Transit Corridor Evaluation: A Guide from a Trade Logistics Management Perspective

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A methodology to evaluate transit corridors from a trade logistics management perspective is proposed. The approach is based on the authors' extensive experience with transit corridors throughout the world and, more recently, on a major effort recently completed by the World Bank to study transit corridors linking landlocked countries (LLCs) to the sea in West Africa. The need to quantify the overall benefits and costs to each of the countries involved is suggested taking into account factors that, at first sight, may not seem directly related to the actual flow of goods but that are perceived by both shippers and freight forwarders to be major determinants in the choice of one corridor over another. Such exogenous factors include but are not limited to the trucking allocation agreements (e.g, the one-third/two-thirds rule) between LLCs and transit countries, the maritime shipping codes (e.g., the UNCTAD 40/40/20 Code of Conduct), customs procedures, freight forwarding fees, and storage policies. Proper quantification of net benefits or costs for each of the countries involved in the transit movement is probably the first step for serious negotiations of transit policies, customs, and trade facilitation procedures between the governments involved. The periodic estimation of those benefits and costs may also serve as a deterrent to unilateral decisions by customs and transport ministries to alter facilitation procedures without proper assessment of the economic and financial impact of those changes on their countries and their importers or exporters.

A major effort to study transit corridors linking landlocked countries (LLCs) to the sea in West Africa was recently completed by the World Bank (*1–3*). The study reiterates the need for an approach that quantifies the overall benefits and costs to each of the countries involved, taking into account factors that, at first sight, may not seem directly related to the actual flow of goods but that are perceived by both shippers and freight forwarders to be major determinants in the choice of one corridor over another. Such exogenous factors include but are not limited to the trucking allocation agreements (e.g., the one-third/two-thirds rule) between LLCs and transit countries (TCs), the maritime shipping codes (e.g., the UNCTAD 40/40/20 Code of Conduct), customs procedures, freight forwarding fees, and storage policies. Proper quantification of net benefits or costs for each of the countries involved in the transit movement is probably the first step for serious negotiations of transit policies, customs, and trade facilitation procedures between the governments involved. The periodic estimation of those benefits and costs may also serve as a deterrent to unilateral decisions by customs and transport ministries to alter facilitation procedures without proper assessment of the economic and financial impact of

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To illustrate the order of magnitude of the costs incurred with transit traffic flows in the Sahelian region, the World Bank study estimates that in 1987, the total direct generalized costs (including ocean shipping costs) for the 337,000 tonnes of transit traffic to and from Mali were approximately U.S. $100 million. The total economic cost for Mali for this transit traffic was roughly 5 percent of the estimated gross domestic product (GDP) for 1987. Payments to other countries for the transit traffic totaled U.S. $48 million, approximately 50 percent of total direct costs. To obtain a significant reduction of the direct cost of transit traffic and of payments to other countries, Mali should attempt to reduce shipping rates for its imports and exports. A reduction of 25 percent of the present conference rates by using a combination of nonconference and tramp shipping would reduce the transport bill by 10 percent and the payments to foreign countries by 18 percent. These results highlight the importance of reducing shipping rates and suggest that Mali should attempt to take as much advantage as possible of the nonconference shipping market. Moreover, an analysis of the composition of total generalized costs of imports to Bamako that originated in Atlantic Europe suggests that shipping rates represent 33 to 37 percent of the cost per tonne, whereas land transit costs and port charges account for 30 to 33 percent and 6 to 9 percent, respectively. Delays in ports and terminals due to low productivity and slow customs clearance and red tape add 29 to 45 percent of total time from origin to destination and are longer than the sea leg of the movement, which represents 29 to 36 percent of the total time, depending on the seaport chosen. Analysis of the composition of total transit time is necessary to identify major bottlenecks and estimate the inventory costs incurred with the movement. The latter reflects the inventory financing costs to the consignee, since the capital invested in the imported goods en route could be earning interest elsewhere. In the case of Mali the inventory costs estimated at a 10 percent interest rate ranged from 7 to 8 percent of total costs.

