, but this means nothing until one compares relative costs. So the measurement of benefits deals with only half the problem, though the more difficult half.

VII-D-4 is one possible measure of total benefits to the economy, adding together transport savings plus that portion of the extra GNP that may be credited to the road project alone.

* * * * *

I. Production, trade, and traffic before conversion of seasonal dirt road to all-weather gravel road

A. Actual volume of sales at \$100/unit, retail	10,000 units p.a
B. Potential volume of sales at market price of \$90/unit: each \$1.00 decrease in price is assumed to enlarge demand by 500 units	15,000
C. Value of retail sales at \$100/unit	\$1,000,000
D. Composition of unit value at retail market	
Total price	100
Merchant's purchase price of goods delivered to his premises	90
Merchant's mark-up to cover distribution costs and profits (including any producer's surplus)	10

E. Distribution of supply

Source	Distance from market	Transport charges	Realization price at source	Supply from source (units)	Supply from producers with specified production costs a/		
					\$60/unit	\$50/unit	\$40/unit
A	100 mi.	\$30/unit	\$60/unit	6,000	5,000	1,000	-
B	150	40	50	3,000	-	2,000	1,000
C	200	50	40	1,000	-	-	1,000

F. Analysis of GNP, production costs and producer surpluses

1. Value of retail sales	\$1,000,000
Merchant's mark-up	100,000
Payments to carriers and farmers	900,000
To carriers	350,000
To farmers	550,000

	<u>Factor payments</u>	<u>Factor costs of production a/</u>	<u>Factor surpluses above costs</u>
2. Marketing	\$100,000 p.a.	\$95,000 p.a.	\$5,000 p.a.
Transport	350,000	332,500	17,500
Agriculture	550,000	530,000	20,000
Total	\$1,000,000	\$957,500	\$42,500

a/ including minimum return on capital necessary to induce production.

II. Production, trade, and traffic after conversion of seasonal dirt road to all-weather gravel road

A. Volume of sales	15,000 units p.a.
Price at market (including 10% merchant's mark-up)	\$90/unit
Previous effective demand at \$100	10,000
Previous potential demand at \$90-\$99	5,000
Value of retail sales:	
at current prices	\$1,350,000
at constant (original) prices	\$1,500,000

B. Distribution of supply

Source	Distance from market	Transport charges	Realization price at source	Supply from source (units)	Supply from producers with specified production costs a/	\$60/unit	\$50/unit	\$40/unit
A	100 mi.	\$15/unit	\$66/unit	7,500	6,500	1,000	-	-
B	150	20	61	4,500	500	3,000	1,000	1,000
C	200	25	56	3,000	-	1,500	1,500	1,500

a/ Including minimum return on capital necessary to induce production.

C. Analysis of GNP, production costs, and Consumer and Producer surpluses

1. GNP

Value of retail sales (= GNP in current prices)	\$1,350,000
Merchant's mark-up	135,000
Payments to carriers and farmers	1,215,000
Carriers	277,500
Farmers	937,500

2. Producers' costs and surpluses

	Factor payments	Factor costs of production a/	Factor surpluses above costs
Marketing	\$135,000 p.a.	\$128,250 p.a.	\$ 6,750 p.a.
Transport	277,500	249,750	27,750 b/
Agriculture	937,500	795,000 c/	142,500
	\$1,350,000	\$1,173,000	\$177,000

a/ Including minimum return on capital necessary to induce production.

b/ Assumed to increase from 5% to 10% of receipts because of heavier pay loads, faster vehicle turn-around, reduced maintenance needs.

c/ Determined by figures in II-B.

3. Consumer surpluses (from I-B)

Consumer surplus from purchase @ \$90/unit
of 10,000 units in effective demand
earlier @ \$100

\$100,000

Consumer surplus from purchase @ \$90/unit
of 5,000 units in potential demand
earlier @ \$90-99

22,500

Total consumer surplus:

\$122,500

III. A. Analysis of Increase in GNP

1. <u>Increase in GNP</u>	\$000 p.a.		Increase (or Decrease)
	<u>Before road improvement</u>	<u>After road improvement</u>	
Value of retail sales:			
current prices	1000	1350	350
constant (original) price	1000	1500	500
2. <u>Transport charges</u>			
Paid to carrier			
Goods from source: A	180	112.5	(67.5)
B	120	90	(30.0)
C	50	75	25.0
Value at current prices	350	277.5	(72.5)
Value at constant (original) price	350	308.3	(41.7)
3. <u>Farmer's gross receipts</u>			
at source: A	360	495	135
B	150	274.5	124.5
C	40	168	128.0
Value at current prices	550	937.5	387.5
Value at constant (original) price	550	1041.7	491.7
4. <u>Merchant's mark-up (10% of value of sales)</u>			
Value at current prices	100	135	35
Value at constant (original) price	100	150	50
5. <u>GNP: Summary</u>	<u>Current prices</u>	<u>\$000 p.a. at constant (original) price</u>	
Increased gross receipts of farmers	387.5	491.7	
Increased distribution income of merchant's total above	35 422.5	50 541.7	
Subtd. decrease in receipts of carriers	72.5	41.7	
Increase in GNP	350.0	500.0	

III. B. Analysis of increase in production costs

	<u>before road improvement</u>	<u>after road improvement</u>	<u>increase or decrease</u>
1. <u>Agricultural costs</u>			
Farmer with costs of			
\$60/unit	300	420	120
\$50/unit	150	275	125
\$40/unit	<u>80</u>	<u>100</u>	<u>20</u>
Total production			
costs: current prices	530	795	265
constant original price	530	883	353
2. <u>Transport costs</u>			
95% of carrier receipts before, 90% after road improvements.			
Goods from source: A	171	101.25	(69.75)
B	114	81	(33)
C	<u>47.5</u>	<u>67.5</u>	<u>20</u>
Total production			
costs: current prices	332.5	249.75	(82.75)
constant original price	332.5	277.5	(55.0)
3. <u>Distribution</u>			
95% of merchant's mark up:			
Current price	95	128.25	33.25
Constant (original) price	95	142.5	47.5
4. <u>Production costs: Summary</u>			
	<u>Current price</u>	<u>\$000 p.a. Constant (original) price</u>	
Increased production costs of agriculture	265	353	
Increased production costs of distribution	<u>33.25</u>	<u>47.5</u>	
Total above	<u>298.25</u>	<u>400.5</u>	
Subtract: Decreased pro- duction costs of transport	<u>82.75</u>	<u>55.0</u>	
Increase in production costs incident to increase in GNP	215.5	345.5	

IIIC. Analysis of increase in producer and consumer surpluses

1. <u>Producer's surpluses</u>	before road <u>improvement</u>	\$000 p.a.	
		after road <u>improvement</u>	increase or <u>decrease</u>
a. <u>Agriculture:</u> Revenue from sale	550	937.5	387.5
Production costs	<u>530</u>	<u>795</u>	<u>265</u>
Surplus (contribution to real net income)-current price	20	142.5	122.5
-constant(original) price	30	158.7	138.7
b. <u>Transport:</u> Revenue from transport	350	277.5	(72.5)
Production costs	<u>332.5</u>	<u>249.75</u>	<u>(82.75)</u>
Surplus (contribution to net real income)-current price	17.5	27.75	10.25
-constant (original) price	17.5	30.8	13.3
c. <u>Distributors:</u>			
Revenue from mark-up	100	135	35
Production costs	<u>95</u>	<u>128.75</u>	<u>33.25</u>
Surplus (contribution to net real income)-current prices	5	6.75	1.75
-constant (original) price	5	7.5	2.5
d. <u>Producers' surplus: Summary</u>	\$000 p.a.		
	<u>Current price</u>	<u>Constant (original) price</u>	
Increase in surplus accruing to farmers	122.5	138.7	
Increase in surplus accruing to merchants	1.75	2.5	
Increase in surplus accruing to carriers	10.25	13.3	
Total increase	<u>134.5</u>	<u>154.5</u>	

2. Consumers' surplus incident to increased sales @ \$90 (computed as shown below)

\$122,500

For Purchasers willing and able to pay	Cons.surplus per unit @ \$90 price	Units sold	Total cons. surplus
\$100	10	10,000	\$100,000
99	9	500	4,500
98	8	500	4,000
97	7	500	3,500
96	6	500	3,000
95	5	500	2,500
94	4	500	2,000
93	3	500	1,500
92	2	500	1,000
91	1	500	500
90	0	0	0
		<u>15,000</u>	<u>\$122,500</u>

IV. Economic benefits as measurable by transport savings

current price

Formula 1. (Savings to national economy)

10,000 units p.a.: transport cost of production before road improvement	\$332,500 p.a.
15,000 units p.a.: transport cost of production after road improvement	<u>249,750</u>
Difference	82,750
Add back: transport cost on improved road of 5,000 additional units	<u>92,250</u>
Saving adjusted for traffic increase	<u>175,000</u>
Deduct: tax component	<u>17,500</u>
Net saving	<u>157,500</u>

Formula 2. (Savings to vehicle owners)

Transport cost to haul original volume of 10,000 units	
p.a.: applying unit costs before road improvement	\$332,500 p.a.
: applying unit costs after road improvement	<u>166,250</u>
(i) Saving, original traffic	<u>166,250</u>
Transport cost to haul additional volume of 5,000 units	
p.a.: applying unit costs before road improvement	184,500
: applying unit costs after road improvement	<u>92,250</u>
Difference	92,250
50% of difference	<u>46,125</u>
(ii) Saving, induced traffic	<u>46,125</u>
(iii) Road-user savings on original plus induced traffic:	
Saving to vehicle owners	\$212,375 p.a.
Deduct: tax component	<u>21,235</u>
Saving in terms of economic cost	<u>191,140</u>

Formula 3. (Savings to vehicle clients)

Transport charges for original volume of 10,000 units	
p.a.: applying unit charges before road improvement	350,000 p.a.
: applying unit charges after road improvement	<u>175,000</u>
(i) Savings on original volume of goods	<u>175,000</u>
Transport charges for additional volume of 5,000 units	
p.a.: applying unit charges before road improvement	205,000 p.a.
: applying unit charges after road improvement	<u>102,500</u>
(ii) Savings on additional volume of goods	<u>102,500</u>
(iii) Savings on total volume	<u>\$277,500 p.a.</u>

V. Economic benefits as measurable by increased production and trade

	---- \$000 p.a. ----	
	<u>Current Prices</u>	<u>Constant (original) Prices</u>
1. Value of retail sales after road improvement		
10,000 original units @ \$90	900	1,000
5,000 added units @ \$90	<u>450</u>	<u>500</u>
Value at market	1,350	1,500
Subtract: sales of original 10,000 units @ \$100 before road improvement	<u>1,000</u>	<u>1,000</u>
a) Increase in GNP (before tax allowance)	350	500
Subtract: 10% allowance for taxes	<u>35</u>	<u>50</u>
b) Adjusted increase in GNP	<u>315</u>	<u>450</u>
2. Increase in GNP (before tax allowance)	350	500
Add: decreased payments for transport of increased volume	<u>72.5</u>	<u>41.7</u>
increase in funds available to pay non-transport factors	<u>422.5</u>	<u>541.7</u>
increased payments for marketing	<u>35</u>	<u>50</u>
increased payments for agriculture	<u>387.5</u>	<u>491.7</u>
3. Increase in GNP (before tax allowance)	350	500
Subtract: increase in total costs of production	<u>215.5</u>	<u>345.5</u>
Net increase in GNP	<u>134.5</u>	<u>154.5</u>
Marketing component	1.75	2.5
Transport	10.25	13.3
Agriculture	<u>122.5</u>	<u>138.7</u>

VI. Economic benefits as measurable by consumer and producer surpluses

	<u>Current prices</u>
1. Consumer surplus from sale of 15,000 units @ \$90/unit:	
10,000 units in effective demand before road improvement @ \$100/unit	\$100,000 p.a.
4,500 units in potential demand before road improvement @ \$91-99/unit	22,500
500 units in potential demand before road improvement @ \$90/unit	0
Total	<u>\$122,500</u>

2. Increase in distribution surplus from sale by merchants of 50% more volume at equal (10%) mark-up 1,750 p.a.

3. Increase in transport surplus from wider profit margins incident to more intensive use of trucks, heavier payloads, reduced maintenance needs.

10% of charges totaling \$277,500 for 2,035,000 ton-miles on improved road 27,750

5% of charges totaling \$350,000 for 1,250,000 ton-miles on original road 17,500

Increase \$10,250 p.a.

4. Increase in agricultural surplus from sale by farmer of 50% more volume at higher realization prices.

Source A producers 35,000

Source B producers 54,500

Source C producers 33,000

Increase \$122,500 p.a.

