



Best Practices in Management of International Trade Corridors

John Arnold



TRANSPORT
SECTOR
BOARD



POVERTY REDUCTION
AND
ECONOMIC MANAGEMENT

Best Practices in Management of International Trade Corridors

John Arnold



THE WORLD BANK
WASHINGTON, D.C.



POVERTY REDUCTION
AND
ECONOMIC MANAGEMENT



TRANSPORT
SECTOR
BOARD

© 2006 The International Bank for Reconstruction and Development/The World Bank
1818 H Street, NW
Washington, DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org
Published: December 2006

The findings, interpretations, and conclusions expressed here are those of the authors and do not necessarily reflect the views of the Board of Executive Directors of the World Bank or the governments they represent.

To order additional copies of this publication, please send an e-mail to the Transport Help Desk transport@worldbank.org

Transport publications are available on-line at <http://www.worldbank.org/transport/>
Trade publications are available on line at <http://www.worldbank.org/trade>

TABLE OF CONTENTS

Preface	vii
Acknowledgements	ix
Abbreviations	xi
Executive Summary	xiii
1. Framework for International Trade Corridor Management	1
A. Defining a Trade Corridor	1
B. Corridor Management	3
C. Types of International Trade Corridors.....	5
D. Scope of Corridor Management.....	7
E. Evolution of Corridor Management	11
F. Development Objectives.....	12
2. Typology of Corridor Management.....	13
A. Participants	14
B. Form of Organization	14
C. Activities.....	15
D. Recent Approaches to Corridor Management	17
E. Four Management Structures	18
3. Monitoring and Evaluating Corridor Performance	24
A. Quality of Service.....	25
B. Corridor Supply Chain Analysis.....	29
4. Mechanisms to Improve Corridor Performance	30
A. Trade and Transit Agreements	31
B. Interconnections	32
C. Interoperability	38
D. Market Access.....	40
E. Route Capacity	43
F. Evaluation of Initiatives.....	46
5. Conclusions and Recommendations.....	48
A. Summary of Observations	49
B. Recommendations.....	50
Appendix 1: Components of the Transport Corridor	52
Appendix 1: Components of the Transport Corridor.....	53
Appendix 2: Measurements of Corridor Performance	55
Appendix 3: International Conventions and Documents	58
Appendix 4: Cargo Documentation	64
Appendix 5: EC-Road Transport-Related Legislation	67
Bibliography.....	69

Tables

Table 1-1: Types of Trade Corridors	5
Table 1-2: Multimodal National Corridors	6
Table 1-3: Focus of Corridor Management	7
Table 2-1: Form of Organization and Duration	15
Table 2-2: Activities of Corridor Management	15
Table 2-3: Examples of Corridor Management	23
Table 2-4: The Relationship Between Management Models and Activities	23
Table 2-5: Sources of Data on Route Performance	24
Table 4-1: Strategies and Mechanisms for Developing and Improving a Corridor	33
Table 4-2: Performance Measures	36
Table 4-3: Technical Parameters for Transport Units	38
Table 4-4: Strategies Employed in Different Corridors	46
Table 4-5: Types of Initiatives	47

Figures

Figure 1-1: Sample Corridor Model	2
Figure 1-2: Choosing Appropriate Management Structure	4
Figure 1-3: Evolution of Corridor Management	11
Figure 3-1: Transit Time for Route 1	25
Figure 3-2: Components of Transit Time on Route 1	25
Figure 3-3: Transit Times for Multiple Services	26
Figure 3-4: Modeling Improvements in Service	26
Figure 3-5: Corridor Time-Cost Options	27
Figure 3-6: Impact of Reliability on Transit Time	28
Figure 4-1: Evaluation of Corridor Performance	48
Figure 5-1: Initiatives Related to Market Access, Interoperability and Interconnectivity	52
Figure A-1: Transit Cost for Route 1	55
Figure A-2: Components of Transit Cost for Route 1	55
Figure A-3: Relationship Between Changes in Time and Cost	56
Figure A-4: Reduction in Variation in Transit Time	57

Text Boxes

Box 1-1: Silk Road – The Continuing Challenges	3
Box 1-2: West Bank and Gaza – Securing a Corridor	10
Box 1-3: Alameda Corridor – Short and Green	13
Box 2-1: Mexican-US Border Slowdown	19
Box 2-2: West Bengal Corridor – Path to the Sky	20
Box 2-3: Eastern and Southern Africa-Private-Private Partnerships In Corridor Development	22
Box 3-1: Cargill – Flexibility in Trading	28
Box 4-1: Mercosur Agreement – Cross Border Movements	32
Box 4-2: TTFSE – Measuring Performance	37
Box 4-3: EU Competition Laws	42
Box 4-4: Golden Quadrilateral – Upgrading Corridors	43

PREFACE

Physical access to world markets is a paramount constraint to the development of many of the poorest countries, especially the landlocked developing countries. The trade potential is hampered by the poor performance of the overland transit systems. Adverse factors come from transportation services, business practices, transport or customs procedures, governance, and infrastructure. The improvement of the global connection of landlocked countries is a high priority in the development agenda, but the experience shows that projects and reforms are complex to design and implement and are not always successful. Indeed, transit facilitation requires the implementation of a wide range of consistent measures in several sectors and countries.