Similarly, the study estimates that the total costs for Burkina Faso's international traffic in 1988 were U.S. $133 million, or 23 percent of the total value of its imports and exports and 7 percent of its GDP. The land transport portion of that bill was roughly U.S. $73 million (4 percent of GDP), and the ocean shipping costs were estimated at U.S. $33 million (2 percent of GDP). Furthermore, it was estimated that Burkina's general cargo generates annual gross revenues of U.S. $30 million (about U.S. $100/ton) for Côte d'Ivoire and U.S. $3.3 million for Togo (about U.S. $50/ton). In Niger, the total

generalized cost in 1988 for international traffic was estimated at U.S. $150 million or 37 percent of total imports. The land transport cost for that traffic was estimated at U.S. $67 million (3 percent of GDP), and the ocean shipping costs amounted to U.S. $36 million, or 1.5 percent of GDP. The international traffic of Niger generated annual gross revenues of U.S. $25 million (U.S. $100/ton) for Benin, U.S. $7.6 million (U.S. $86/ton) for Togo, and U.S. $3.3 million (U.S. $90/ton) for Nigeria. In short, the costs and benefits involved in transit movements are important, and their proper evaluation is crucial if decision makers are interested in assessing the impact of major changes in transport policy and facilitation procedures.

The technical and economic evaluation of transit corridors that link LLCs to the sea is somewhat complicated, because one must take into account the infrastructure, operations, and institutional aspects in at least two countries and often in more than three countries. Furthermore, the analysis must examine in detail the custom procedures, intercountry agreements, and trade facilitation procedures in all the countries involved. The economic evaluation of improvements in a transit corridor would usually be incomplete if only the effects on transit traffic were considered. Normally transit infrastructure is an integral part of the domestic transport network of the TC. It is the nature of most transport investments that the improvement of the infrastructure for one specific flow will also improve conditions for all other traffic using the same infrastructure. Consequently, three distinct flows may have to be considered: (*a*) transit traffic (between the LLC, the seaport, and overseas), (*b*) domestic traffic (internal transport of goods within the TC or LLC), and (*c*) mutual trade or regional traffic (goods flowing between the LLC and the TC).

To appraise any infrastructural improvement to the transit system, the costs and benefits stemming from each of these individual flows must be estimated. Moreover, as discussed previously, the distribution of net benefits between the LLC and the TC must also be considered. It is necessary to evaluate the financial effects for both countries, and then the real resource effects, because market prices often do not reflect social costs. The appraisal is further complicated when transit goods are carried in vehicles owned by nationals of both the TC and the LLC. The relatively simple appraisal technique used in most transport investments (multiplying total flow by the unit reduction in social costs) is inadequate. A much more complex analysis of flows and costs, together with consideration of competition within the transport sector, is required. The following guidelines were developed from corridor studies carried out by the Technical Department of the Africa Region of the World Bank during the last 2 years and the prior experience of the authors with transit transport throughout the world. It is hoped that the guidelines will help to provide a basic methodology for the analysis of transit corridors linking LLCs to the sea.

DATA COLLECTION AND ANALYSIS

The proposed approach for the evaluation of transit corridors is based on analytical audits of infrastructure, operations and traffic, trade facilitation, trade logistics, and institutions. The audits form the basis of an in-depth economic evaluation of the costs and performance in each corridor. The objectives of the individual audits and possible approaches to their conduct are described in the following sections.
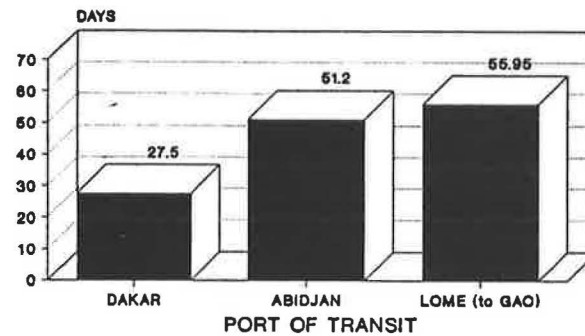
Infrastructure

The objective of this audit is to detail the physical characteristics of the infrastructure in each of the identified corridors. The survey would necessarily collect information on both movement links and interchange nodes within the transport corridors. The information required would include

• Transport movement links—distances between major origins and destinations by mode and country (e.g., distance by road from Bamako to border with Côte d'Ivoire and from border to port of Abidjan); specification of infrastructure (e.g., paved, gravel, or earth road or gauge of railway); condition of the infrastructure by main link; speed, axle loads, and other physical restrictions; and number, type, and location of controls and checkpoints;

• Transport interchange and cargo storage points—port infrastructure, port equipment, storage capacity and condition, customs facilities, and specific transit facilities; location, size, and capacity of inland transfer terminals and handling equipment available (e.g., rail/road transfer terminals, railway yards, container terminals, and bonded warehouses); and

• Infrastructure costs—expenditure actually allocated to the maintenance of the existing corridor infrastructure and an estimate of the expenditure that should be allocated for adequate maintenance of the infrastructure.