	Current Prices	Constant (original) Prices
Increase in producer surpluses	134.5	154.5
Emergent consumer surplus	122.5	133.6 a/
	257.0	288.1

a/ 10,000 units in previous demand 111.1
5,000 units not in previous demand 22.5
133.6

VII. Summary comparison of economic benefits as computable by various measures

---- \$000 (rounded) p.a. ----

	Current Prices	Constant (original) Prices
A. <u>Transport Savings</u>		
1. Savings to national economy (excluding tax component)		
a) without allowance for increased traffic volume	75	83
b) with allowance for increased traffic volume	158	176

Current
Prices

Constant (Original) Prices

2.	Savings to vehicle owners		
	a) original traffic only:		
	i. including tax component	166	185
	ii. excluding tax component	149	166
	b) original plus induced traffic:		
	i. including tax component	213	237
	ii. excluding tax component	191	213
3.	Savings to vehicle clients		
	a) original traffic only	175	194
	b) original plus induced traffic	278	309
B.	<u>Increased production and trade (excluding tax component)</u>		
1.	Increase in GNP without allowance for decreased expenditure to transport	315	450
	increased volume of goods		
2.	Increase in GNP plus transport savings adjusted for larger traffic volume	473	626
3.	Increase in net real income:		
	a) before allowance for release of portion of vehicle fleet for transport service on other roads	121	139
	b) allowance for vehicle release assumed equal to 25% of transport costs of production before road improvement	56	62
	TOTAL	177	201
C.	<u>Increased consumer and producer surplus</u>		
1.	Release for other expenditures and/or investment of consumer's income previously spent on buying original volume of goods at higher unit prices	100	111
2.	Transfer of consumer income (because of lower price) from other goods and services and/or savings	22.5	22.5
3.	Generation of merchant, carrier, and farmer profits available for increased investment and/or expenditure	134.5	154.5
	TOTAL	257	288

D. Reduction in transport costs plus increased production and trade attributable to transport investment

Current Prices

1. Transport savings (costs of production) on original traffic: - current prices (net of tax) \$149,000 p.a.
- constant (original) price 166,000
2. Assumed composition of required incremental investment in transport and agricultural facilities

<u>Total</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>
Road construction and vehicle fleet	75	50	25
Agricultural production	25	50	75

----- \$000 p.a. -----

	<u>Current Price</u>	<u>Constant (Original) Price</u>
3. <u>Increase in GNP</u>	<u>315</u>	<u>450</u>
Attributable to transport investment assumed to be:		
- 25% of total investment	79	112
- 50%	157	225
- 75%	236	337
4. <u>Economic benefits attributable to improved roads</u>		
Assuming: 25% investment ratio	228	278
50%	306	391
75%	385	503

PROJECT ELEMENTS AND THE PROJECT MODEL

GEORGE B. BALDWIN *

INTRODUCCION

People are sometimes bothered because they do not have a clear and unambiguous conception of just what a project is. They can relax: there is no clear, sharp technical definition of a project. It is perfectly adequate and respectable to rely on common sense and convenience.

One is often tempted to think that a development project necessarily means the establishment of a complete legal, managerial and financial and accounting entity. In many cases this may be true. But in the majority of cases projects represent the expenditure of capital funds by pre-existing entities which want to extend or improve their operations. We will define a project as any expenditure of

funds for the purpose of creating physical assets whose subsequent use can be analyzed with the usual tools of economic and financial analysis. In other words, any project, even if it is only part of a much larger enterprise, can be looked at and analyzed "as if" it were an independent, self-contained production unit. These are the two key tests — one, the creation of a new unit of production (which may replace an older or competing one) which will use resources to meet some need, and two, this new or renewed unit of economic activity must be sufficiently self-contained to make it amenable to economic and financial analysis. This requirement that a project should be something relatively "self-contained" allows us to avoid calling every expenditure of capital funds "a project". It would be silly for example to define the expenditure of capital funds for one electric motor or for one loom that will become part of a new weaving shed as independent projects — the weaving shed is obviously the project. On the other hand, a railway that wants to (1) build a new extension, (2) replace its steam locomotives with diesels, (3) to double-track its busiest line, and (4) erect a wagon-building factory really has four separate projects on its hands even though they might all be financed as part of a single foreign loan and might be referred to collectively as one project.

The notion that a project is an activity sufficiently self-contained to permit financial and economic analysis raises the question of how to approach this task. It is sometimes said that each sector of the economy has such distinctive and characteristic problems that each is in fact unique and the analysis of projects in each sector had better be left to sector experts. This statement is half true; later on we shall return to the true half. But to begin with I want to deal with that part of the statement which is not true. A major reason why projects in different sectors are frequently felt to be dissimilar is simply that long traditions have developed in each sector that have tended to feed a spirit of independence and separatism and to neglect those aspects of projects which they share regardless of the sectors from which they may be drawn. However, for the training of well-rounded and flexible project analysts as individuals, and for the building up of appraisal staffs in planning bodies and financing institutions, there is a considerable advantage in setting out not from the uniqueness of projects in each sector (itself much too broad a statement) but from a way of thinking about projects that underscores the essential similarity of projects no matter from what sectors they may be drawn.

The remainder of this chapter is concerned with developing a relatively simply generalized model of a development project that can be applied to any sector of the economy. This model is certainly not sufficient by itself to permit a project analyst to perform competently in any sector without a great deal of specific knowledge of and experience in the sector concerned. However, the model

RESUMEN

ELEMENTOS DE UN PROYECTO Y EL PROYECTO MODELO

Se define "un proyecto" como un gasto de fondos con el fin de crear activos físicos cuyo uso subsecuente puede ser analizado por los métodos usuales del análisis económico y financiero. Aquí se ofrece un modelo general para ayudar en el análisis de cualquier proyecto. El analista no puede ser especialista en todos los ramos, pero con un modelo general tendrá la visión amplia que se requiere de él.

(Para el modelo completo, vea Fig. 3).

Básicamente, el modelo es de un proceso insumo-producto. La diferencia entre insumos internos (mano de obra y capital) y externos se explica; la creación del producto es la actividad de combinar los insumos internos y externos. La evaluación de un proyecto empieza allí: Análisis del mercado o necesidad, ¿Es necesario y útil el producto o el servicio?

La mayor parte de la evaluación se concentra en decidir qué valores tienen ciertos elementos de la evaluación. Hay que considerar 2 clases: 1) cantidades físicas de insumos y productos; 2) precios y costos. El analista debe asegurarse antes de todo de la certeza de los valores cuantitativos de los ingenieros. Las suposiciones técnicas determinan el volumen de producto útil de todo proyecto. Una manera de examinar estos datos técnicos y financieros es "cambiar" los datos. El uso imaginativo de "análisis de sensibilidad" aclara los elementos cruciales.

Para introducir valores económicos y financieros en el modelo, es conveniente dividir a los proyectos en 2 clases, comerciales y servicios. De allí, se puede pasar a investigar 2 puntos, análisis financiero (posibilidad de ganancias) y análisis económico, (valor del proyecto en la economía general).

Mirando al valor agregado (Fig. 3) es esencial entender que eso representa el valor generado entre la unidad de producción misma, esto es, el mismo producto. Esto es un punto de confusión, hoy que evaluar la relación entre X, suma de capital y el aumento correspondiente del valor agregado que es capaz de generar. No se refiere a la relación del total de capital y el valor en el sentido ordinario del producto total. Este representa la suma de insumos comprados y valor agregado. Otra cosa importante sobre el valor agregado es que corresponde exactamente a la remuneración total de los factores de producción ligados a la unidad de producción.

Finalmente, hay que comparar costos y beneficios. La cuestión central en la evaluación es si los beneficios (outputs) valen los costos o sacrificios de su producción. ¿Es el mejor uso de los fondos disponibles, u otro proyecto podría dar más beneficios para menos costos?

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De su próximo libro sobre avalúo económico y financiero de proyectos de desarrollo el doctor Baldwin ha cedido para esta Revista el capítulo segundo que constituye el artículo presente.

(2nd chapter of book on Iran)

does have the great advantage of putting project analysts in a position where they know how to attack projects of a type they may be unfamiliar with. It is then that they must call on their energy, ingenuity, and humility as they try to translate the main elements of the general model into the all-important specifics of the individual projects that come to them.

WHAT THE MODEL TELLS US

A model is a simplified representation of reality. There are many kinds of models—physical scale models, pictures, word descriptions, or a set of mathematical relationships. The model we shall be talking about in this chapter is a diagram and word-description of the various parts of the picture and what they mean.

The value of a model lies in its ability to give us a quicker and better understanding of reality than if we try to look directly at reality itself, or approached it through the detailed study of the separate parts that make up reality. We do not expect an engineer to know all aspects of a project; we expect him to be an expert only on its engineering elements. We do not expect a financial analyst to know all about a project; we expect him to be expert only on the financial elements of a project. In the final analysis the task of project appraisal consists of harmonizing the expert contributions of various specialists who work on the major separate elements of any project. On the other hand, there are certain people who have a special responsibility for taking an overall view of any project, people who must have an understanding of how the main elements fit together. In addition, the specialists themselves can benefit if they have an overall understanding of how their contribution will fit into the total project appraisal. This book is intended primarily for people concerned with the economic and financial evaluation of projects. People with these skills (and particularly the economists) have both a generalist and specialist role in project analysis. Consequently it is probably more important that these two groups understand all the major elements of a project and their relationships than it is for other professions who contribute to the overall evaluation.

One of the problems many economists have in communicating effectively with other professions is that they are concerned with concepts and measurements that apply to the aggregate level of national economic activity. They tend to think in terms of national income or national product. Projects, however, are made up of details whose relationships to the larger concepts of national income and national product are not always self-evident. One of the great values of a simple project model is that it can show how each separate act of investment—each project—can be related to national income analysis and to other aggregate economic concepts and measurements frequently encountered in economic analysis. For example, the essential concept of value added is immediately made clear and so is its distribution among the factors of production. The relationship of a project's value added (and the factor incomes which make up value added) can then be related easily and directly to national income. The effect of that rather mysterious concept "shadow prices", and of excise taxes, can be simply demonstrated. So too can the useful concepts of the capital-output ratio, the capital-employment ratio, and the financial analyst's concept of "cash flow". The model itself does not of course tell us what tests to apply to help decide whether or not a particular project is a good one. That problem is dealt with in later chapters. But the model does provide a way of organizing our thinking and of visualizing relationships and sets us headed in the right direction as we set out on the task of project evaluation and start to "put numbers on things"—i.e. to estimate physical quantities and to put prices on them.

THE MODEL IN ITS SIMPLEST FORM:

We shall begin with the very simple diagram 1 below (the full diagram may be found in Figure 3):

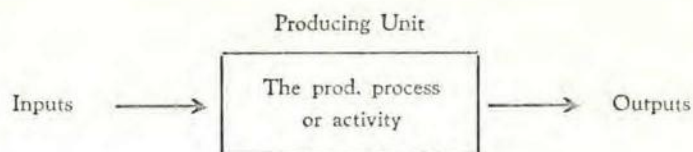


Figure 1

This is a picture of any kind of useful economic unit we care to think of. It might represent a factory, a power generating station, a retail store, a peasant farm, a merchant ship, a national airline (or indeed a single airplane), a primary school or a university, a rural health clinic or an urban hospital, a super highway or a rural feeder road, or even a local police station or a ministry building or perhaps even a presidential mansion. Each of these represents a center of economic activity of some kind. Its output may not be anything physical or tangible—indeed a great many useful "production units" in every economy exist to produce intangible outputs that we call services. But every one of these economic units either makes something tangible and physical or provides some useful intangible service, the production of which requires the use of certain economic resources purchased from outside the economic unit in question. These "external inputs", if they were not used at the point under consideration, would be available for use somewhere else in the economy (in a general sense we are here touching on the most important single question involved in project appraisal: Is a proposed use of resources at a particular point in the economy—i.e. in project A, as good a use of these resources as any other we can find. Nobody would vote to use resources for low-priority uses because using them for such purposes makes them unavailable for any other project and causes us to miss better opportunities).

Just as all projects require external inputs they also require the use of a certain amount of capital and labor which are attached to the economic unit and which may be called the "internal inputs". Indeed, these internal inputs are the economic unit; without them the unit would not exist. They are the economic "assets" which constitute the firm, or enterprise, or economic unit or indeed whatever name we want to give our project. The distinction between "external" and "internal" inputs calls for a revised diagram:

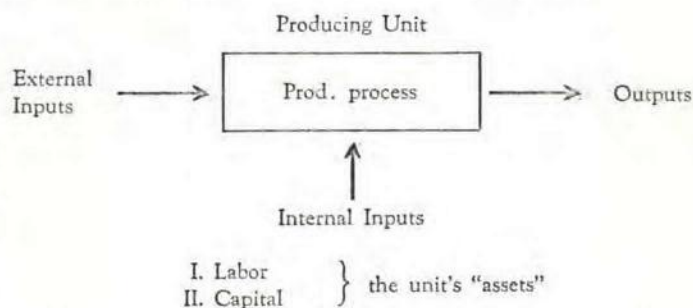


Figure 2

Our use of the word "assets" in the diagram is not exactly the same as its use in accounting and as it would appear on a company balance sheet. One relatively minor adjustment is the necessity for taking account of working capital; this is easy, since all it represents is an enlargement of the capital of the enterprise by taking into account the fact that some of the "external inputs" have been purchased and are in process of moving through production activities and being combined with internal outputs and may be in distribution channels awaiting sale. A much more important point is that one of the factors of the production, labor, cannot be considered a capital asset in the legal or accounting sense. The reason for this is the ban on slavery. If slavery were an acceptable human institution, then it is analytically possible to imagine that all or part of the labor supply attached to any economic unit could be treated

exactly like any building or piece of machinery. It would be possible to estimate the present value of the future services of each laborer for the remainder of its useful economic life and to enter this value as one of the capital assets of the enterprise. Such assets could then be bought and sold just like any other capital assets. This is precisely what was done in an earlier period of history in those countries where slavery was practiced. The legal ban on slavery means that labor has to be considered a current input and that the length of the future period of its services has constantly to be renegotiated—i.e. for an additional month or year or whatever the employer and employee can agree on.