So far, one of the most effective approaches is to focus on trade corridors. Indeed, one salient feature of overland trade, since the most ancient times, is its organization along linear corridors. The trade corridor is the natural entity to identify problems, bring together policy-makers and stakeholders, and implement concrete facilitation measures or investment. Corridors also bring together national reforms and regional policies.

No two corridors are alike in terms of structure, political economy, modes of transportation, or regulations. Some may be very informal arrangements, while others may have sophisticated institutions and decision-making processes. The present report takes stock of this diversity of situation and arrangements and identifies factors of success. Much of the information was provided by the World Bank experts involved in corridor projects, as well as external partners, including some corridor organizations. Brief summaries of the corridors referred to in the text will be published later as an informal document.

We hope that the document will be especially useful for policy makers in national or regional bodies and donor agencies. For the first time, they should find a comprehensive knowledge of what works and does not work on the ground, and why. It should also foster further debates on the instruments and arrangements needed to facilitate transit trade, and ultimately stimulate the promotion of new facilitation projects.

Maryvonne Plessis-Fraissard
Director
Transport and Urban Development Department
The World Bank

Uri Dadush
Director
International Trade Department
The World Bank

ACKNOWLEDGEMENTS

This paper was prepared by John Arnold, Consultant. The author wishes to thank Gerald Ollivier (ECSIE) and Jean Francois Arvis (PREM) for their patience, support, and valuable insights during the extended production of this work. Others who gave generously of their time and experience include Marc Juhel, Simon Thomas and Gael Raballand of the World Bank. The analytical approach to performance analysis would not have been possible without the contributions of Barry Cable of UNESCAP, and Martin Humphreys and Robin Carruthers of the World Bank. The author would also like to acknowledge the contributions of Hans Peter Brunner and Myo Thant of the ADB and Uma Subramanian of the World Bank who foresaw the need to integrate corridor development into the design of trade and transport projects.

ABBREVIATIONS

ADB	Asian Development Bank
ASYCUDA	Automated System for Customs Data
EC	European Commission
ECOWAS	Economic Community of West African States
EDI	Electronic Data Interchange
EU	European Union
EWEC	East-West Corridor (Myanmar-Vietnam)
GMS	Greater Mekong Subregion
ICD	Inland Container Depot
IGC-TRACECA	Inter-government Commission of TRACECA
IRU	International Road Transport Union
NAFTA	North American Free Trade Agreement
RFID	Radio Frequency Identity Tags
SAARC	South Asian Association for Regional Cooperation
SACU	Southern African Customs Union
SAD	Single Administrative Document
SADC	Southern African Development Community
SDI	Spatial Development Initiative
TEN	The Pan European Transport Network
TEU	Twenty-foot equivalent unit (measure of unit of volume of container traffic)
TRACECA	Transport Corridor Europe, Caucasus, Asia
TTCA	Transit Transport Coordination Authority
TTFSE	Trade and Transport Facilitation in Southeast Europe Program (Website)
UIC	International Union of Railways

EXECUTIVE SUMMARY

This report provides a comprehensive review of how transport corridors function, what institutional and operational structures are used to manage their performance, how that performance can be assessed and compared with that of other corridors, and what measures can be taken to improve corridor management and through that, corridor performance. The review is based on consideration of, and provides examples from, many corridors including those serving land-locked developing countries.

The title of this report implies that corridors can be managed. While both public and private entities have been involved in the development and regulation of the corridors that were reviewed, it is not clear that they managed either the development or operation of these corridors. The term management implies some form of control, but it is difficult to create a single point of coordination given the diversity of stakeholders.

There are multiple government agencies, shippers, transport companies and logistics service providers involved in the activities of the corridor, all involved in management of a corridor in one way or another. The appropriate management structure for any particular corridor depends on the nature of the corridor and the objectives for its promotion and development. Because of the complexity of corridors, in terms of the variety of services provided, stakeholders involved, and economic activities dependent on them, there is no simple answer to the question of what is the overall best practice in corridor management. Instead we address a more fundamental question of what is the appropriate form of corridor management for a specific situation. In order to answer this, we develop a typology of corridors and possible management interventions. The typology covers both the organizational structure and the role of public and private sector entities. Connecting the typology with the appropriate management structure is the main objective of this report.