Operations and Traffic

It is essential to understand how each mode in the corridor operates, what type of equipment is used, performance levels, operating costs, and constraints. The following list gives a guide to the approach needed:

1. Identify detailed time schedules for each mode. This should include loading, unloading, and waiting times; movement times; and delays at customs, checkpoints, and border crossings (see Figure 1). Several transport operators and freight forwarders should be contacted and the schedule prepared by main commodity and consignment type (general cargo, containerized, dry and liquid bulk, etc.). Identify the potential for reducing total transit time and the constraints to such reduction.

2. Identify the characteristics of the vehicle fleets used (e.g., size and axle configuration of trucks and wagons, type of containers, ship type and size).

3. Determine the tariffs charged by each mode or, when applicable, the door-to-door tariff. Because discounts may be common, a range of customers must be contacted. Conference rates are a reference point for ocean shipping tariffs, but, given the extent of discounts used by the conference and "outsider" shipping, best estimates of average tariffs will have to be based on interviews with shippers and freight forwarders.
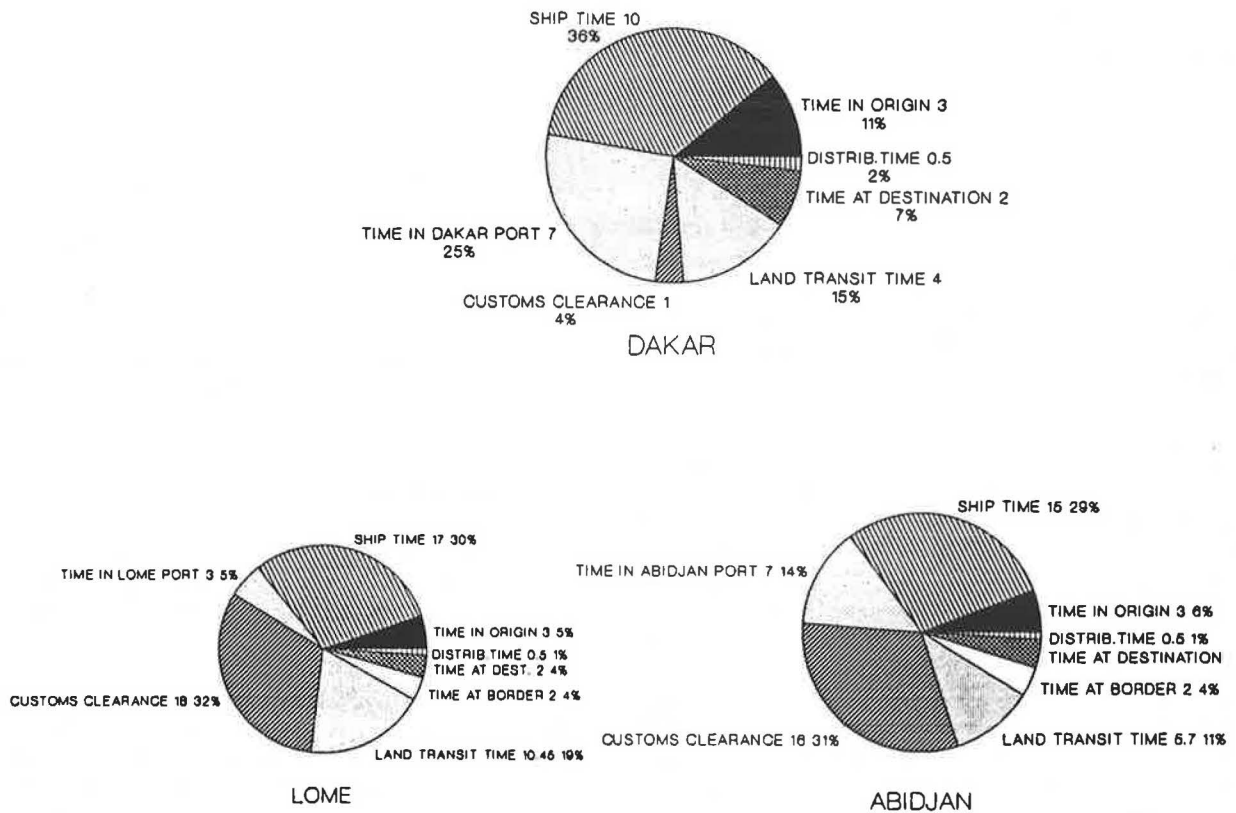
FIGURE 1   Transit times to Bamako from an origin in Atlantic Europe (1987).

4. On the basis of vehicle and infrastructure characteristics, estimate, wherever possible, long-run variable transport operating costs for each mode and corridor. The analysis should determine where inputs, such as fuel and spares, are purchased and the incidence of indirect taxation.

5. Obtain commodity flows via each corridor for the previous 5 years. Regional and transit traffic should be distinguished. Regional traffic refers to trade exchanges between neighboring countries and often involves different procedures and formalities.