The activity of combining the external and internal inputs results in the creation of the output, the goods or services which the project was designed to produce. Eventually these goods or services will be sold, or if they do not consist of outputs meant to be sold, they will otherwise enter the uses for which their production was designed. It is at this point in our project diagram that every project appraisal should begin—i.e. with a market analysis. It makes no difference whether or not the project output is intended for sale; if it is not to be sold, all we need to do is to change the term "market analysis" to read "need analysis". If one cannot establish reasonable prospects for making use of the output of a project, there is obviously no point in wasting people's time and money in evaluating any other aspects of the proposal.

The producing unit we have been talking about represents what is created when "the project" is completed. Thus a project is really the process of spending capital funds to bring into existence new economic units. We could of course treat the process of investment—i.e. the activity of creating new producing units—in exactly the same terms we have been using above. That is, we could conceive of an existing producing unit, a construction firm, which combined certain external inputs with its own internal inputs to produce an "output" which would consist of a new producing unit. But when we talk about project evaluation we are talking about the evaluation of the long-run prospects of a producing unit which it is proposed to construct.

THE PHYSICAL AND MONETARY VALUES USED.

The largest part of project appraisal usually consists of deciding what numbers (values) to put on certain elements of the appraisal. These numbers will be of two kinds, *physical quantities* of inputs and outputs and *economic and/or financial value* of inputs and outputs, i.e. prices and costs (a cost is simply the price of an input). We are not yet ready to talk about financial and economic values. However, this is the place to emphasize the crucial importance of the quantitative values which the engineers place on the various external and internal inputs in any project and on the yields resulting from their combination. These technical assumptions and estimates determine the volume of useful output to be expected from any project. The subsequent economic and financial appraisal of the project will be greatly affected by what the engineers tell us about the physical basis of the project's operations.

The kinds of quantitative technical assumptions I have in mind are perhaps easiest to think of in terms of a factory or a farm, but they apply equally to any type of economic activity including schools, hospitals, roads, theaters, government ministries, airlines, harbors, power plants, or anything else. After the engineers have determined the product-mix for the enterprise in terms of specific quantities and qualities of annual output, they must then determine the amounts and qualities of each specific purchased input required and make assumptions about how much of this may be spoiled or wasted before it becomes embodied in final products; they must make assumptions about labor skills and other factors effecting labor productivity, including its availability at the site where the project will be constructed; the rate of utilization of machinery and other capital equipment (e.g. the number of shifts in schools as well as in factories, or whether or not a particular piece of land will be double

cropped); the frequency of machine breakdowns; the number of working days per year; the amount of heat energy that will be extracted from a given amount of fuel; the percentage of final output that may be imperfect in quality or completely unsaleable; the yield of crops per hectare, and many similar questions. Part of the expertise of technicians and engineers in any given field is that they will carry around in their heads certain standards that allow them to give answer to every one of these questions. An important part of a solid project appraisal, however, is to test the reasonableness of the assumptions or judgments made by the technicians in the particular case at hand. For example, a feasibility study made by persons not sufficiently familiar with the degree of availability of raw materials or skilled labor in a particular locality or who assume that labor will be motivated in a developing country with the same intensity as in others from which the technician may draw his standards can easily lead to judgments which will be later disappointed in practice.

It may appear presumptuous for other people to question the assumptions and judgment of engineers and other technical experts. Anyone who feels this way is unfit for the role of a project analyst! Question-asking is one of the chief "techniques" of project evaluation and everyone involved in the art must cultivate this habit. Sometimes the questions will be asked face-to-face, as the various people in the chain of an evaluation ask others for clarifications, explanations, or for more information. Often questions will get asked only in the mind of an analyst as he asks himself whether or not the data before him are reasonable and unbiased. It will help immensely if the people preparing the data have made explicit the assumptions on which their calculations rest.

One systematic way to deal with technical and financial data that rest on assumptions and judgment is to see how the results are affected by changing the data. The imaginative use of "sensitivity analysis" can show which elements and judgments about them are crucial in the overall analysis. People responsible for the evaluation can then concentrate their energies in sharpening up the estimates for these particularly important elements and can try to assure that the performance of the project, when it comes into operation, will live up to expectations in these key problem areas.

THE COMPLETE DIAGRAM AND ITS PARTS

We are now ready to introduce economic and financial values into the diagram. This is done in Figure 3. The dashed lines represent economic and financial flows, usually flows of money. The flow of money begins of course on the output side of the diagram and—because money is what we give up when we buy things—flows in a direction opposite to the physical flows with which we have so far been concerned.

It is convenient to divide all projects into two broad classes, (1) those that are revenue-producing and self-financing (i.e. "commercial" type projects) and (2) non-revenue producing projects. The first class of projects are normally intended to cover all their costs (i.e. their use of external and internal inputs) by the sale of their outputs, usually with something left over (profit). In every economy, however there are many units of production that are not expected to cover their costs from the sale of their outputs. They have to be wholly or partially financed from other sources. Naturally the great bulk of such projects are carried on by government which can finance such activities by raising funds through taxation and distributing them through the budget.

Let us begin with a revenue-producing project intended to cover its full costs from sales. The volume of sales per month or per year represents a certain number of physical units of output multiplied by their prices ("market prices"). This is the amount of money the customers pay and it starts a flow of funds toward the production enterprise. If there should be an excise tax on the output, then some of the money paid by customers will not get through to the

Figure 3
A GENERAL MODEL OF A PROJECT

I. Physical Analysis: Engineering, Technology, Manpower

External Inputs

raw materials
fuels
electricity
office supplies
maintenance supplies
transport services
advertising services
banking services (not loans)
insurance

The Economic Unit

Production Activity

Payments to outside suppliers

Cash received by the unit = p_2q

Output(s) = Sales.

Cash payments by customers (or other users) = p_1q

Internal Inputs
(the unit's "factors of production")

I. Labor (types and numbers from a "manning" table)

II. Capital

land; buildings, machinery, equipment, spare parts, furniture, vehicles, utilities, inventories, etc.

(Remuneration of Factors of Production) Before Taxes on Income

I. Labor: wages, salaries, bonuses, allowances (in cash and kind), social security payments, etc.

II. Capital

A. Depreciation

B. Net Profits

1. Interest

2. Income Taxes

3. Re-invested earnings

4. Dividends

"Cash Flow"

= Value of Outputs

II. Economic & Financial Analysis

1. Value Added: Value of purchased inputs

2. Cost/Benefit, Rate of Return:

plus: Value added to the external outputs by the internal inputs

Costs: Capital plus Operating

Benefits: revenues*

*or economic values that can be measured as if they were money

G. B. Baldwin
March, 1966

enterprise but will be diverted into the government treasury. That is why in Fig. 3 the prices used to represent cash received by the unit are not necessarily the same as those paid by the customers. Where an excise tax exists, P_2 will be less than P_1 . However P_2 can sometimes be larger than P_1 —e.g., in the case where the government subsidizes a production activity and allows customers to pay a lower price than the production unit requires to cover its costs. After examining these aspects of the project we arrive at the *cash receipts* realized by the economic unit. A large proportion of these have to be passed on to other economic units in the form of payments to outside suppliers. What remains left over is available for payment to the factors of production attached to the enterprise. Although payments to the factors of production will take many detailed forms, depending upon the nature of the enterprise, they all consist of payments to either labor or capital. The particular way in which the factor payments are shown in Diagram 2 is more characteristic of a large industrial enterprise than it is of many others. However the factor payments in other types of activities could easily be brought within this framework by changing the classifications of factor incomes. The most desirable breakdown for factor payments is that employed in national income accounting. This allows project analysis to be related easily and directly with the national accounts. The breakdown recommended by the United Nations has six categories, as shown below in the left-hand column (the right-hand column is a slight re-classification to make it easier to identify "cash flow").

Table 1. Distribution of National Income
(or of the Value Added in a Project)

Income (Before Income taxes) Paid Out As:

U.N.'s Format

Author's Format

1. Compensation of employees	1. Wages and Salaries
2. Income of unincorporated enterprises	2. Incomes of unincorporated enterprises
3. Income from property	3. Rents
a. Rent	
b. Interest	
c. Dividends	
d. Business transfer payments	
4. Savings of private corporations	4. Interest (non-corporate)
5. Direct taxes on private corporations	5. Corporate profits, including
6. General government income from property and entrepreneurship	a. Direct taxes
	b. Depreciation
	c. Interest
	d. Dividends
	e. Re-invested earnings
	} "Gross Cash Flow"

If the project was a humble capital improvement on the farm of a peasant who had never heard of accounting the resulting increase in "value added" could nevertheless be estimated (by a farm economic study) and would take the form of an increase in "Income of unincorporated enterprises". This would be a mixture of the peasant's wage, the net profit on his capital investment, any interest he had to pay in the event his project had been financed partly from borrowed capital, and any taxes he might have to pay on his income, profits, or property (this is the same concept as a corporation's "cash flow"). It is because of the impossibility of sorting out these separate elements of the incomes of small production units that everything is lumped together as the "net income of unincorporated enterprises" (here, "net" means "after operating expenses").

To take another example from a different sector: If the project were a primary school, most of the factor payments would consist of Category N° 1 (salary payments to teachers). It is likely that the accounts of the school or Ministry of Education might not show any remuneration for capital either in the form of depreciation or of interest, income taxes, reinvested earnings, or dividends. On the other hand, the government might be paying interest if it had borrowed funds to construct the school building, but this interest would probably not pass through the accounts of the school itself would be handled as an internal transaction within the Ministry of Finance. Again the Ministry of Education's budget would probably not include any funds to cover the depreciation of school buildings. Although, if the Ministry's accounts were kept as most economists would like them to be kept, they would indeed include provision for this. However the accounts may be kept, school buildings will inevitably depreciate, and a thorough project appraisal must take this fact into account as one factor to consider.

We will come back to this question of the remuneration of the factors of production in a minute. For the present it is enough to note that we can step off from this point in our diagram in two major directions: (1) into the details of financial analysis, concerned with the project's "means of support" and financial profitability and (2) into economic analysis, which is concerned with the value of the project to the economy and not with its ability to survive financially.

The bottom half of Fig. 3 shows—in extremely schematic form—the way in which economic and financial analysis relates to the physical or "real" analysis covered by the top half of the diagram. The first line (II-1) shows how the important economic concept of "value added" relates to the physical analysis in the top of the diagram. In aggregate terms value added is simply the difference between the value of the unit's output and the value of all purchased inputs. It is easy to see that the term simply refers to the amount of value added to whatever value all the purchased inputs possessed as they entered the production unit (i.e. their delivered cost). The amount of "value added" generated in any project will obviously depend on both the quantity of output and the price at which it is valued. Thus it is possible to conceive of two exactly similar textile mills or cement factories, one of which is operating in a highly competitive environment, the other enjoying a high degree of monopoly power. The latter mill can easily charge a considerably higher price than the former. With exactly the same physical amount of both external and internal inputs, it will nevertheless generate a much greater amount of value added simply because of the favorable prices at which the physical output can be valued. However, the price at which monopoly cement may be sold in the market, while highly relevant for the financial analysis of the enterprise, may not be acceptable at all from the point of view of an economic analysis. If the high price of cement were the result of a large amount of tariff protection or of a restrictive import policy, and economist might make his calculations with a much lower unit price—for example, the price of cement landed at the main ports, which is what buyers would have to pay if the market

were completely free. This calculation would put this particular project on the same footing as other projects which did not enjoy such favorable protection and might reveal that, even though the project looked attractive financially to its sponsors, it appeared much less attractive from the point of view of the national interest.

It is essential to realize that Value Added represents the amount of value created or generated *within the production unit itself*. It is this amount of value which is the true "output"—the true "production"—for which the economic unit itself can take credit. The unit itself can take no credit for values purchased from outside the firm. The main point of project evaluation is to make decisions on how best to allocate resources, particularly capital. One of the main questions always asked is: How much economic value can we get from using a particular amount of capital in a specific project? That is, we want to know the relationship between a given amount of capital and the amount of "value added" it will be capable of generating. The latter will be the true "output" of the capital embodied in the project. This is in fact precisely what the "capital/output" ratio refers to—it *does not* refer to the relationship between the amount of capital being used and the value of the total output in the ordinary sense. The latter represents the sum of purchased inputs plus value added. Not infrequently one finds project reports which are confused on this point and which represent the capital/output ratio of the project as being the amount of capital embodied in the project over the total value of project output. This can be a useful ratio, but it is not the capital/output ratio (it is in fact the "turn-over ratio"). While the capital output/put ratio is of some interest and usefulness in project appraisal, its significance is distinctly limited. It is certainly far from sufficient by itself to give us any final judgment about the economic desirability of a project.