Typology of corridors

Foreign trade corridors are used to promote economic growth through increased trade and competitiveness. They may serve the foreign trade of a single country, adjoining countries, or frequently both. Since they are composed of national transport links that also serve domestic traffic, there are conflicting demands for corridor capacity to serve domestic and international demands and this conflict can result in conflicting objectives for the development of the corridor. There are also multiple jurisdictions responsible for maintaining these routes with varying sources of funding for their development and maintenance. It is, therefore, important to distinguish between the roles of corridors in serving domestic, foreign and transit traffic.

The four types of corridor are identified as National, Bilateral, Multilateral, Multimodal, and Intermodal.

A ***national trade corridor*** is a designated route within the national transport network that is used to transport imports and exports from and to an international gateway or a border crossing. It connects to one or more of the country's major centers for production and consumption. The most common corridor is that connecting a country's national capital or industrial heartland with its major port.

Bilateral trade corridors are used to transport trade between two countries and to allow each country to use the international gateways of the other. As such, they include one or more border crossings and

connect to one or more international gateways. The corridors are determined by national legislation that stipulates not only the routes, but also locations where bilateral trade may enter and exit the country.

Multilateral trade corridors are used to transport cargo through three or more countries of which at least one acts as a transit country. As a result, there are at least two border crossings and there may be a connection to one or more international gateways.

Another method of differentiating corridors concerns the range of transport modes and routes included in the definition of the corridor. A single-mode, single route corridor, such as a road or railroad line, is relatively simple to manage. A single agency is responsible for development of infrastructure. The same or another agency is responsible for regulation of that mode of transport.

A **multimodal corridor**, in which there are parallel routes using different modes, is more difficult to manage. It requires coordination between modal agencies, both for development and regulation. In order to achieve this coordination, there must be participation by senior political leadership, for example, prime minister, planning commission, a senior ministry, or legislative committee.

An **intermodal corridor** is more difficult to manage as it has individual routes that include more than one mode with intermodal connections. This requires even better coordination between the ministries/agencies responsible for each of the modes and therefore stronger leadership from senior government officials.

The distinction between single mode, multimodal, or intermodal corridors is somewhat artificial in that most international trade corridors are intermodal and include parallel routes with different modes. At issue is how inconclusive the definition of the corridor, and therefore the scope and effectiveness of the corridor management, is. With the exception of a road corridor providing connections between adjoining countries, all foreign trade corridors include a domestic land mode and an international ocean or air mode. For corridors that end in a gateway port, it is important to include the seaport as the intermodal connection between land and water transport. Transiting the gateway port often requires more time than for the land transport and significant costs. It may also affect the efficiency of land transport by limiting options for reliable scheduling of movements. Rail and air routes are also intermodal because road transport is required at both ends of the movement. Even road routes that cross borders can be treated as intermodal since the border crossing generally acts as a point of transfer between transport services, albeit of the same mode. Although intermodal corridors are more complex to manage, efforts to limit the corridor to individual modes will also limit the effectiveness of the corridor management and lead to partial, or worse, ineffective initiatives.

While not being mutually exclusive categories, this typology does provide a framework for consideration of their management objectives and structure.

The scope of corridor management covers: Trade and transit agreements, Infrastructure and facilities, Transport and logistics services, Standards, Regulations and Procedures and Security. The effectiveness of these corridor components and their management can be assessed by a range of performance measures that cover each of them individually and the corridor as a whole. Corridor management can act as the nexus for this monitoring effort and can coordinate efforts to improve performance.

The operation and management of a corridor has three components: legal, physical, and operational. The legal component produces the bilateral and multilateral agreements that allow goods to cross international borders and the regulatory and policy framework that governs the provision of transport and

logistics services along the corridor and across the borders. The physical component produces the infrastructure and facilities that make up the corridor, including the border crossings and international gateways. The operational component not only implements the regulatory and policy framework and maintains the infrastructure and facilities, but also modifies these to improve performance and promote improvements in the quality and variety of transport and logistics services. These three components do not occur in sequence. The legal and physical components overlap and the operational phase cannot begin until they are well underway.

Objectives of corridor development

The role of corridor management should be consistent with the goals that the trade corridor is meant to achieve. While there is a common objective of providing for efficient movement of trade, there are often broader economic goals that the corridor is meant to achieve. Some corridors have been developed to **promote economic activity along the corridor**, others to **increase activity at the international gateway** at the end of the corridor. A corridor may also be developed to **provide an international gateway for one or more landlocked countries**. While there is usually substantial trade between the landlocked country and its neighbors, trade with third countries must often be conducted through intermediaries due to lack of direct access to the sea. Still other corridors have been developed as part of a broader effort to **promote or expand an economic union**. Promotion was the rationale underlying the development of the corridors in the Greater Mekong Subregion, and Mercosur region, while expansion was the case for the extension of the TEN transport network to Eastern Europe through TRACECA in support of the enlargement of the EU.¹ Finally, some corridors have evolved with no objective other than to **facilitate bilateral and multi-country trade** that is controlled through back-to-back agreements. This has been the case for the land routes in the Middle East, including those from the Eastern Mediterranean through to Iraq, from Iran up through the Central Asian Republics, and from Jordan through to Syria and Iraq. Efforts to create an Asian Highway have followed this incremental approach.