6. Understand the organizations operating the corridors—ownership and control, employees, profitability, subsidies, own account versus for hire, and so forth.

7. Obtain information on the operating strategies used by each mode (groupage services, wagonload, block movements, unit trains, etc.).

8. Determine the nationality of the transport operators and whether there are formal or informal traffic-sharing arrangements, national fleet protection, and so forth.

Trade Facilitation

It is essential to understand fully the procedures and documentation necessary for the conduct of foreign trade. This would include the procedures required to obtain import-

export licenses as well as the procedures and documentation required for customs clearance. The following approach is suggested for this aspect of the study:

1. Documentation: Identify all documents required for the import or export of each product (import license, certificate of origin, clearance papers, letter of credit, chamber of commerce authorization, shipping documents, etc.), the time required for each document, and the difficulties faced.

2. Freight forwarding: Identify which firms are branches of international freight forwarders and which are local freight forwarders.

3. Freight bureaus: Check whether there is a requirement to use an entity in control of arranging overseas freight movement.

4. Customs procedures for imports-exports in both LLC and TC: Identify the constraints posed by the procedures and the need for and cost of informal payments to customs to expedite clearance. Do informal payments allow under-declaration of cost, insurance, and freight (C.I.F.) values?

5. Identify nominal and effective use of international customs procedures, such as the Transport International Ferroviaire or the Transport Routier Inter-Etats in the region. Identify use of other procedures, including police- or customs-controlled convoys.

6. Ascertain the availability and quality of telecommunications, telephone/fax/telex. Identify problems with the transmission of documents required for customs clearance.

Trade Logistics

The objective of this audit is to document the overall door-to-door movement by each available route and mode: the delays and constraints, the combined customs procedures, total number of halts or inspection stops, and all the elements that differentiate one route from another.

1. Use the information obtained in the operations audit to determine direct costs for a shipper using that route. Direct costs are only the costs incurred in cash and do not include time-related costs such as delays and reliability or the costs of insurance, loss, or damage.

2. Use the information collected in the operations audit to estimate overall transit times by route and the equivalent inventory costs as a function of the C.I.F. value and financing costs. Estimate also the variability of transit times and the probability of late arrivals (reliability). This information should then be valued as a function of the C.I.F. value.

3. Calculate the cost of insurance for traded goods, the actual loss and damage to goods imported or exported, and the extent to which insurance compensates for such losses. Calculate the total cost of loss and damage provision, including the cost of delay in settling insurance claims.

4. The addition of the direct (Item 1) and indirect (Items 2 and 3) costs will provide an estimate of the overall generalized financial costs to the user. Comparison of the route-generalized costs and the distribution of transport flows may indicate anomalies. Such anomalies should be investigated to determine whether certain costs have been missed or whether

shippers place higher valuations on time or reliability (see Figure 2).

Trade-Transit-Transport Institutions

This audit identifies the institutional environment in which the shippers, transport operators, and government organizations perform. The institutional environment often has a direct and significant effect on the costs, capacity, and efficiency of routes. It plays, therefore, a significant role in route and transport mode choices:

1. The scope and effectiveness of trucking regulation in both LLC and TC on market entry, operations, vehicle loads, tariffs, and so forth;

2. The main institutions involved in transit movements (e.g., shipper's council, chamber of commerce, national shipping company, and trucking association), their roles in the transit process, their relative strength, and the constraints they create;

3. The scale and distribution of private-sector involvement in the freight forwarding and transport industries: size and ownership of companies, local and overseas participation, and extent of competition;

4. Availability of credit and foreign exchange to individual entrepreneurs;

5. The role played by the central bank and commercial banks in trade-transit operations;

6. The effect of parallel markets for foreign exchange on the choice of route/modes/transporters by shippers;

7. Institutional arrangements for trade insurance—role of local insurance companies;

8. The nominal and effective implementation of the UNCTAD Maritime Code (40/40/20 rule); and

9. Traffic sharing between LLC and TC nationals—agreements, institutions, and enforcement.

Any other institutional aspects should be noted in this audit and the constraints they create on their advantages should be clearly documented. The audit should include an analysis of the main institutional constraints within the system and discuss possible reforms of the system. Any proposed reform, such as privatization or total deregulation, should be accompanied by a sketch analysis of whether it is economically feasible and realistic in the social-political-economic environment of the corridor.