A second important point about "value added" is that it corresponds *exactly* to the total remuneration of the factors of production attached to the production unit. The relation between the payment of the factors and value added is that of an identity, i.e. there are simply different ways of looking at the same thing. In many project appraisals it may not be enough simply to arrive at a single overall estimate of value added; we may want to know in considerable detail what the distribution of this value is among the various factors of production—how much for wages, how much for taxes, how much for depreciation, how much for profits, etc. Indeed it is impossible to make a calculation of the financial or economic rate of return of the project without separating out that part of value added which represents remuneration of capital—and then further separating out the five distinct components of the total return to capital represented by depreciation, interest payments, income taxes, reinvested earnings, and dividends. (See Table 1).

Finally we come to the most important of all the many calculations that go to make up a good project appraisal. This is the comparison of costs and benefits, usually done as a rate-of-return calculation. As shown in Fig. 3 the use of the external and internal resources up to the break in the line represents the use of both capital and current inputs, uses which are represented by capital costs and operating (or "current") costs. There may be different ways of measuring costs; but however they are measured, costs represent the amount of value used in turning out a particular volume of outputs. The central question in project appraisal is always whether or not the benefits represented by the outputs are worth the costs or sacrifices involved in producing them. At a very general level one may say that if the same amount of resources could have been used to produce an even larger amount of benefits, then the proposed project should be abandoned in favor of the opportunity with the larger benefits. If one went ahead with the proposed project, even though it might yield a profit, one would nevertheless pay an additional "cost" over and above the costs explicitly taken into account in the project appraisal. This additional net cost would be the difference between the amount of benefit realized in the project

you chose and the larger benefit in the alternative project. The latter would represent an opportunity missed. In many cases the difference between two projects may be so small or so uncertain that no precise comparison is possible. Or it might be that after completing the less desirable project one could then take up the more desirable project—even though it might have been preferable, from a theoretical point of view, to take up the more desirable project first. Nevertheless, this concept of "opportunity costs" is central to the economic aspect of project appraisal since it focuses attention not on whether a proposal can pass a certain minimum test of acceptability but the harder test of whether or not there are any other possible projects which might yield greater benefits for the same amount of costs.

We are now ready to compare costs and benefits. This is reserved for subsequent chapters. All we will say here is that there are many different ways of carrying out such comparisons, and that there are often different points of view as to which kinds of calculations are most appropriate for particular types of projects. For the present we will simply note that there is no one calculation which can be relied on as universally applicable to projects in different sectors. Even if there were a single agreed test of project profitability there are so many knotty technical problems in carrying out satisfactory measurements of costs and benefits that the results must be regarded as human estimates, not as revelations of divine certainties. This is one important reason for not giving cost/benefit calculations excessive weight in the final decision whether or not to proceed with a project.

George B Baldwin

FOUR STUDIES ON THE IRANIAN "BRAIN DRAIN"^{1/}



Introduction

On ^(April 10), 1966, an article appeared on page 1 of the New York Times reporting the results of a world-wide reconnaissance of the "brain drain" by Dr. Ehsan Naraghi. Dr. Naraghi, Director of the Institute of Economic and Social Studies in Tehran, had conducted his impressionistic survey on behalf of the United Nations Special Fund, which has had a long-standing interest in the training of human resources. Dr. Naraghi's report was not rich in statistics, but it sounded a world-wide alarm about the loss of trained personnel from the less- to the more-developed countries. It did not take long for many influential Iranians to decide that their country was suffering from the world-wide drain which Dr. Naraghi had found to exist. By the summer of 1967 the Shah's twin sister, Princess Ashraf, was reported to be establishing a high-level committee to study the Iranian brain drain. At a somewhat lower level (but clearly in response to some high-level prodding) an informal committee of well-known economists and educators held a few meetings to discuss the problem and to plan some studies. Informal soundings were made about organizing an international brain drain conference in Tehran to demonstrate Iran's leadership in doing something about this alarming problem.

^{1/} The bulk of this paper was prepared for a conference held at Columbia University in November, 1968. This paper is an extension and revision of the conference document, published in the conference volume under the title, "The Iranian "Brain Drain"?".

History was cruel to these intentions but kind to Iran: no high-level brain drain committee was ever established, none of the planned studies were ever carried out, no conference was called. Within 12 months of the 1967 flurry of interest in Iran's assumed brain drain it became difficult to find anyone in Tehran who continued to show any interest in the problem. The Iranian economy of 1968-69 was riding a wave of prosperity that hardly reflected any serious bottlenecks of educated manpower made it difficult to argue that development was being held back by high-level manpower shortages. Iranian leaders, instead of complaining to foreigners about the number of good Iranians who were working abroad, were taking pride in the number who were returning home. By the summer of 1969 the Iranian brain drain was over.

The "on again, off again" character of Iran's brain drain partly reflects the Iranian style of handling public issues. But partly, too, it reflects the reality of a small problem that had grown smaller. Indeed, it is easy to let the foreigner's somewhat cynical amusement at the non-handling of a non-problem blind one to the major lesson of Iran's experience. This lesson is that a nation which is succeeding in providing reasonably satisfying employment opportunities under conditions of relative political stability can succeed in holding on to its key manpower. Nearly every other country study in this volume reports manpower losses that result from overproduction of educated personnel who cannot be used because the economy has failed to generate sufficient effective demand for their services. Iran's prosperity of the mid-sixties has pushed effective demand high in

many fields. The result is that during this decade relatively few key men have been leaving, and many have returned. What makes this experience especially significant is the change it represents from a decade ago: then, economic and political uncertainty pushed many talented Iranians abroad, along with many untalented ones. A major lesson of Iran's moderate loss of high-level manpower in the 1950's and early sixties is that such flows can reverse themselves if home conditions turn favorable -- even when there are boom conditions abroad. The Iranian lesson may not be universal; but there is no reason to think it unique.

In the early 1960's there were indeed reasonable grounds for suspecting that Iran was losing more than her share of high-level manpower to Western Europe and the United States (the two regions to which Iranians overwhelmingly go for higher studies and for foreign employment. By "more than her fair share" I mean only a rate of emigration of students or of professional manpower higher than some rather vague notion of a "normal" level of emigration -- i.e., normal as measured by the level of earlier years or by the rates of loss experienced by similar countries.

We would be on much surer ground if the statistics were better than they are. For example, the Government of Iran does not know, except in very general terms, how many Iranians are studying abroad in any year, in what countries they are studying, or in what fields. Losses from this student population through emigration are almost a pure guess. Nor can the host countries provide much better information. It is true that Iranian Embassies in countries where most Iranians study (e.g., the U.S.,

Germany, the U.K., France, Switzerland) are supposed to keep in touch with Iranian students in those countries. But records are hopelessly incomplete, out of date, and unanalyzed. I do not know about European governments, but the U.S. government does not publish figures on Student Visas issued to Iranians year-by-year, nor can it tell us how many Student Visas are converted each year into Resident Visas, a figure that would be a useful clue in measuring student brain drain. The American Embassy in Tehran has historical records of Student Visas issued, but it has not had money or staff to dig these figures out of the files. So one may say that while data often exist, statistics often do not.

Even if we had good statistics they would tell us more about "bodies" than "brains." When we use the term "Brain Drain" we implicitly have in mind something more than "bodies"; we mean bodies that contain above-average brains that have been given special value for nation-building by virtue of the education and training invested in them. As a practical matter I do not know of any objective way of classifying the quality of Iranians who emigrate, either temporarily or permanently. The most satisfactory classification I have encountered is a common-sense grading of human resources suggested by a well-known Iranian who has given considerable thought to this problem, Dr. Jahangir Amouzegar. In speaking of Iranians in the U.S. he classified them into three groups:

1. A tiny group of first-class brains who could not be used in Iran because the physical environment and working conditions necessary for the use of their talents does not yet exist

there. The world, including Iran, is better off when such rare individuals emigrate to a country where they can exercise their gifts. My own guess is that this group would account for less than half of one per cent of the population under consideration.

2. At the other end of the scale, the bottom end, is a fairly large group of what might be called petit-bourgeois Iranians most of whom came to the U.S. as students after failure to gain admission to an Iranian university. They typically arrive in the U.S. with very little money and are forced to take up menial part-time employment to make ends meet. They often take English-language instruction and register at some small college for a few courses. Eventually many of them marry American girls. These people have little to return to in Iran: they themselves would be embarrassed to return to their humble parental origins and their wives simply would not accept it for long. Consequently, many in this group remain here. Their families can point proudly to their sons "in America" and celebrate them as a new type of "Haji." They find more status and fulfillment by remaining in the U.S. than if they returned home. This group is very close to the classical European emigrant who came to the U.S. in the 19th century. I would hazard a wild guess that this "bottom" layer might account for 40-70 per cent of the total.

3. The third and last of Dr. Amouzegar's classes is a fairly sizable middle group, somewhat above petit-bourgeois status, who come from relatively good socio-economic backgrounds in Iran and who successfully acquire in the U.S. an education and a training that would be useful in Iran. It might account for 30-60 per cent of the total Iranian student population in the U.S. This is the critical group I shall have in mind in much of what follows.

The E.W.A. Studies

In 1967-68 E.W.A. sponsored four research projects in Iran that were designed to throw light on the emigration of Iran's elite manpower. Three of the studies were conducted by contractors, the fourth by the author. All four projects were intended to throw light on a single question: has Iran been experiencing a level of emigration sufficiently serious so that it has interfered with national development, particularly economic development? Put differently, have we any reason to believe that Iran's growth during the past 10-15 years would have been faster if its rate of emigration had been lower? The first task was to define the problem conceptually, to decide what it is we wanted to learn. We defined our objectives with three broad questions:

1. From the point of view of national development (again, particularly economic development) what were the key positions and what skills were needed to fill these positions? This went far

beyond the usual manpower approach, since it involved us in highly subjective judgments about critical development institutions, the critical jobs in these critical institutions, and the kinds of education and training needed to fill these key jobs.

2. How many key jobs did we need to worry about, in a quantitative sense? Here the main problem was to decide whether demand should be quantified by reference to some notion of (a) "needs" or "potential demand" (measured by international standards such as the number of doctors, or professors, or extension agents per thousand population) or (b) by reference to "effective demand," i.e., what the country can employ and pay for within the short-run future. Question 1 is the qualitative aspect of demand; question 2 is the quantitative aspect.
3. From the supply side, one then had to try to measure the seriousness of present shortages of qualified candidates for the key jobs and, where shortages existed, one was then ready to ask if there were qualified Iranians abroad who could fill these posts if only they would return home.

It proved very difficult to design straightforward research projects that could throw light on what we wanted to know. The migration statistics available from normal government sources, either in Iran or in the countries to which Iranians go for study or for work, were of almost no use in deciding whether or not a Brain Drain existed. This was chiefly because government

statistics on international migration are not organized with this problem in mind; but partly it was because neither the Iranian nor any foreign governments has had the time or money or ability to analyze what statistics they do have for purposes of Brain Drain analysis. This lack of helpful government statistics means that students of the problem must try to generate their own statistics. These are bound to be scrappy and incomplete, will often be based on the experience of single institutions, and will usually throw only indirect light on the overall problem. But a few statistics are better than none. Furthermore, statistics are not the only facts. One of the great strengths of research focused on selected institutions is that in addition to some quantitative data it reveals other "facts" that are equally important.

The four research projects to be summarized below consisted of the following:

1. A study of the records of 3,200 individuals who had returned to Iran during the four years 1963-67 to learn the distribution of foreign study by countries and by fields and levels of study. This study was done by the National Institute of Psychology, headed by Dr. Iraj Ayman.
2. A questionnaire-interview study of 50 key development agencies designed to find out how seriously their work had been affected by emigration. This too was done by the National Institute of Psychology.
3. A study of over 4,000 application forms in the Tehran files of the American Friends of the Middle East, covering the years

1954-66. This study covered only Iranians intending to study in the U.S.A. It was designed to find out more about who these students were, in terms of broad socio-economic and educational characteristics, and which colleges and universities they entered. The study could not tell us anything about student return to Iran. This work has been done by A.F.M.E. itself.

4. A study of experience with overseas faculty recruitment at Pahlavi University in Shiraz. This was an attempt to describe how the University went about identifying and contacting candidates in the U.S. and to measure its success in persuading men to accept faculty positions in Shiraz. This work was done by the author.

After summarizing the findings of each of these four projects I shall present seven summary generalizations about the Brain Drain which I think apply not only to Iran but to a great many countries.

1. Some Educational Characteristics of Returned Students

One of the greatest gaps in our statistical understanding of migration is the lack of figures on people who return. The largest class of such people in Iran are graduating university students, or recent graduates. The National Institute of Psychology attempted to get at this figure by studying such records on returned students as were available at the High Council of Education. Until that organization was abolished in the reorganization of higher education late in 1967, the High Council was the Iranian certifying agency for all diplomas and degrees awarded by foreign educational

institutions. It was not mandatory that returning Iranians should go to the High Council to have their degrees registered. However, they did have to do this if they wanted to apply for a government position; but normally a large proportion of returning students have tried for government positions. Consequently, we can assume that a large but uncertain proportion of returning foreign-educated Iranians did register with the Council.