Participants in corridor management

There are three categories of participants in the corridor management. The first and most important is the leadership. To be effective, the management must have sufficient authority to obtain cooperation from the public agencies that develop the infrastructure and facilities, prepare the trade and transit legislation, and formulate and enforce the standards and regulations affecting services in the corridor. This implies relatively senior officials from either the executive or legislative branches of government. For bilateral or multilateral corridors, the leadership would have to be senior political officials from each of the participating countries with comparable status. When they exist, regional organizations with competence in customs and transportation policies have also a natural role to play.

Organization of corridor management

The form of the organization depends on both the issues it will address and the period over which it is expected to be active. If the management's primary concern is with the legal component of the corridor, then it is likely that the organization would take the form of a standing committee within the legislature or a special section within the Ministries of Transport or Planning. The life of the organization would be

¹ The stated goals were specified as follows: smooth functioning of the internal market; strengthening of economic and social cohesion; and ensuring the sustainable mobility of persons and goods taking account of their comparative advantages.

linked to the time required to ratify the treaties and enact the legislation required to allow the corridor to operate, but is unlikely to extend beyond 1-2 years. Therefore, the organization should have a flexible structure relying on consultants or seconded staff for technical support.

If the primary concern were project development, then the tenure would continue through the planning and construction of infrastructure and facilities. If management's responsibility is limited to planning, then a task force or inter-ministerial committee, as have been established in Pakistan and India, would be the suitable structure. However, if management were also responsible for construction, then a special department within a senior Ministry (for example, Finance or Planning) would be more appropriate.

If the primary concern were operational, then a more permanent organizational structure would be required. At the same time, it would operate independently of government. An association or commission could be set up if management's primary duties are to monitor performance and promote the use of the corridor. If the duties include coordinating activities of public agencies, for example, for upgrading infrastructure, contracting for construction and/or concessioning, then an autonomous authority would be more effective.

In all cases, the corridor management would be a relatively small organization with a technical rather than administrative orientation, but with leadership that is involved in public dialogue. The requirement to interact with a large number of political and private sector actors does not require size, but flexibility. The same applies for the requirement to act across provincial and national boundaries. For the latter, working committees can be established involving senior officials involved in trade and transport to focus on the legal components, but the physical and operational components must be dealt with at a national level. The exception would be efforts to improve performance at the border, in which case bilateral working groups can be established.

The activities of a corridor's management could include: planning and financing, legislation, regulation, operation, monitoring and promotion of the corridor. But more likely management will be responsible for coordinating or promoting these activities by others.

Models of corridor management

While it is not possible to completely control corridor development, it is important to have a single organization whose purpose is to promote and coordinate this development. Where corridors have been successful, there have been strong political and market support for their development. A corridor organization provides a point of focus for stakeholder efforts and a forum for identifying major constraints on corridor performance. It also provides a focus for the lending programs of multinational organizations, which typically lend to individual line ministries. While there has been significant variation in approach to the development of international trade corridors, there are four general models that have been applied, with increasing complexity as the degree of integration and devolution of responsibilities to a dedicated corridor institution.

The first model is *project coordination* as part of a general corridor development plan. Efforts to expand and improve corridors are usually undertaken by government agencies on a project-by-project basis. The corridor management can coordinate these activities either through direct interaction with the agencies or by providing oversight as part of a senior ministry or the prime minister's office. The government agencies would undertake improvements in the corridor infrastructure based on local requirements and problems, but as the nature and importance of the corridor evolves, there would be a greater effort to relate these projects to corridor development. The management does not concern itself

with the variety, quality, and competitiveness of the transport services, which is expected to develop through market forces and growth in trade. Nor does it become involved in issues of deregulation of transport and logistics or negotiation of agreements to expedite cross-border movements or improve access to international gateways.

The second management model is the *legislative* model. Typically, the corridor management is imbedded in the legislative committees that produce policies and legislation that support the development of the corridor. It is extremely important during the formative period of a corridor, as its objective is to produce:

- bilateral and multilateral trade and transit agreements;
- formal recognition of the importance of the corridor;
- designation of specific routes, border crossings and connected gateways; and
- programmatic funding for corridor infrastructure.

It is also effective for initiating reforms to harmonize standards, simplify cross-border movements, and reduce regulatory impediments to efficient corridor services. This form of management resolves many of the difficulties with coordination among government agencies, but has relatively little impact on the physical and operational components of the corridor. Implementation of investments in infrastructure and facilities and changes in procedures are left to individual jurisdictions and line agencies. While the management structure is formal, it tends to be short-lived.