ECONOMIC EVALUATION OF INTERNATIONAL TRANSIT COSTS

National Identification of Transit Costs and Benefits

In the analysis of transit corridors, it is essential to understand that, unlike transport within a country, transit necessarily involves at least two countries. In most cases, there is one LLC (e.g., Mali) and one TC (Côte d'Ivoire or Senegal), but there are instances where an LLC (e.g., Burundi) has to cross several TCs (Rwanda, Uganda, and Kenya). Economic costs or benefits can occur for both the LLCs and TCs, and they must be separately identified: an economic cost to one country
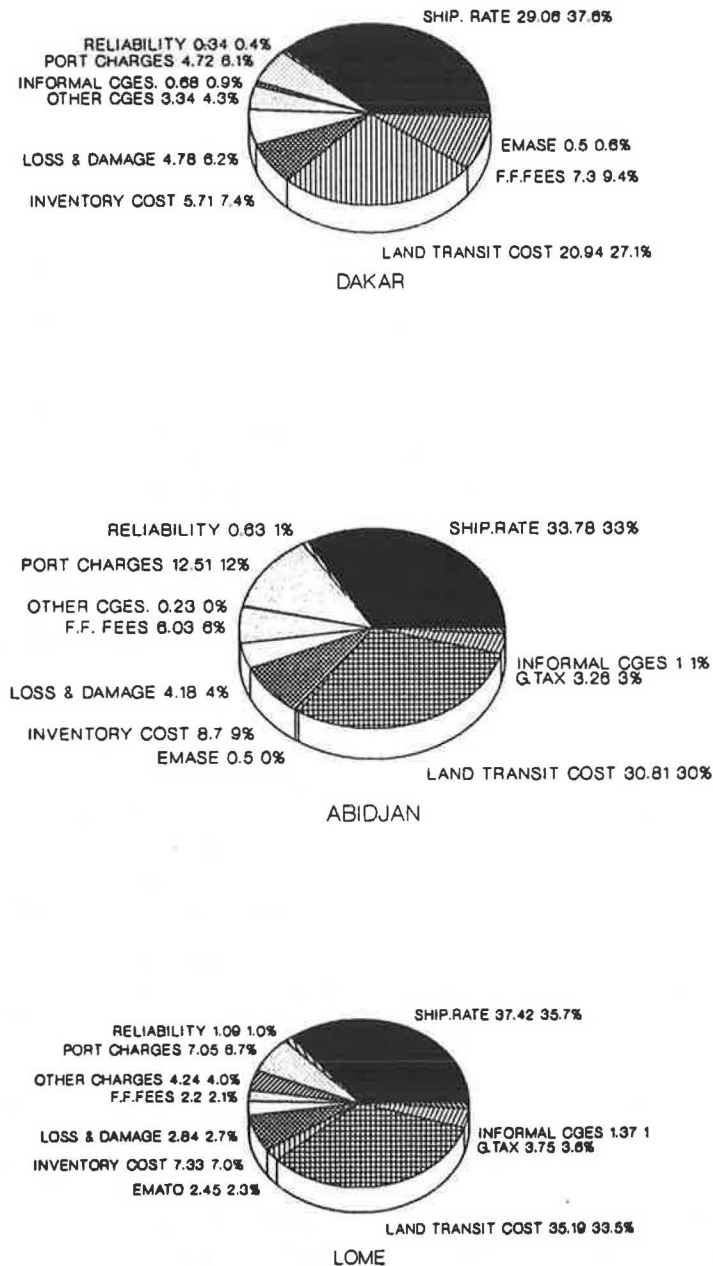
FIGURE 2 Composition of direct generalized costs, imports to
Mali, 1987 (thousands of FCFA/tonne).

may be, at least partly, a benefit to the other. Therefore, the
economic costs of these international transit flows cannot be
evaluated using the same methodology applied to national
transport movement within countries. Each cost must be eval-
uated from the perspectives of both the LLCs and TCs.

In principle, all charges paid in the transit country (port
and storage charges, customs charges, etc.) are economic costs
to the LLC. These economic costs should be multiplied by
the relevant shadow foreign exchange rate to reflect the true
resource loss for the economy of the LLC. The transfer of
resources from the LLC may or may not give a real resource
gain to the TC. If the transit revenues, multiplied by the
shadow price of foreign exchange in the TC, are higher than

economic costs incurred in providing these transit services,
then there is a social profit or gain for the TC. If, however,
the services are priced below their real economic costs, there
will be a net economic loss to the TC, and the transit country
should adjust its prices to reflect economic cost.

An improvement of the transit system that lowers the trans-
port costs for the LLC may or may not be of benefit to the
TC, depending on what that improvement entails in terms of
economic benefits or costs to the TC. The private sector (freight
forwarders, port administration, container companies, etc.)
could receive higher financial gains, but if prices are distorted,
the overall economic impact on the country could be negative.
The economic evaluation of costs is further complicated by

the nationality of the transporter carrying the transit goods. Transit goods are often carried by trucking companies from both the LLC and TC, and there are often agreements regulating national shares in the international trucking market (the trucking agreement between Mali and Côte d'Ivoire stipulates a ratio of 2:1 in favor of Malian trucks).