N.I.P. studied the certification-decisions of the High Council of Education for four years, 1963-67. It did this on a "random sample" basis that covered about 3,200 individuals. Dr. Ayman's best judgment is that something like 1,000 foreign degrees were certified annually; therefore these 3,000-plus individual records account for about three-quarters of those submitting their degrees for certification during this four-year period. Analysis of these records gave us some understanding of where Iranians go for their foreign educations, what levels of degrees they returned with, and the fields in which they had studied. The connection between such information and the Brain Drain, however is tenuous and uncertain, though not entirely useless.

The few summary statistics that follow give a quantitative confirmation of what many already know. First, the countries in which returning Iranians of the early 1960's did their studying: only 1 per cent studied in Russia, only 2 per cent in Asia; only 3 per cent in the Middle East (mainly Turkey and the Lebanon); the main countries for foreign study for Iranians are of course the United States, Germany, the U.K., and France -- in that order. The U.S. accounted for 35 per cent of the 3,000 degrees

certified, Germany for 19 per cent, the U.K. for 13 per cent, and France for 11 per cent. Thus, nearly four out of five foreign-educated Iranians have studied in one of four countries. There is a sprinkling of students who return from the lesser countries of Europe; Austria and Switzerland are much the largest of these "lesser countries."

Second, the level of study: most returning Iranians came back with either a first university degree (i.e., a bachelor's) or something lower, such as a diploma or a high school certificate. This level accounted for over 60 per cent of the 3,000 degrees. Between 35 and 40 per cent were higher degrees -- 4 per cent of them M.A.'s, over 30 per cent doctorates. Although Dr. Ayman did not send figures, he states that few of the doctorates were earned in the U.K. or the U.S.; most were earned in countries "noted for their relatively lenient methods of offering doctorate degrees," such as France, Spain, and to some extent, Germany and Austria.

Finally, a few figures on fields of study. A remarkably high proportion of the 3,000 individuals returned to Iran with technical degrees: 26 per cent were doctors, 26 per cent were "technicians or engineers", 17 per cent had studied agriculture, and 8 per cent had a degree in math or a natural science. This accounts for 77 per cent of the total. The remaining 23 per cent was accounted for by social studies, fine arts (including architecture), management, and languages. It cannot be said that foreign study drains Iran of its technical graduates and returns to the country those with less-wanted skills.

2. The AFME Study

The second EWA-sponsored field study was an "origin and destination" study of some 4100 Iranians who applied for admission to U.S. colleges and universities between 1951-66 through the Tehran office of the American Friends of the Middle East (AFME).

The American Friends of the Middle East is a private U.S. foundation devoted primarily to assisting Middle Eastern students find places in American colleges and universities. AFME does not have a monopoly position vis-a-vis students desiring to study in the U.S.; it simply offers an educational "finding service", to whomever desires such help, without charge. Since AFME maintains only one office in Iran, and since students must apply to the office in person (not by mail) students wishing to seek AFME's help must either live in or travel to Tehran. AFME's "finding service" consists of forwarding an applicant's papers to an appropriate educational institution in the U.S., or to a clearing-house such as the International Institute of Education, with a view to having the applicant accepted for admission. Once a letter of acceptance (a standard document known as an I-20 Form) has been sent to Tehran by the institution the student may then apply to the American Embassy for a visa. In effect, applicants pass beyond AFME's knowledge and record-system as soon as they receive an I-20 Form from the U.S. and are handed over to the U.S. Embassy. AFME has no way of knowing whether or not an applicant did indeed apply for a visa, was given one, or whether he ever departed for the U.S. What the study presents, therefore, is data on student applicants, a group that would inevitably be larger (by how much is not known) than the number who actually became students in the U.S.^{1/}

The number of files included in AFME's statistical population was just short of 4100. This is not the total number of applications in the Tehran

^{1/}? An attempt was made to compare AFME applicant records with student visa lists maintained in the U.S. Embassy files in Tehran. This would have told us something about the proportion of applicants receiving I-20 Forms who continued on to the visa-issue stage. For various reasons it did not prove possible to make this comparison.

office but it is the total number for 1951-66 (with a few in 1967) of those students who received some kind of acceptance from an American educational institution. AFME officials have estimated that not more than about 25-30 per cent of all Iranians desiring to study in the U.S. go through the AFME office.^{1/}

By and large the Iranian students who come to the United States for their higher education are not part of any government program to send people abroad to acquire nation-building skills (that was the case, however, when Iranians first began to go abroad for university education in the 1920's). The overwhelming majority of students (95%?) are outside any government program and do not receive any funds from the Iranian government. A few receive government or university scholarships from the host country, but the overwhelming dominant source of funds is private -- family money plus whatever a student can earn for himself. One implication of the private nature of this student-flow is that the government has substantially no influence or control over the institutions which students attend or the subjects they study.

With this background we are in a position to summarize the main findings of the AFME study:

1. The typical Iranian intending to go to the U.S. for university studies is a single male entering his undergraduate studies. It is hardly surprising that 90% of the applicants have been males. What is somewhat surprising is the relatively high proportion of all applicants (male and female) at the post-graduate level (30%). Presumably almost

^{1/} There is at least one private, fee-charging education broker in Tehran who, for a fee of 30 tomans (\$40 U.S.) will guarantee to find a client a place in a U.S. institution. If he fails he returns the fee. In recent years this broker is said to have processed more applicants than AFME.

all of these graduate applicants had done their undergraduate work in Iran, or possibly Europe. The number of married individuals applying for foreign study was negligible at the undergraduate level; but at the graduate level between 15-20% of applicants were married.

2. If AFME's experience is representative of all Iranians applying for study in the U.S., there was no significant growth of U.S. bound students over the 17-year period. As Table-1 shows, there has in fact been no trend at all: a peak was reached about 10 years ago, in the late 1950's. If anything, there appears to have been a slight decrease in subsequent years. This is somewhat surprising in view of the rapid growth of secondary graduates in Iran since the late 'fifties and the much less-rapid growth of enrollments in domestic universities. One would expect such a combination of pressures to increase the "overflow" of students seeking educational opportunity abroad.

3. The age-distribution of both the undergraduate and post-graduate groups was somewhat older than would be true of Americans. At the undergraduate level, some 37 percent of the applicants were between 21-29 years (just over half were 18, 19, or 20). At the graduate level slightly more than 20% were aged 30 or older at time of application; only a third were 23, 24, or 25, the years of heaviest application for graduate work in the United States. Thus at both levels there was a somewhat heavier proportion of older students than would be true of nationals pursuing higher education in their own countries (whether in Iran, Europe, or the U.S.). Short of individual interviews there is no way of telling

whether this older sub-group included many individuals who had tried careers in Iran and were sufficiently dissatisfied to want to seek a new life abroad or who represented individuals sufficiently rooted in Iranian culture to be relatively sure to return.

4. The role of Tehran as a collecting point, or staging-area, for students who go abroad is abundantly clear from the AFME records.

Almost no one who had not done his secondary schooling in Tehran sought, or was successful in achieving, admission to a U.S. college or university. Ninety-six per cent of all applicants for undergraduate and graduate places had graduated from a high school in the capital -- although only half of these had been born in Tehran. The one-way flow of talent and opportunity in Iran, reflecting the country's chronic internal "brain drain", is evident from the fact that some 1780 students who had been born in the provinces graduated from Tehran schools but only 37 students born in Tehran graduated from a provincial high school.

5. The grade-distribution of applicants, ~~shown in Table 2~~, reveals little more than a "normal" spread of achievement scores. In judging whether Iranians seeking U.S. education had higher or lower scores than the general run of those graduating from high schools, or gaining admission to Iranian universities, one would have to make comparisons with grade-distributions provided by the Ministry of Education or the University of Tehran (whose student body of 15,000 is nearly the same size as the university population abroad). Unfortunately neither institution was able to supply any information. All that can be said is that, in the judgment of experienced AFME officials, the academic distribution

of AFME applicants is not believed to differ in any significant way from that of students who attend the nation's seven public and one private universities. The highly pluralistic nature of American higher education affords ample opportunities for both talented and untalented Iranian applicants. It is tempting to say that this is truer of American than of European education and that therefore a higher proportion of less-qualified Iranians pursue higher education in America than in Europe; but this is doubtful in view of the fact that more Iranians study in Europe (including the U.K.) than in the U.S. and this larger number seems more likely than not to ^{show} ~~contain~~ the same ability-distribution as ^{those who study in the U.S.} ~~that shown in Table 2.~~

6. When Iranian students come to the United States they tend to concentrate in certain regions but not heavily in particular institutions. The AFME records divide the U.S. into 10 regions and show how many applicants were accepted in each. Nearly half of all undergraduate and postgraduate applicants were headed for either the Far West or the West Coast (nearly a third of all applicants, 1951-66 gained acceptance by some West Coast college). Relatively small numbers have headed for colleges in New England, New York, New Jersey, or in the Southeast. The Southwest has been relatively popular, with the Mid-West also accounting for substantial numbers.

The degree of institutional concentration (or rather the lack of it) is shown in the fact that there were 131 institutions, accounting for 1766 or 60% of all students, which took five or more Iranian applicants during 1951-66 period; the other 40% went to institutions which accepted

no more than 5 Iranians over the 17 years. The institution taking the largest number was North East Oklahoma Agricultural and Mechanical College which took 79 applicants or 2.8% of the 2800-plus total of undergraduate applicants. This implies that this institution would have accepted something like 4-5 Iranian freshman each year, on average, and would have (from AFME applicants alone) had 15-20 AFME-referred Iranians in the student body (assuming no transfers). During the period studied, there were only 21 colleges and universities that accepted, from AFME applicants, as many as 25 or more students; these 698 students accounted for about one quarter of all AFME placements.

7. The most important finding of all is the strong technological bias that has characterized Iranians' intended fields of study in the U. S. during the past two decades. Over 50% of those applying for undergraduate education said they intended to study engineering; only 10% said they intended to study the Liberal Arts. Agriculture and Medicine each attracted more students than Liberal Arts. It is highly probable that there would be many "dropouts" among the 75% who said they hoped to study engineering, agriculture, or medicine; but as a reflection of the prestige of the technological fields among Iranians the figure is significant. (Indeed, the figure holds up well for returning Iranians -- see above; as suggested by the N.I.P. study.)

3. The Study of Development Agencies

In a third piece of Brain Drain research, an attempt was made to find out whether or not some 43 Iranian public and private development institutions felt they had been adversely affected by excessive migration of educated manpower. This study was conducted through interviews guided by a 22-question questionnaire, which I had a major hand in designing but which was administered and analyzed by the National Institute of Psychology. I cite my own role because in retrospect I do not think this study yielded as much or as useful information as it should have, and part of the fault may have been questionnaire design. A main difficulty was the interviewers' inability to secure good statistics on employment by educational level, and on personnel losses through emigration. So the conclusions are based primarily on responses to subjective multiple-choice questions. Here are seven of the study's major findings:

1. Seventy per cent of the degree-holders in these 43 institutions earned their degrees in Iran, not abroad. But there were about a third of the agencies in which well over half the degree-holders were educated abroad.
2. Only about one-third of the institutions reported having "serious difficulty" in recruiting "good university graduates with the kinds of skills needed....". In other words, two-thirds were having less than "serious difficulty" -- a rather mild finding in view of the booming economic conditions both at home and abroad, when the survey was made in late 1967. In a closely-related question, only

a quarter of the agencies said they felt that their organization had been "greatly" affected by difficulty in recruiting good university graduates.

3. Agency heads were asked whether or not the "key skills" in their agency were being adequately supplied by Iranian educational institutions. A quarter of the agencies said "not at all"; only 3 of 40 respondents said the domestic supply was "very adequate"; while 60 per cent said that the domestic supply was only partially adequate. This shows a widespread recognition of Iran's continuing dependence on, or preference for, foreign study.
4. Agencies were asked whether or not they were having difficulty holding their employees (as distinguished from recruiting new employees). Twelve of the 43 reported "no difficulty", 23 reported "some difficulty", and only 8 reported "serious difficulty". Certainly the labor market did not feel demoralized by turn over despite the sellers' market for labor. Employers who complained of some difficulty in holding employees pointed to competition in the domestic labor market as far more important than competition from abroad.
5. Employers were asked a series of questions about their knowledge of specific individuals abroad and their success in persuading them to return to employment in Iran. Over 70 per cent of the agencies knew of Iranians then abroad whom they hoped to employ eventually. Two-thirds of the agencies (28) had actually tried

to persuade specific individuals to return to employment. Of these 28 employers, more had had "considerable success" than "no success" (6 vs. 4); the great majority (18) had had "some success".

6. Half the agencies expressed themselves as definitely in favor of foreign work-experience, with another quarter saying that it is "sometimes desirable". Only 2 agencies considered it "not desirable". These responses indicate that very few employers would like to insulate the Iranian labor market from foreign work-experience.
7. Finally, questions were asked concerning the difficulty employers had in persuading their employees to accept provincial assignments, outside Tehran. Responses showed that this has clearly been a difficult problem for many organizations. It reflects a phenomenon found in many countries, namely, that the internal brain drain of talent to capitals is often as severe a problem as the loss of educated people abroad.

Although there were shortcomings in this survey, the general impression given by its results was that the Brain Drain did not seem to loom as large in the minds of people interviewed as one would have expected in view of (a) concern about the problem in certain parts of the government and (b) the buoyant prosperity at home and abroad.