The third management model is a *consensus-building* institution. It is a formal institution created to mobilize support from stakeholders for improvements in the corridor and for reforms in regulations and procedures, especially border-crossing procedures. This model can be used to mobilize support for the legal, physical, and operational components of the corridor, but with limited scope for direct action. Its primary activity is advocating improvements to the corridor by providing information to stakeholders, including government agencies, concerning current performance, needs for improvement, and success of previous initiatives. The effectiveness of this model depends on the level of participation by public and private sector stakeholders as well as its ability to maintain a professional staff that can address issues related to planning, regulation, and performance. While its primary focus would be national, it can be used to develop consensus between the countries along the border. This institution would have an indefinite tenure, but requires specific tasks to be sustainable.

The fourth model is an institution responsible for developing *public-private partnerships* in order to improve the operation of facilities and services in the corridor. The management develops concessions, operating agreements and other arrangements to involve the private sector in managing the corridor's infrastructure and facilities and to mobilize funding for corridor development. This model is effective at the domestic level, but has some limitations for addressing problems with cross border improvements. However, it can be used to develop toll roads, rail concessions, and dry ports multimodal services which extend across borders. This institution would have an indefinite tenure, which could be limited to the development of these partnerships or could be extended to the supervision of the resulting contracts.

Corridor performance evaluation

The performance of a corridor can be evaluated from three perspectives. The first is an *infrastructure* perspective. This considers the physical capacity of the links and nodes in a corridor and the utilization of these components. This approach is often used when deciding on requirements for additional capacity, but provides little insight into the effect of corridor performance on trade. The second perspective

examines the **quality of the services** provided for the goods moving on the various routes. Performance is measured in terms of average time and cost for transport units moving through this corridor. These may be evaluated for individual links and nodes. The third perspective is the **shipment of goods** through the corridor. Again cost and time are measured, but this time for each of the principal supply chains. The costs and time can be disaggregated for the transport services on the links and the processing services at the nodes.

Measures to improve corridor performance

The concept of a corridor is a powerful construct for addressing most of the major issues confronting freight transportation and especially for freight movements between and through adjoining countries. The concept includes not only a collection of routes, but also a portfolio of transport services. It provides a mechanism for focusing public and private sector efforts on a common objective: moving goods efficiently throughout the corridor. It creates a framework in which initiatives to improve cross-border freight movements can be defined, appraised, and evaluated. This framework can accommodate intermodal transport and integrated logistics.

The mechanisms available to the public sector for improving corridor performance include **capital investment, legislation, technical standards, and regulatory reform**. Capital investment was the key component of the strategy for developing the Pan-American Highway, but its performance suffered from lack of attention given to the regulatory reform and legislation to facilitate cross-border movements. The Northern and Central Corridors in East Africa initially relied on investment, but have since focused on legislation and regulatory reform to facilitate the movement of goods on the road and rail infrastructure. The EU relied on three basic strategies for development of the trans-European transport network:

- Ensure interoperability through harmonization of technical standards for infrastructure and rules applied to transport service providers;
- Improve interconnections of national networks that have been designed primarily to meet domestic needs; and
- Increase market access for transport services provided by one Member State in other Member States.

Responsibility for investment in infrastructure was assigned to individual governments. The private sector was given responsibility for improving the management of transport and other logistics services.

The major constraint on corridor performance is generally found at the interconnections. These include not only border crossings and international gateways, but also the major nodes along the corridor. The transport units and their cargo are normally cleared at these border crossings and gateways. It is at these points that the majority of the unnecessary delays and informal payments occur. These delays and costs can be reduced by moving the clearance to an interior location, especially a node where there would normally be delays associated with intermodal transfer, equipment interchange, or cargo storage. If interconnections are to operate efficiently, it is necessary to provide sufficient investment in infrastructure and effective management of the services at these interconnections.

These interconnections have traditionally focused on investment in new capacity, but in the last few decades, increasing attention has been given to the quality and efficiency of cargo handling and processing services offered with the result that the public monopolies have been replaced by competitive private sector service providers. More recently, efforts have focused on reducing the regulatory

constraints on efficient interconnections. All three, capital investment, commercialization, and simplification of regulations, continue to be important initiatives for improving corridor performance.

Nearly all of the corridors reviewed have adopted a strategy of improving the performance at the border crossings and international gateways, making it the most consistent strategy employed. In the case of TRACECA, it is the core strategy. This strategy has been most successful in corridors that pass through a Customs Union. The TEN transport network and the Trans-Kalahari Corridor have been able to simplify cross-border procedures and significantly reduce delays through agreements developed as part of the Customs union. In contrast, the customs unions on the Pan American highway cover only the beginning (NAFTA) and the end (Mercosur). As a result, the efficiency of the border crossings has not improved in Central America and northern South America, and relatively little traffic moves through the middle of the corridor.² The success of improving cross-border performance on the Maputo corridor and the resulting growth of traffic at the expense of South African ports contrasts with the difficulties in improving performance on the Northern and Central Corridors where there has been relatively slow growth in traffic even though these corridors provide essential outlets for landlocked countries.