If the transporter is from the LLC, the costs of truck transport are the economic costs of vehicle operations. Estimation of these costs can be complex:

1. Inputs purchased in the TC valued at financial price adjusted by the shadow price of foreign exchange;

2. Inputs purchased in the LLC valued net of indirect taxes and the foreign content adjusted by the shadow price of foreign exchange;

3. Basic labor costs adjusted by the shadow price of labor, foreign exchange payments for trip expenses adjusted by the shadow price of foreign exchange; and

4. Vehicle annual capital charges estimated on the basis of the real capital cost adjusted by the shadow price of foreign exchange and the social discount rate of the LLC.

If the transporter is from the transit country, the transport charge can be considered as an economic cost and should be multiplied by the shadow price of foreign exchange. Minor adjustments would need to be made for any border taxes or tolls levied by the LLC on foreign trucks or indirect taxes if a significant volume of inputs is purchased within the LLC. If the transporter is controlled by the LLC until the border and by the TC from the border to the port [e.g., Mali Railways (RCFM) to the Senegal border and then Senegal Railways (RCFS) to Dakar], a combined approach is necessary. In the case of the Mali-Senegal rail movement, the total transit resource cost would be the sum of the economic long-run variable railway cost of RCFM to the border and the tariff charged by RCFS from the border to Dakar, multiplied by a shadow price of foreign exchange in Mali.

All other costs involved in the movement of goods (shipping rate, storage charges, port charges, and distribution charges) should be examined in a similar fashion (i.e., determining economic costs on the basis of who incurs the costs and where). The same costing approach should be applied to the other components of generalized transport costs (inventory costs, loss and damage, etc.), which are discussed in detail elsewhere (*1*).

Route and Mode Choice

User's Perspective

A Malian importer deciding whether its imports from France should go via the Port of Dakar (Senegal) and then by rail to Bamako or by the Port of Abidjan and then by truck to Bamako would not only consider the freight costs (freight bill to the port) involved but also other factors that in the industrialized countries are generally taken for granted. For example, the Malian importer or its agent will in most cases investigate the average time the shipment takes at each port, the delays at the border, the degree of loss and damage due to pilferage or poor handling, the availability of truckers and

railcars at the ports, and the respective waiting time and the cost of informal charges required to move the freight to Bamako. Furthermore, the agent will check whether there are special taxes on each of the ports and the reliability of the trip times normally suggested by the truckers or indicated in the rail schedules. He knows that his goods, for which he already paid an F.O.B. price to either Dakar or Abidjan, cost an additional amount of money for each extra day they stay en route. This cost is, at least, equal to the interest he forgoes if he had the amount equivalent to the cost of the money in a bank account. How can he capture all these costs to know what is the actual "freight bill"? He needs to look at the generalized cost [i.e., the freight bill (tariff) plus all the other time-related costs representing inventory costs plus reliability plus the informal charges he must pay to get the goods to his door].

There is nothing new in the concept of generalized cost. Most logit models used to estimate modal split in urban transport compare the preference of the user for two or more modes that are weighed against each other by comparing their generalized cost, which includes the tariff plus the waiting time due to different frequencies, the reliability of the system, and some value of comfort. The user who wants to minimize costs will choose the route with lower generalized costs. The modal split usually reflects this, not just the tariff.

Government's Perspective

Whereas the private shipper or importer tries to minimize its costs (although most often it does not pass on its savings to consumers because in most developing countries there is hardly any competition), government has another perspective. Indeed, government not only wants to minimize the overall economic costs of imports but also wants to increase the net revenues generated by these shipments by internalizing most of the expenses and revenues generated by the transit movement. For example, in the Dakar-Bamako rail route both Senegal (TC) and Mali (LLC) would split the rail revenues according to the tariffs they practice. Each country would receive a share of the rail revenues proportional to the distance traveled. In the Abidjan-Bamako truck route the revenues generated by the movement will in general go to the country to which the trucking firm belongs, and since the assignment of the truckers is made according to the one-third/two-thirds rule, in which truckers will be 33 percent from the TC and 67 percent from the LLC, the revenues will in general be split that way. However, since most of the truckers have to wait several days in Abidjan for their turn to pick up cargo, they generate expenses, which represent net revenues for Côte d'Ivoire. In addition, they also tend to fill their trucks as much as they can in Côte d'Ivoire, because fuel is cheaper than in Mali. In the process, they may not be paying their fair share of road user charges in Mali while they are paying it in Côte d'Ivoire.