4. The Experience at Pahlavi University (Shiraz)

One of the main conclusions which seems to emerge from E.W.A.'s studies in several countries is that the mechanisms for repatriating people from abroad are of crucial importance - an absolutely necessary instrument if good people are to be repatriated. This is true for a broad range of development institutions -- oil companies, banks, manufacturing firms, planning agencies, universities, hospitals, etc. There is great room for repatriating people if effective policies and procedures and channels of communications can be established. National policies are probably much less important than the specific arrangements adopted by individual employers. Indeed, a major lesson to be drawn from Iran's experience, and from Turkey's, is that the rifle is much more effective than the shotgun, that the private arrangements of major employers are more effective in repatriating the type of key individuals needed for growth than any general policies open to governments or ministries. Iran shows many examples of the ineffectiveness of general-purpose recruiting trips by high-level emissaries whose purpose has been to use personal contact and discussion to persuade students and others to return home. These missions are usually poorly prepared, and so do not make effective contact with as many people, or as appropriate people, as they should; furthermore, the recruiters do not come armed with firm offers of employment spelled out in specific detail.

But Iran also provides many examples of the effectiveness of "custom-made" or "rifle-type" repatriation procedures. Sometimes these are highly personal, as in the case of Aria Mehr University, where the recent Vice

Chancellor was apparently highly successful in going to Europe and the U.S. to persuade former students of his to return to join his faculty. He could offer specific employment and he could offer salaries which Iranians abroad recognized were good. Bank Mellî has developed one of the most effective training programs for future key people (economists); it has done this by selecting men already in the Bank's employ, giving them generous scholarships to attend specific American universities for an agreed period of time, and giving the men guaranteed re-employment upon completion of their studies. In its first four years this program trained perhaps 12-15 men; not one of whom had failed to return.

Another important organization that has been effective in repatriating Iranians and in arranging for foreign study without worrisome losses is the National Iranian Oil Company. I do not have specific figures; I have only the statements of N.I.O.C. officials in Tehran that the Company does not feel that it has suffered from the Brain Drain, although it has, of course, lost some people. I ascribe N.I.O.C.'s general recruiting success to the fact that the Company maintains offices in London and New York in which are employed individuals charged with maintaining close contact with Iranians studying in areas of interest to the Company, and to its policy of deputing men abroad for higher studies only after they have first worked for a few years in Iran (and, hopefully, have married Iranian girls!) This latter pattern (foreign study on a leave-of-absence basis for men who have already begun careers, and adult life, in Iran) has also worked well for the Institute of Business and Public Administration in the University of Tehran.

These examples are perhaps unexceptional. Their main lesson is that some key development institutions have been able to build up competent staffs without being frustrated by excessive losses to the international labor market. But there is one outstanding example of custom-made, rifle-aimed repatriation experience that deserves special notice because it has been outstandingly successful for Iran and because it may offer a model for other institutions in other countries. I refer to the procedures worked out at Pahlavi University in Shiraz in cooperation with the University of Pennsylvania in Philadelphia.

Iran's educational reformers have repeatedly been slowed, or stopped, by the difficulty of reforming institutional attitudes and practices, and of upgrading the quality of faculty, in order to give Iran higher-quality universities. Until mid-1968, most of the progressive people in Iran, including those at the top, had felt it impossible to do anything very significant at the University of Tehran or at most of the provincial universities. So for the past decade the main thrust for the improvement of higher education has been to create new institutions that would be outside established customs and which could therefore do things in new and different ways. The creation of the private National University of Tehran in the late 1950's was one such effort. The selection of the provincial university at Shiraz for a massive transformation was the second major attempt at educational innovation (a third has been the establishment of Aria Mehr Technical University in Tehran).

The university at Shiraz was selected for special attention following a survey by a group from the University of Pennsylvania. This survey re-

commended, and the Government of Iran endorsed, the creation of an "American-type" university which would use English as a main medium of instruction which would be run by an independent board of trustees, would have a departmental and administrative structure similar to American universities, and which would aim at high-quality instruction and research under a well-paid, full-time faculty. Large amounts of money were earmarked for a major building program, involving the construction of an entirely new university campus on the edge of Shiraz. But the key to the whole program was the recruitment of a high-caliber Iranian faculty. And the key to this was the repatriation of able and well-educated Iranians from the United States. This effort has now been going on for not quite four years. My impression, based on discussions with key people in both Philadelphia and Shiraz, is that this repatriation effort has been highly successful.

It was in February 1966, that Pahlavi University first sought help from the University of Pennsylvania in securing new Iranian faculty members. They wanted 60, spread over four faculties, and they wanted them by the following September. The officer in charge at Penn, Mr. W.A. Copeland, thought he would be lucky to identify 15 qualified candidates in the short time available. The Pennsylvania recruiting office was forced to build up its own statistics and records of Iranian students in the U.S., since it found that the Embassy's records on graduate students covered less than one-third of the graduate-student population. It was estimated that of the 6-8,000 Iranian students in the U.S., some 1,200 to 1,500 were in graduate schools. This was the group Pahlavi and Penn have been interested in. Penn sent letters to all major U.S. graduate schools asking for names and addresses of Iranian grad-

uate students and their fields of study. It then wrote individual letters to all students who looked as though they might have qualifications that matched those laid down by university authorities in Shiraz. From the responses to this initial mailing more than 50 individuals were called to Philadelphia for interviews, at a total cost of \$8-10,000, from all over the U.S. This procedure built up widespread interest in employment possibilities at Pahlavi. The combination of letters and interviews also was effective in spreading word about the specific openings at Shiraz, the terms of employment and return travel, and the character of the University which people in Shiraz were trying to create. ✓

The response to this rifle-shot recruitment procedure has been excellent. As of October, 1968, 250 individuals, representing about 15 per cent of all Iranian graduate students in the U.S., have submitted applications for employment at Pahlavi. Every application received in Philadelphia is passed on to the authorities in Shiraz: Penn does not do the selection, even preliminary selection, for Pahlavi. Penn acts only as a collecting-agency for applications. Of the 250 or more names Penn has submitted to Shiraz, Pahlavi has offered employment to almost 100 or about two out of every five. Of those who have been offered employment, about 70 per cent have accepted and have returned to Shiraz. The result of this procedure has been that Pahlavi has been able to fill every one of its faculty openings with an applicant it considered qualified, with almost all these openings being filled by Iranians who have returned from the U.S. As of October, 1968, only 2 of the 70 returnees had quit and left Iran.

The most difficult type of opening to fill, not surprisingly, have been senior posts. There are two difficulties. One is the difficulty Penn has experienced in identifying qualified senior Iranians at work in the United States. (This fact is itself a reflection of the "thinness" of the Iranian brain drain.) In the first 18 months of its recruiting experience, Penn had been able to identify only 15 such individuals, as compared to over ten times that number of graduate students. The second difficulty is that older men have proved somewhat more skeptical about what they would find if they returned to Shiraz. Also, this group has deeper commitments to life in the U.S. and is more difficult to uproot. As a result, only 3 of the 15 senior individuals identified (20 percent) in the first 18 months actually returned to Iran.

The success of the Penn-Pahlavi recruitment program is only half explained by the specific administrative steps taken by the Penn office and by that office's detailed knowledge of conditions at Shiraz (e.g., Penn can tell an applicant what journals the Pahlavi library subscribes to, what courses he would be expected to teach, and the names of his potential colleagues). The other half of the explanation is the very favorable employment terms offered by Pahlavi University plus the willingness of people at Shiraz to make decisions within a reasonable time (usually within 3 months after an application has been mailed from Philadelphia). The "favorable terms of employment" at Pahlavi do not refer only to salary levels, although these have been markedly higher than in any other Iranian university, higher than government service generally, and higher than most

industries have paid for comparable academic qualifications. The salary structure provides for merit increases, not merely seniority increments. Recruitment has also been flexible enough so that people could get appointed to levels appropriate to their experience and abilities, so that initial appointment and subsequent promotions have not been governed entirely by seniority. In addition, the University has an attractive sabbatical system, enabling faculty to be away (which usually means abroad) every 4 or 5 years.

What I have described so far amounts to a "success story" in university recruitment. I have not said anything about Pahlavi's success in holding men who have returned. Statistical information on faculty turnover during the past 3 years is not available. Such impressionistic evidence as I have been able to gather suggests that turnover has not been overly serious, although admittedly there has not yet been enough experience on which to establish standards. Until 15 months ago new faculty members were being employed initially on two-year contracts; in the summer of 1967 this was changed to a three-year contract. Apparently this change was made by Pahlavi because of some uneasiness about how the turnover picture was developing, a two-year contract allowing a dissatisfied man to leave without an adequate test of his return. The longer commitment now required does not appear to have reduced the number of applicants during the past two years. The major problem at Shiraz, as many here would understand, has been the ability of the University to resist the intrusion of traditional Iranian administrative influences and to put into effect and to nurture the new "American-type" pattern which was the main purpose under-

lying Pahlavi and which has been a necessary condition for recruiting and holding an American-educated Iranian faculty. By mid-1967 some uneasiness had developed in Shiraz among many returned Iranians as old influences challenged the new ones on the campus. All one can say at present is that in mid-1969 the effort to create a modern university is being sustained and morale, as evidenced by the turnover rate, does not seem to be a serious problem.

To my mind the Penn-Pahlavi experience has a very important general lesson for those interested in the Brain Drain: (1) individual development institutions have to look after their own repatriation; they cannot afford to rely on general government measures or on the efforts of general recruiting teams whose main aim is to "get people back into the country." (2) Repatriation from abroad requires a link-up with an experienced recruiting agency in the foreign country or countries. This agency must assign an able person to the task and give him some money to work with. (3) The home institution that is trying to repatriate people must be able to offer attractive terms of employment. Salaries can probably be lower than directly competitive rates in the foreign country, because people generally prefer to work in their own country than abroad, "other things being equal". However, salaries probably have to be above-average, by local standards; this means that an institution which cannot gain a preferred position in the domestic labor market (with permission and funding to permit this) will probably be unsuccessful in repatriating people. (4) Nationals who have pursued graduate study abroad, or who have taken up professional careers abroad, probably cannot be attracted back to development agencies unless

the latter can offer an administrative environment that offers earlier recognition to younger men, adequate budgetary support for books, supplies, equipment, and travel; and a serious, non-political professional atmosphere. Given these four conditions, there is much room for recapturing men who may appear to have emigrated.

Seven Conclusions

E.W.A.'s attempt to evaluate Iran's experience with the Brain Drain suggests seven generalizations which I suspect are valid for many countries.

The are:

1. The hopelessness of using official statistics as a basis for firm conclusions: In Iran -- as in most countries -- the statistical picture of the Brain Drain is poor, exceedingly poor. So we are forced to erect general conclusions on the basis of "scrappy" and rather impressionistic data on the numbers, skills, and qualities of the country's net emigration (gross emigration minus those who return). On this basis I would say that Iran has suffered only mildly from a Brain Drain during the past 25 years. In the past 10 years (and especially in the past 5) net losses have probably declined rather than increased.
2. The "Brain Drain" problem is one of key individuals, not of mass losses: In thinking about the effects of migration on national development it is probably true that while knowledge of total flows is of some importance, it is more important to gain knowledge of strategic groups and of key individuals who possess specific skills and gifts. Strategic groups would include, in most countries, engineers, doctors, agriculturists,

nurses, and professional people capable of building institutions.

Such individuals -- professionals and institution-builders -- possess dual loyalties. One loyalty is to their profession and the pursuit of a satisfying professional career. The other loyalty is to their country -- family, friends, and emotional associations of many kinds. Emigration most frequently occurs when the conditions of work in a man's profession in his home country fails to satisfy his professional drives, so that professional loyalty overcomes patriotism and takes him abroad.

3. Key individuals have dual loyalties that increase their vulnerability to international competition: During the past quarter century several factors have combined to internationalize the market for professional manpower. The main factors in this process have been a prolonged period of relatively full employment in the developed countries, the cheapening of international travel, and the more rapid spread of information about foreign employment opportunities. The internationalization of the market has forced the LDC's into competition with the DC's for key skills and for gifted individuals, who are needed everywhere. The poorer countries must therefore compete if they are to hold or recapture their own "brains". This competition has two main substantive aspects -- (a) salary levels and (b) conditions of work, including such elements as professional and individual status, individual freedom and opportunity for growth in the place of work, access to good libraries, the availability of equipment and supplies, opportunities for professional travel and contacts, reward according to merit, reasonable housing, good education and medical facilities for one's family, etc. The provision of this second set of elements often requires major adaptations

within institutions involved in the competitive struggle -- in universities, ministries, research institutions, industries, etc. In the nature of things, such adaptations are usually painful, usually slow, usually ambiguous. New institutions are normally better able to embody these adaptations than older ones.