One of the best options for increasing efficiency of cargo clearance is to relocate the clearance procedures away from the border. Indeed this is one of the basic insights of the EU's program. Inspections of truck registration, driver's licenses, and certificate for road-worthiness can be conducted along the corridor, but away from the border as part of the domestic program of roadside inspections. Trains can be inspected at marshalling yards where trains are reconfigured or shipments transferred to road transport, instead of at border crossing points. Cargo inspection and clearance procedures can be relocated at inland bonded warehouses, container depots, and dry ports. This approach was pioneered at international seaports in order to alleviate congestion, but is now being adapted for imports arriving through land borders. It allows movement of goods under bond from the border to inland customs facilities or special economic zones or other enclaves that are granted duty free status. This can include allowing cargo to be cleared at factories.

For international corridors, interoperability refers to the ability of transport units to operate across the countries through which the corridor passes. This requires compatibility of transport infrastructure on both sides of the border. It also requires harmonization of the physical characteristics, policies and procedures that would otherwise prevent cross-border movements. Without harmonization, it is necessary to perform back-to-back transfers of cargo between transport units at the border. This adds to the costs and time for the crossing and the losses during cargo handling. Most of the features of interoperability are achieved through bilateral agreements and back-to-back agreements where there are more than two countries within the corridor.

Harmonization is needed for both ***transport infrastructure and transport units***. It requires an agreement on a common set of technical standards or an acceptance of the technical standards applied by adjoining countries. Harmonization of infrastructure is difficult to achieve because it implies a modification of existing infrastructure or a change in engineering practices. There is often an agreement to gradually adjust designs towards a common standard as was done in the Mekong subregion.

Associated with physical standards for transport units are the procedures for certification of transport units that meet these criteria and the documents that confirm that these procedures have been performed. Harmonization of inspection procedures and frequency of these inspections can be

² In part because of the waterborne competition.

accomplished on a bilateral or multilateral basis. The most common mechanism is bilateral agreements that provide for mutual recognition of the other country's procedures and documents.

An important complement to interoperability is the ability of service providers from one country to compete in the provision of transport services in other countries along the corridor. In order to have meaningful competition between countries, there must be a legal framework that gives transport operators access to the transport market throughout the corridor. Without this, an international corridor is merely a collection of interconnected domestic corridors.

Improvements in market access increase the pool of transport operators, thereby offering more options in terms of the cost and quality of service. There is also a greater potential for economies of scale. In order to improve market access, it is necessary to have an effective transit agreement and supporting agreements on standards and certification. In addition, it is necessary to allocate the liabilities so that transport operators can obtain the necessary insurance coverage.

Recommendations

The three factors that determine corridor performance are quality and competitiveness of transport and logistics services, capacity and condition of public infrastructure used by these services, and domestic, bilateral, and sometimes, multilateral regulation of these services and the trades that they serve. The organization responsible for corridor development must address all three factors; however, one area usually dominates. Transport and logistic services are rarely the primary concern. The exception occurs where the government is heavily involved in providing these services or there are significant constraints on market access. Where infrastructure is the problem, it may be due to poor condition, insufficient capacity or lack of physical integration. Policy and regulation is more likely to be the major problem, especially as it relates to border crossing procedures for both import/export trade and transit shipments.

Efforts to improve corridor performance require a cooperative effort by the public and private sector. While there are some initiatives that can be undertaken exclusively by the public sector, most require private sector involvement to ensure that the quality of services offered in the corridor are improved. The configuration presented in Figure 5-1 suggests that most initiatives improve some combination of market access, interoperability, and interconnection. The initiatives at the center of the figure take longer to implement, but have a more substantial effect on corridor performance. These are generally the subject of continuing efforts at improvement. The initiatives at the periphery can be achieved in a shorter time frame, but must be built on developments in the core areas.

The range of public and private sector stakeholders involved in a corridor and diversity of their goals limit the ability to control development of the corridor. The major challenge is to define a common set of objectives and, based on these, to coordinate the activities of the stakeholders. The private sector should take the lead where there is sufficient infrastructure and an appropriate regulatory environment. The public sector should take the lead where there is a requirement for significant improvements in infrastructure or for major regulatory reform.