So, although LLC governments want to keep a certain route diversification to avoid being captive to only one TC, they also want to know how much the revenues are that they generate to the TCs through transit movements so that they can strike reasonable agreements in the sharing of infrastructure investments in the railways, roads, and ports; in the customs

area; and in the trucking and shipping arrangements. That is why a method should be used to first estimate the direct generalized cost from the point of the user or on a commodity basis, and then averages should be used in a more complex spreadsheet to determine the economic benefits and costs for the LLC and TC.

Generalized Transport Costs: Concept

Since a primary measure of effectiveness to compare costs and benefits for the LLCs and TC is generalized transport cost by route and mode, it is important to discuss the concept of generalized transport cost in some detail. Direct transport and transit charges are only elements of much larger total transit-transport costs faced by the LLC. The concept of generalized cost is based on the fact that direct costs are only one element of the total transport cost. The prices charged for handling and moving freight are important, but the same is true for the costs attached to average transit time, the reliability of delivery times, and the loss and damage to goods [reliability and loss and damage are defined elsewhere (1,4)]. For example, the longer the transit times, the higher are the inventory financing costs for the owner (consignee), because the capital invested in the goods could be earning interest elsewhere. These other, more indirect transit costs may, when taken together, be far higher than the direct transport prices charged, although they are not reflected in terms of immediate out-of-pocket costs. Any improvement that reduces the direct costs of transport may also affect these other elements of generalized cost and thus the total benefits of the improvement.

The concept of generalized cost is not unique to the transport of transit goods and applies to all freight movement. Generalized costs explain why goods do not always travel by what is apparently the cheapest route. It is, however, of particular importance in the transit situation, where most of the benefits from a reduction of "other costs" in the TC are usually internalized within the LLC. Three other costs are thus of little economic significance to decision makers in the TC unless they can be appropriated by changes in pricing policies.

OVERALL EVALUATION OF TRANSIT IMPROVEMENTS

From the analysis of the effects of an improvement to the transit system, a stream of net benefits for each country will emerge (see Table 1 for an example). The distribution and even total level of benefits may not, however, be unique, but vary with the particular pricing decisions made. If all the benefits are passed to the LLC, there will be an increase in traffic. On the other hand, if the benefits are appropriated by the TC, there will be no change in traffic flows. Most likely pricing decisions have to be estimated and the sensitivity of overall benefits to changes in pricing have to be tested.

To appraise any infrastructural improvement to the transit system, the costs and benefits stemming from each of the three individual flows (transit, mutual, and domestic) must be estimated. Moreover, as discussed previously, the distribution

of net benefits between the LLC and the TC must also be considered. It is necessary to evaluate the financial effects for both countries, and then the real resource effects, because market prices often do not reflect social costs.

The net present value (NPV) of the discounted flow of net benefits and the capital costs of the improvement should be calculated. In national transport analysis a single NPV is calculated, but in the transit situation a number of calculations are relevant: (a) NPV(a) to LLC, indicating whether it is economically viable for the LLC to invest; (b) NPV(b) to the TC within whose territory the improvement is located; (c) NPV(c) to both the LLC and the TC within whose territory the improvement is located; and (d) NPV(d) to the region including the LLC and all TCs. The need for NPV(a) is clear. NPV(b) will indicate the likely willingness of the TC to either invest or accept the investment. It is possible that while the NPV(a) and NPV(b) are negative, the combined NPV(c) will be positive, suggesting that some type of joint funding would be desirable.

Often NPV(d) will be the same as NPV(c), but where there are several transit corridors and traffic is responsive to changes in the cost and quality, transport gains to the LLC and one TC may be offset by losses to other TCs. The regional NPV(d) indicates whether the improvement would be feasible if the entire regional transport system was under unitary control. If NPV(d) is negative, there should, theoretically, be other arrangements that could improve the welfare of all countries in the region.

Overall, when improvements to the transit system are considered, a number of possibilities exist with respect to the level of total benefits and their distribution between the two countries:

1. Investments that can be undertaken by the TC for its own benefit, either because it reduces the social cost of internal transport or because it increases the social surplus from transit goods;

2. Investments that could be financed entirely by the LLC and that would yield sufficient internal benefits to the LLC through reductions in the generalized cost of transit;

3. Investments that yield benefits to both countries but not to a sufficient scale for either country to invest. The investment would be economic, however, if both countries were prepared to invest in the improvement to that point where the yield was equal to their respective social rates of return. The total capital that they might be prepared to commit would be greater than the actual cost of the improvement;

4. Investments that yield benefits to one country but disbenefit the other or where there are mutually exclusive alternatives and the share of the benefit between the two countries is dependent on the alternative chosen; and

5. Investments that are profitable for one country within its own territory as long as some complementary improvement is made within the territory of the other country. Both investments must therefore be considered as a package to see whether either the complementary investment is profitable in its own right or whether the benefits from the package are sufficient to make both investments profitable.