4. The outcome of international competition depends on procedures as much as on relative salaries, etc.: The development of "recapture" mechanisms is a key factor in the international competition for brains. Such mechanisms for locating and communicating with specific individuals are as important to the working of the market as relative salary levels, which normally receive far more attention. The experience at Pahlavi University in Shiraz is probably the most dramatic example of a successful "recapture" mechanism in Iran since World War II.
5. Many brains do not drain -- they overflow: During the past 10-15 years there has been world-wide attention to the problem of expanding the supply of high-level manpower to serve the needs of development. Experience during this period has shown that it is much easier to expand the supply of such manpower than it is to expand the demand for them in the LDC's and to make the institutional adaptations necessary to compete successfully for key individuals. As a result, the volume of international migration of high-level manpower has undoubtedly increased. But because of the excess of supply over demand in many LDC's this migration represents not a drain but an "overflow". Many countries, including Iran, need to pay more attention to the improved gearing of supplies to needs and to improved arrangements for using key skills

and key individuals. In Iran, manpower planning has been weak; but for the past five years the economy has been strong, so that former imbalances have been reduced by the rise of demand and the repatriation of many able men.

6. Migration is Good; only "too much" migration is bad: In general, the international migration of educated manpower is Good -- unless it becomes "excessive" and clearly interferes with the development of brain-losing countries. I do not think that Iran's losses have been excessive, despite the fact that anyone in Iran can name Iranians abroad whose return would benefit the country. These individual cases simply are not widespread enough to add up to a significant national problem.
7. Internal migration is often as serious as international migration: There is an almost identical parallel between internal and international migration of high-level manpower. An excess of either results in an unhelpful distribution of a key development resource. The causes are very similar. Iran's national development has probably suffered more from internal migration of talent to Tehran than from emigration to Europe and North America.

George B. Baldwin
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June, 1969

PERSPECTIVAS ECONÓMICAS

Enrique Iglesias

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Peter F. Drucker

Lester B. Pearson



*No date or source
other than inside back cover*

CONTENIDO

- 3 Enrique Iglesias
Las Perspectivas
del Desarrollo Económico en la América Latina
- 18 John Kenneth Galbraith
Tres Modelos de Naciones en Desarrollo
- 29 J.-J. Servan-Schreiber
El Desafío Americano
- 40 Rodrigo Botero
Un Camino Propio
- 44 Werner Baer
Los Usos del Capital Extranjero
- 48 Una Discusión de Mesa Redonda
Se Cierra la Brecha Tecnológica
- 59 Raymond Vernon
La Empresa Multinacional
- 70 Raúl Prebisch
Comercio, Ayuda al Exterior y Desarrollo
- 78 George B. Baldwin
¿Fuga de Cerebros, o Desbordamiento?
- 87 Neil H. Jacoby
El Impacto de las Empresas Multinacionales
- 100 Peter F. Drucker
Desarrollo, Productividad y Talento
- 111 Lester B. Pearson y otros
El Desarrollo: Empresa Común
- (filed in Pearson vol 1c)*

El triunfo o el fracaso del desarrollo económico de la América Latina no sólo afectará a los pobres de la región, sino también a otras partes del mundo. Para muchos países en desarrollo de Asia y de Africa, la experiencia latinoamericana bien puede ser como un anticipo de su propio futuro. La mayoría de las naciones latinoamericanas poseen un largo historial de independencia política, una tradición de educación universitaria y abundantes recursos de talento profesional. Además, su vasta gama de estructuras políticas y económicas, sus experimentos en cooperación regional, su fácil acceso al conocimiento especializado y a la financiación por medio de la Organización de Estados Americanos y el Banco Interamericano de Desarrollo hacen de la zona una especie de avanzado campo experimental para programas y políticas relacionadas con el desarrollo. Y para las naciones más industrializadas de Norteamérica y de Europa, un triunfal desarrollo latinoamericano representa perspectivas de mayor comercio y relaciones económicas en un nivel de mayor igualdad.

Pero, aunque virtualmente hay unanimidad de opiniones sobre los objetivos del desarrollo y el progreso social, no es tanto el acuerdo cuando se pasa a hablar de métodos y programas. ¿Qué formas debe adoptar la ayuda internacional? ¿Puede reconciliarse la inversión extranjera con la autonomía nacional? ¿Ha existido una preocupación excesiva por el sector urbano industrial, a expensas del sector rural? ¿Pueden acumularse los ahorros necesarios para las futuras inversiones de capital, al mismo tiempo que se eleva el nivel de vida de los pobres? ¿Puede aumentarse el empleo, especialmente entre los jóvenes, de manera que contribuya al desarrollo general?

Estas son algunas de las difíciles preguntas que se plantean y discuten en las páginas siguientes. Los doce artículos, obra de destacados expertos de la América Latina, Norteamérica y Europa, se han reproducido de las páginas de la revista trimestral **Facetas**. Tenemos la esperanza de que ayuden a definir los problemas y a sugerir soluciones que sean, al mismo tiempo, trascendentales y realistas.

Nathan Glick
Editor de **Facetas**

¿FUGA DE CEREBROS, O DESBORDAMIENTO?

Por George B. Baldwin

¿Cómo pueden las naciones en proceso de desarrollo reducir la migración de sus profesionales expertos hacia las naciones más desarrolladas? No imponiendo restricciones al libre ir y venir de los individuos, dice el autor, sino haciendo más atractivas las condiciones del trabajo profesional. Asegura que una considerable proporción de la "fuga de cerebros" es en realidad un "desbordamiento" de la fuerza de trabajo especializada que no encuentra acomodo en su país.

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A pesar de la creciente atención prestada en recientes años a la "fuga de cerebros", no se ha logrado establecer un consenso sobre si en realidad existe o no. Hoy conocemos mucho más que hace cinco, cuatro o aun tres años acerca de la migración internacional de la fuerza de trabajo profesional. Pero lo "más" que conocemos principalmente consta de hechos, y ni siquiera de muchos. Aún hay dificultad para determinar lo que significan los hechos y decidir si la fuga de cerebros constituye o no un problema de "dimensiones perturbadoras", tal como lo llamó la Comisión Pearson.

En lugar del avance de masas de personas relativamente imprevistas e indoctas hacia los espacios vacíos del mundo, la migración internacional cada vez más consiste en el movimiento de personas altamente preparadas, que buscan oportunidades en los países más desarrollados para aplicar la técnica que les ha dado su educación. El asombroso aumento de los estudios en el extranjero desde la Segunda Guerra Mundial, la explosión de las comunicaciones internacionales y la baja del costo de los viajes se han combinado para internacionalizar el mercado de capacidad técnica hasta un grado previamente desconocido.

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Este ensanchamiento del mercado, combinado con el pleno empleo en Occidente, ha incrementado grandemente la competencia por el talento excepcional. Para algunas compañías, esta competencia internacional ha significado problemas; para muchos individuos, ha constituido una oportunidad.

Nadie puede refutar un informe de las Naciones Unidas, en 1963, según el cual "personal altamente especializado procedente de muchos países en desarrollo está llegando a unos cuantos grandes países desarrollados; el monto de esta corriente es grande, y está intensificándose a un ritmo muy rápido". Pero sí está por saberse si esta migración realmente está perjudicando a aquellos países que son los exportadores de la mano de obra especializada. El hecho sorprendente es que, en la mayoría de los países en desarrollo, el número de personas preparadas profesionalmente que están a la disposición de los patrones del país está aumentando, no decayendo, y en un país tras otro el número aumenta con más rapidez de lo que pueden absorber sus economías. Ciertamente, esta observación no se refiere a todos los países, ni siquiera a todos los países subdesarrollados. Pero si empezamos a pintar el Gran Cuadro acerca de la migración profesional que parte del mundo menos desarrollado, no parece ser entonces una fuga, sino un desbordamiento. Estos países no están siendo despojados de una fuerza de trabajo que necesitan urgentemente; con mucha mayor frecuencia se están librando de una fuerza de trabajo que no pueden emplear.

A pesar de todo, la pérdida de fuerza de trabajo altamente especializada no constituye un fenómeno que sólo afecta a los países del mundo subdesarrollado. La Gran Bretaña quizás haya mostrado la mayor preocupación por este problema, como resultado del gran número de científicos, ingenieros y físicos que han emigrado a los Estados Unidos. La vulnerabilidad de la Gran Bretaña es cuestión principalmente de lenguaje. Noruega y Suiza son otros dos países europeos que han perdido proporciones muy considerables de su producción anual de fuerza de trabajo profesional, que ha emigrado a Norteamérica. La relación de Canadá con los Estados Unidos es muy similar a la de la Gran Bretaña: pierde grandes cantidades, que emigran a las compañías norteamericanas, pero gana grandes números procedentes de otros países del Commonwealth y también de otros países europeos.

La Ambigüedad de las Estadísticas

Quienes estudian la fuga de cerebros saben que las estadísticas de la fuerza de trabajo internacional y su movimiento son una ayuda limitada para decirnos hasta qué punto es serio el problema. Esto se debe en parte a que las propias estadísticas no son muy buenas: son razonablemente buenas en los Estados Unidos, Gran Bretaña y Canadá; mucho menos satisfactorias en Francia, Alemania Occidental y la

mayoría de los países europeos; y absolutamente insatisfactorias en la mayoría de los países en desarrollo. Pero ni siquiera unas buenas estadísticas son una gran ayuda, a menos que se sepa exactamente lo que está tratando de medirse. Y en el debate acerca de la fuga de cerebros hay mucha ambigüedad acerca de qué es "cerebro" y qué es "fuga".

Algo que los números sí pueden decirnos es que los científicos, ingenieros y médicos ("fuerza de trabajo profesional") no constituyen una gran proporción de la inmigración total al país que está recibiendo a los "cerebros fugitivos". Los Estados Unidos actualmente absorben cerca de 400.000 inmigrantes por año. De esta cantidad, un 60 por ciento depende de otros, son "personas sin ocupación" que no ingresan en el mercado laboral norteamericano. De los cerca de 160.000 que sí buscan empleo, entre 15.000 y 20.000 están clasificados como científicos, ingenieros o físicos; así, cerca del 4 por ciento del total de inmigrantes, o del 10 al 15 por ciento de quienes buscan trabajo, poseen especialidades profesionales de alto nivel; así, estas proporciones no son muy significativas. No nos dicen nada, por ejemplo, acerca de la importancia de estos 15.000 a 20.000 inmigrantes profesionales para aumentar la producción de mano de obra profesional, a partir del sistema educativo norteamericano.

Las estadísticas también muestran que la corriente de inmigración profesional sobre las últimas dos décadas realmente ha aumentado, pero no tan consistentemente como podría suponerse. Las cifras que separan a los inmigrantes profesionales que van a los Estados Unidos de los demás empezaron a registrarse en 1949; hubo un aumento bastante firme, de los 1.369 de ese año a un máximo de 6.046 en 1957. Pero entonces la cifra declinó durante cuatro años, y no se superó la cifra de 1957 sino hasta 1966. Substancialmente, el mismo cuadro vale para los médicos, cuya cifra fue de alrededor de 2.000 anuales hasta que empezó a aumentar considerablemente en 1966. Un fortalecimiento de la corriente durante los tres últimos años ha causado considerable preocupación pública. La inmigración de los científicos e ingenieros ha aumentado, del nivel de 6.000 en 1963-1965 a 7.205 en 1966, 12.523 en 1967 y 12.128 en el año que terminó el 30 de junio de 1968. Así, el último año de los sesentas ha presenciado un aumento del ciento por ciento en el número de los científicos e ingenieros que han entrado en los Estados Unidos, y un aumento de cerca del 50 por ciento en el número de médicos, en comparación con los últimos cincuenta y principios de los sesentas.

Nueva Política de Inmigración

Sin embargo, estos aumentos son resultado directo de cambios en la Ley de Inmigración de los EE. UU., que permitió a las personas procedentes de países que tenían lista de espera, aprovechar las cuotas no

totalmente aprovechadas por otros países. Desde el primero de julio de 1968, la inmigración a los Estados Unidos no ha dependido ya de la nacionalidad, sino que ha seguido la política de que quien llega primero, primero es atendido, dependiendo de la especialización personal. (La admisión sobre las humanitarias bases fijas de relaciones familiares, asilo político, etc., en gran parte quedaron incólumes.) El resultado inmediato de este histórico cambio ha sido: (a) disminuir un tanto el número de profesionales admitidos de Europa, y (b) abrir súbitamente las puertas a un número mucho mayor de profesionales procedentes de Asia.

Como resultado de este giro de la política de inmigración norteamericana, el número de científicos e ingenieros asiáticos que han emigrado a este país aumentó más de diez veces entre 1965 y 1967: de 360 a 4.160, superando por primera vez a los europeos, que tradicionalmente eran el grupo más numeroso. La mayoría de estos inmigrantes asiáticos (80 por ciento) la constituyeron estudiantes que ya estaban en los Estados Unidos y que pronto, gracias a la nueva ley, recibieron permiso de cambiar su situación de "visitantes temporales" a la de "residentes permanentes" (inmigrantes).

La inmigración de estudiantes extranjeros que modificaron su situación no es algo que ocurre exclusivamente en los Estados Unidos. En Australia se ha calculado que quizás el 20 por ciento de los 12.000 estudiantes asiáticos que se encuentran allí no vuelven a su país al terminar sus estudios. Se cree que Canadá ha tenido una experiencia similar con sus estudiantes extranjeros, y a falta de números de otros países desarrollados, quizá podamos presuponer pérdidas de una magnitud similar. Sin embargo, esos porcentajes de "pérdida" no son, ni con mucho, tan significativos como el número *absoluto* de estudiantes que vuelven al hogar: este número ha estado aumentando rápidamente como resultado del enorme aumento del número total de estudiantes que van al extranjero.