The four management structures can provide this coordination, but their effectiveness depends on the situation. The legislative development model is useful when dealing with large networks, including several corridors and several countries, where there is already some level of political integration and where the corridors are in their formative stage. This model was effective in organizing the TEN and TRACECA networks, but less effective in the attempts to develop the Can-Mex and ASEAN corridors. The project coordination model applies when dealing individual corridors that have poorly developed infrastructure.

This approach is less effective for integrating corridor development across multiple jurisdictions. It works best where there is a broad-based effort to upgrade infrastructure. The consensus-building model is most effective when the major concerns are simplification of regulations and border-crossing procedures, improving transport market access, and removing specific choke points. This model was effective in developing the Trans-Kalahari corridor, but less so in the Central corridor or in West Africa. It is being used to develop the Asian Highway, but as this is a more extensive and difficult network, progress has been slow.

In all cases, the role of coordination is primarily one of facilitating the flow of information between the parties to develop consensus on the initiatives to be taken. This is most effective where there is an autonomous entity with regular staff, funding commensurate with the scale of initiatives required, and an executive board that includes the principal stakeholders from the public and private sector. For multilateral corridors, the corridor management can contribute to this effort by providing advice on initiatives that have proven successful in other corridors and technical support for implementation of pilot projects as was done in the case of Trade and Transport Facilitation Program in Southeast Europe.

Best Practices in Management of International Trade Corridors

1. FRAMEWORK FOR INTERNATIONAL TRADE CORRIDOR MANAGEMENT

A. Defining a Trade Corridor

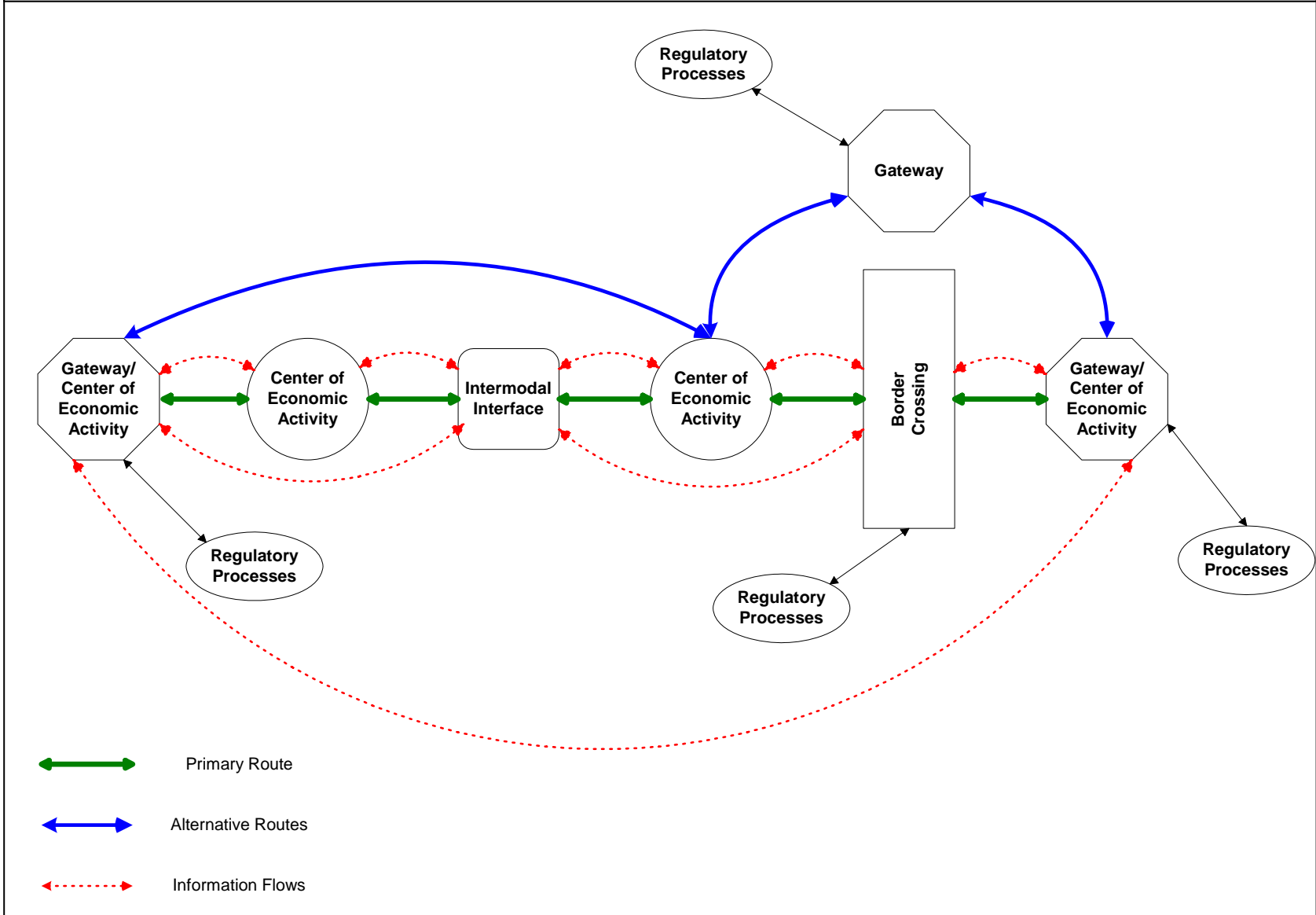
The concept “trade corridor” lacks precise definition. Transport corridors have both a physical and a functional dimension. In terms of physical components, transport corridors are one or more **routes** that connect economic centers within and across countries. These routes may have different alignments, but they have common transfer points which are connected to the same end points. These routes are composed of **links** over which transport services travel and **nodes** that interconnect transport services. The end points are **gateways** that allow for traffic outside the corridor (and its immediate hinterlands) to enter or exit via the corridor (Figure 1-1).