Geographical realities suggest that the impetus for change should come from the LLC. Unless the LLC takes the initi-

TABLE 1 EVALUATION OF MAIN MALIAN TRANSIT ROUTES

Cost Components, per Ton, 1987 (Costs in FCFA/tonne)[1]	Dakar Route	Abidjan Route	Lome Route
A. Direct Costs			
a Shipping Rate	28 812	32 122	37 417
b Freight-forwarders	6 832	3 937	2 197
c Port Charges	4 538	9 937	7 049
d Informal Charges	706	1 001	1 370
e Other Transit Fees	587	139	4 237
f Loss and Damage	2 361	3 858	2 841
g Inventory Costs	5 520	7 055	7 327
h EMAs Costs	500	500	2 450
i Reliability	333	496	1 092
j Guarantee Tax	0	1 950	3 754
k Land Transit Charges	23 821	28 664	33 874
Total Direct Costs of Transit (A)	74 009	89 658	103 608
B. Breakdown of Direct Costs			
B1-Direct Costs in Transited Country (B)	34 154	28 479	30 774
% of Transit Costs (A)	46 196	31 896	29 796
B2-Direct Costs in Mali (C)	21 215	36 898	39 900
% of Transit Costs (A)	28 796	41 296	38 596
B3-Direct Costs in Other Countries (D)	10 426	12 873	21 674
% of Transit Costs (A)	14 196	14 496	20 996
C-Indirect Benefits for Transited Country			
Total Indirect Costs in Transited Country (E)	7 515	7 020	4 446
Total Direct Costs in Transited Country	34 154	28 479	30 774
Value Added by Direct Costs (V)	28 233	24 791	27 319
Balance (Net Economic Benefit) =V-E	20 718	17 771	22 872
% of Transit Costs (A)	28%	20%	22%
D-Indirect Costs for Landlocked Country (Mali)			
Net Indirect Costs in Mali (F)	7 916	635	1 578
Total Direct Costs within and outside Mali (A)	74 009	89 658	103 608
Balance (Net Economic Cost for Mali) A+F	81 925	90 293	105 186
% of Transit Costs (A)	111%	101%	102%

1/ 1 US$= 300 CFA during the study. CFA is the common currency of Senegal, Côte d'Ivoire, Togo and Mali.

ative in suggesting improvements and agreeing to either total or partial financing, it is quite possible that transit systems will remain underdeveloped or will be developed suboptimally: investments may be made by the TC that conflict with the needs of the LLC. In these circumstances the LLC must be prepared to compensate the TC for introducing desirable changes and forgoing changes that are inimical to the LLC's interests.

CONCLUSIONS

In the consideration of transit situations, it cannot be stressed sufficiently that there are always at least two countries, two sets of social and financial costs and benefits, and two social opportunity costs of capital. Simple addition of benefits by either country or by international aid donors ignores the reality of the situation. Bargaining over the share of profits or social surplus may be inevitable, and the result is economically indeterminate. A minimum level of benefits, either originating in the country or being transferred, will be required to ensure that the internalized benefits yield a sufficient social rate of return to each country. For many improvements, the

LLC may have to decide what is the maximum it is prepared to pay for an improvement and the TC the minimum it is prepared to require for accepting the improvement. If the minimum required by the TC is greater than the maximum the LLC is prepared to pay, the improvement is unlikely to take place. If, on the other hand, the minimum required by the TC is less then the maximum the LLC is willing to pay, improvements can be achieved.

Investment in the TC may be the only way in which the LLC is able to remedy the shortcomings in the transit system. Ideally, it should be prepared to invest until benefits from the marginal investment are just equal to the social opportunity cost of capital. In reality, some premium above the social cost of capital may be required to compensate for the various unquantifiable costs resulting from uncertainty attached to such investment. This would be particularly true if a socially acceptable rate of return was only made possible by the transfer of some of the profits made in the transit country.

Many infrastructure projects are conventionally evaluated over a 20-year economic life, and may have a much longer physical life. It is possible that political relations between the LLC and TC or within the region may change during the

period and alter country needs and priorities. The need for a political relationship must therefore introduce an element of uncertainty into the analysis of joint projects. The LLC may have to guarantee a minimum flow of transit traffic to make the project worthwhile for the TC.

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