De manera un tanto sorprendente, parece que durante las dos últimas décadas el número de estudiantes extranjeros que han sido perdidos por sus países, y el número de estudiantes que han vuelto, *ambos* han aumentado a una tasa compuesta del 20 por ciento anual. En términos absolutos, esto significa que el número de graduados en ciencias, ingeniería y medicina que vuelven al hogar —procedentes de los cinco países que tienen mayor número de estudiantes extranjeros— ha aumentado de 1.600 por año en 1950, a más de 20.000 por año, el día de hoy. Esto, sin tomar en cuenta el aumento de los graduados locales.

Necesidad Vs. Demanda

Si hubiera una general escasez de graduados universitarios en los campos profesionales en los países en desarrollo, casi cualquier pérdi-

da por emigración sería dolorosa. Hay países cuyos graduados profesionales son tristemente escasos; sobre todo en algunos países africanos del sur del Sáhara. Pero por cada país en desarrollo que tiene una escasez general de mano de obra profesional el día de hoy, probablemente hay dos que tienen excedentes, sean actuales o inminentes. La razón es sencilla. En país tras país hay una corriente irresistible en favor de la expansión de la educación universitaria, y así, muchos países han podido hacer esto, por lo que el número de graduados de los *colleges* (incluso graduados profesionales) ha estado aumentando más rápidamente de lo que pueden absorber sus economías.

Esta última frase es importante. Si se atiende a la mera "necesidad" que un país subdesarrollado tiene de médicos, ingenieros, abogados, agentes de extensión agrícola, expertos en genética de las plantas, economistas y profesores de ciencias para la enseñanza secundaria, resulta fácil ver la escasez. Pero si se mira el número de empleos vacantes, o el número de graduados universitarios que tienen dificultades para encontrar lo que consideran un empleo aceptable, entonces a menudo se encuentran excedentes. Así, una parte del argumento de que existe o no una fuga de cerebros, depende de si se miden las "necesidades humanas" de una sociedad, o la "demanda efectiva" de una economía. Indudablemente, esta última es más aplicable y realista como prueba. La verdadera pregunta es cuán rápidamente se puede hacer aumentar la "demanda efectiva" de una mano de obra de alto nivel. Preguntar esto es preguntar cuál es el ritmo del desarrollo.

Todo esto no quiere decir que el desarrollo no esté siendo perjudicado por la migración de individuos clave. Dirigentes bien dotados, educados y con experiencia escasean, casi por doquier, incluso en los Estados Unidos. Son estos los cerebros que realmente cuentan, porque han alcanzado un nivel tan alto. No se les puede definir como genios ni como potenciales ganadores del Premio Nobel; pero su número sólo es una pequeña fracción (5 a 10 por ciento) de todos los emigrantes profesionales. Los individuos destacados son quienes muy probablemente no se puedan reemplazar a satisfacción, aun en un país que tenga docenas de hombres con los mismos grados educativos, esperando para solicitar sus puestos si aquellos los dejan vacantes. Gran parte de la preocupación de Europa por la fuga de cerebros se enfoca en su pérdida de esta pequeña clase de "hombres clave", que se van a los Estados Unidos.

La pérdida de un hombre clave no aparece en las estadísticas de migración. La única manera de notarla satisfactoriamente consistiría en hacer estudios cualitativos de instituciones importantes, campo tras campo y país tras país, como base para juzgar si estas instituciones han sido seriamente perjudicadas o no, por tales pérdidas o por su incapacidad para repatriar hombres clave del extranjero. Nadie ha hecho ta-

les estudios más que sobre una base casual, y parece muy improbable que alguien los haga. Así, todo lo que podemos hacer es volver a la suposición de que la migración de una élite crítica aproximadamente sería proporcional al número total de emigrantes profesionales. Ello significaría que las pérdidas de hombres clave han aumentado conforme ha aumentado la migración total. Sin embargo, estas pérdidas frecuentemente son compensadas por el rápido crecimiento de nuevas aportaciones de hombres clave (aunque más jóvenes y menos experimentados) que genera la difundida educación, en el interior y el exterior.

El Hijo Pródigo y la Absorción Doméstica

Otra persona que no aparece en las estadísticas de migración es el que ha regresado. En muchos países, las estadísticas de inmigración muestran cifras de inmigrantes por ocupación y país de origen. Pero si un hombre después decide volver a casa, esto no se registra. Sin embargo, se sabe que números considerables de profesionales sí vuelven a sus países de origen después de trabajar en el extranjero durante variados períodos (a menudo en el país que les dio la educación). Tales "hijos pródigos" no sólo reducen el gran derrame que aparece en las estadísticas oficiales, sino que, a menudo, su importancia cualitativa es grande: tales individuos vuelven no sólo con una educación extranjera, sino con experiencia, visión y acceso a influencias extranjeras que no hubiesen podido adquirir en su patria.

Este flujo de regreso parece ser muy sensible a las fluctuaciones de las condiciones económicas y políticas y al desarrollo de los programas de "recaptura" bien formulados. Ello significa la identificación de los nacionales clave que trabajan en el extranjero, el ofrecimiento de específicas oportunidades de trabajo y la provisión de gastos para el viaje de regreso. Así, una cantidad no insignificante de los emigrantes parece ser temporal; y de este "banco" de recursos humanos en el extranjero (quizás inicialmente inutilizable en su patria) podrán hacerse retiros paulatinos y automáticos, si las condiciones de su patria cambian para bien.

La Organización Panamericana de la Salud fomentó un estudio de la emigración procedente de la América Latina hacia los Estados Unidos, sobre el período 1961-1965. El estudio encontró que "no hay una fuga general de personas altamente especializadas procedente de los países latinoamericanos". En general, la fuga de cerebros ha sido causa de tensión con los Estados Unidos, como lo ha sido con algunos países europeos, sobre todo Inglaterra. Algunos países han estado perdiendo muy pocas personas: México, Venezuela, Guatemala, Brasil, Argentina y Chile entre ellas. Sin embargo, los ha habido que sufren pérdidas considerables: Colombia, Ecuador, Perú, Haití y la República Dominicana, por ejemplo. Durante los seis años estudiados, Latinoamérica per-

dió, por término medio, cerca de 600 científicos, ingenieros y médicos cada año, una vez descontados quienes volvieron. La mitad era de médicos, lo que representa cerca de uno por cada doce graduados en medicina en toda Latinoamérica cada año. (Sin embargo, estas pérdidas se concentraron en ocho escuelas de medicina en seis países). Como muchos de estos médicos (y algunos otros) no hubiesen encontrado un útil empleo en su patria, su migración significa que "los Estados Unidos ganan más de lo que ellos pierden". Los remedios que pudieran adoptarse, de acuerdo con este estudio, dependen de las naciones "perdedoras", no de los Estados Unidos. Puesto que todos los países están "expuestos" casi en igual medida a la influencia norteamericana, este impacto diferencial sugiere que la principal explicación de las altas pérdidas debe residir en "las condiciones de esos países".

Enfoques Actuales

La migración de la mano de obra técnica altamente educada indudablemente continuará preocupando a los gobiernos y amenazando o perjudicando a los patrones por todo el mundo. Pero ya en la actualidad la preocupación por este problema está en descenso: en Washington, en otras capitales, y aun en las Naciones Unidas, donde un emotivo debate en 1964 provocó el estudio del tema a cargo del Secretario General. La principal conclusión del mejor libro sobre el tema (*The Brain Drain* [La Fuga de Cerebros], editado por Walter Adams) es que si tanto los países desarrollados como los países en desarrollo se concentraran en el desarrollo económico, la fuga de cerebros se remediaría por sí sola. Por lo tanto, las probabilidades indican que muy poco o nada harán los gobiernos o las Naciones Unidas para remediar directamente el problema. Así, un lustro de preocupación por la fuga de cerebros parece estar terminando no con una serie de propósitos de reforma, sino por una "decisión por abandono", para iniciar los setentas con las reglas fundamentales de migración esencialmente intactas, tanto en los países ganadores como en los perdedores.

Una de las proposiciones más interesantes que se han oído entre los economistas es que los países que están ganando cerebros debieran compensar a los países perdedores por los gastos realizados al producir esta "exportación". ¿No es sumamente injusto que Egipto o la India inviertan el equivalente de 20.000 a 40.000 dólares para graduar un médico, un ingeniero o un físico, sólo para que éste emigre antes de pagar a su país, en forma de servicios rendidos, las erogaciones de su costosa educación? Aunque bien puede sostenerse esta proposición, sobre las bases de la igualdad y la lógica, nadie ha hecho una proposición específica. Dudo de que tal esquema pueda ser factible administrativamente, o que pueda superar la fatal proposición de exigir a los inmigrantes que compren su libertad.

Lealtades Dobles

Un estudio de dos años hecho por *Education and World Affairs* (EWA) llegó a la conclusión de que sería un error tratar de reducir la migración internacional, ya fuese estrechando los controles de la inmigración o emigración, o disminuyendo el ritmo de la producción en los sistemas educativos de los países en desarrollo, las dos principales categorías de proposiciones acerca de la fuga de cerebros. En cambio, el estudio de EWA insiste en que los países que pierden los cerebros no tienen tarea más importante que mejorar las condiciones en que se espera que trabaje esta "élite crítica". Los líderes políticos, administrativos e institucionales de los países en desarrollo pueden comprender que los hombres profesionales normalmente tienen dobles lealtades, divididas entre su país y su carrera intelectual y profesional.

La pérdida de dirigentes profesionales clave continuará, a menos que las condiciones de trabajo en sus países puedan satisfacer necesidades tan elementales como los requerimientos del salario mínimo para permitir un empleo de tiempo completo, reconocimiento del talento y la creatividad individuales, una adecuada progresión por medio de los canales de la carrera, una mayor movilidad laboral y oportunidades para mantener y cultivar contactos con los colegas profesionales del extranjero. El punto de vista de la EWA equivale a decir que los profesionales de todo el mundo tienen requerimientos muy similares para sus satisfacciones profesionales y que, a menos que las culturas tradicionales y las escalas de pagos de muchos países (tanto desarrollados como subdesarrollados) que pierden cerebros puedan adaptarse a estos requerimientos, según frase de Kenneth Boulding, la mano de obra capacitada para "levantarse y andar se levantará y andará".

Una lección importante de la reciente investigación es un mayor respeto a la fuerza de las consideraciones no-salario yacentes bajo la migración, en particular las relacionadas con las condiciones de trabajo de los profesionales en sus países de origen. Los más importantes de estos factores son un débil apoyo presupuestal para la investigación; sistemas tradicionalmente jerárquicos en las instituciones académicas y gubernamentales, que niegan oportunidades satisfactorias a los jóvenes capaces; pobreza del estímulo intelectual (pobres bibliotecas, débiles asociaciones profesionales, incapacidad de obtener periódicos extranjeros, escasas oportunidades de viajar al extranjero) que requieren las mentes creadoras; la inseguridad profesional que resulta de la intrusión política en el nivel personal e institucional; y el desempleo y el subempleo. Estas fuerzas domésticas ejercerían su efecto aunque no hubiera diferencias de salario que echar en la balanza. Una de las más importantes conclusiones que pueden derivarse de la investigación de EWA es que los países pueden contrarrestar considerables diferenciales de salario si estos otros factores son favorables.

El problema central para ayudar a los países en desarrollo a conservar su mano de obra de alto nivel es combinar el respeto a la libertad individual con la necesidad de minimizar la inmigración de la gente clave. Hay una creciente conciencia de que un enfoque indirecto, que estudie las causas en lugar de los síntomas, *puede* ser eficaz: los países pobres *pueden* competir, porque la mayoría de la personas tienen poderosos nexos con sus propios países. Pero muchos países necesitan ayuda —y apremio— antes de encontrarse en posición de aprovechar la básica lealtad de sus profesionales.

Entre los muchos problemas que requieren atención si los países que están perdiendo cerebros desean competir más exitosamente por su fuerza profesional, se encuentran los siguientes: mejores servicios de asesoramiento para los estudiantes extranjeros antes y después de su llegada al país en que estudiarán; apoyo en el establecimiento de más eficaces mecanismos de "recaptura" a cargo de instituciones y países interesados en repatriar a los nacionales que estudian o trabajan en el extranjero; enorme aumento de la producción norteamericana de personal médico; experimentación de nuevos sistemas de salubridad en los países pobres para reducir la dependencia, en gran parte inútil, en médicos excesivamente preparados quienes, muy comprensiblemente, no querrán vivir fuera de la ciudad, donde se encuentra la mayoría de la gente; asistencia —como la que hemos venido dando durante años, pero con mayor variedad y recursos— para la construcción de instituciones extranjeras que puedan ofrecer carreras satisfactorias a los individuos clave, de importancia tan decisiva.

Estas reformas —no reformas al control de la migración— son la clase de procedimientos que debemos aplicar si deseamos tener una perspectiva adecuada de la fuga de cerebros. En resumen, podemos permitirnos tomar con relativa calma la migración, pero no despreocuparnos de sus causas.



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