In terms of functional component, trade corridors connect one or more adjoining countries, connect countries separated by one or more transit countries or provide access to the sea for landlocked countries (for example, the corridors connecting landlocked Bolivia to the Pacific *via* Chile and Peru and the corridor connecting Nepal to the Bay of Bengal and the Arabian Sea). Although some corridors have a single mode or route (for example, Can-Mex or the Trans-Kalahari corridors), most have multiple modes and routes. Some corridors are relatively short in length and defined by principal gateways (for example, the Maputo Corridor connecting Maputo port to the industrial areas around Witbank in Eastern South Africa). Other corridors are defined by the region they serve (for example, the West Bengal corridor connecting Kolkata and Haldia ports with Eastern India, Bangladesh, Bhutan, and Nepal). Still others are part of a set of corridors serving a larger region (for example, the Trans-European Networks (TEN) in EU).

While it is important to distinguish between economic corridors and transport corridors, most trade corridors are designed primarily for facilitating regional economic growth, through providing transport and logistics services to cities and countries along the corridor (for example, the corridors connecting the countries of the Greater Mekong Subregion). The special relationship between trade and economic corridors has caused countries in East and Southern Africa to incorporate the development of corridors into Spatial Development Initiatives (SDI).

Corridors are rarely developed as Greenfield projects. Most have developed from existing routes, several of which are traceable to ancient trading routes, such as the Silk route (Box 1-1). Almost all corridors have evolved from existing land-based transport networks. Coastal and short sea routes are less common in practice, although these routes are important for connecting the archipelagic countries (for example, the Manila-Davao Strong Republic Nautical Highway) and for countries separated by large bodies of water (for example, the TRACECA corridor across the Caspian and Black Seas). Inland water routes are also less common, although they are important for riverine countries (such as Bangladesh and Vietnam). Since there is little necessity for developing links on these routes, ocean and air routes are usually not included in the definition of corridors; however, airports and seaports are included in our analysis since they serve as international gateways.

Figure 1-1. Sample Corridor Model



Box 1-1. Silk Road - The Continuing Challenge

The "Seidenstrasse" was so named in the late 19th century long after its decline. This route was established during the Han dynasty in the middle of the 2nd century BC for strengthening its military and political regional position. This corridor evolved into a network connecting Northern India, the Black and Caspian Seas, the Arabian Peninsula and Istanbul and linking the Roman Empire with the Imperial court in China.

The volume of trade along this route was relatively modest until the middle of the 1st century BC until the Romans began rapidly expanding trade in silk. Trade then diversified along this route to include a range of goods including gold, ivory, glass, perfumes, and textiles moving east and furs, ceramics, spices, jade, lacquer objects, and silk moving west. During its long history the Silk Road served not only as a trade route, but also as means for exchanging information. Over this route traveled the concepts of mathematics and technologies for gunpowder, printing press, and sericulture.

Trade along the corridor was conducted by caravans transporting goods from one border to the next, where goods were sold to a trader of the adjoining region. This trade, in turn, would then transport the goods to the next border. Thus Chinese traders could sell to Central Asians who in turn would trade with Persians. The Persians in turn, provided the goods to the Syrians who could ship them to the Romans through the Greek or Jewish traders. Although the movement of goods was slow under this system, the system was lucrative for the middlemen and besides, the system entailed limited risks.

The decline of the Han dynasty in the early 3rd century AD led to a decline in trade along this network. The network further regained its importance in the 7th century with the rise of the Tang dynasty, but then declined along with the dynasty in the early 10th century. In the 13th century, the network was revived with the rise of the Mogul Empire, which stretched from China to the Mediterranean only to once again decline in the 14th century with the demise of the Mogul empire and the isolationist policies of the Ming. Perhaps the most important reason for its final demise was the discovery of the sea route to India.

Current efforts to revise parts of this network have been confronted with problems of political integration, significant financial risks, transshipments at the borders, and competing sea routes.

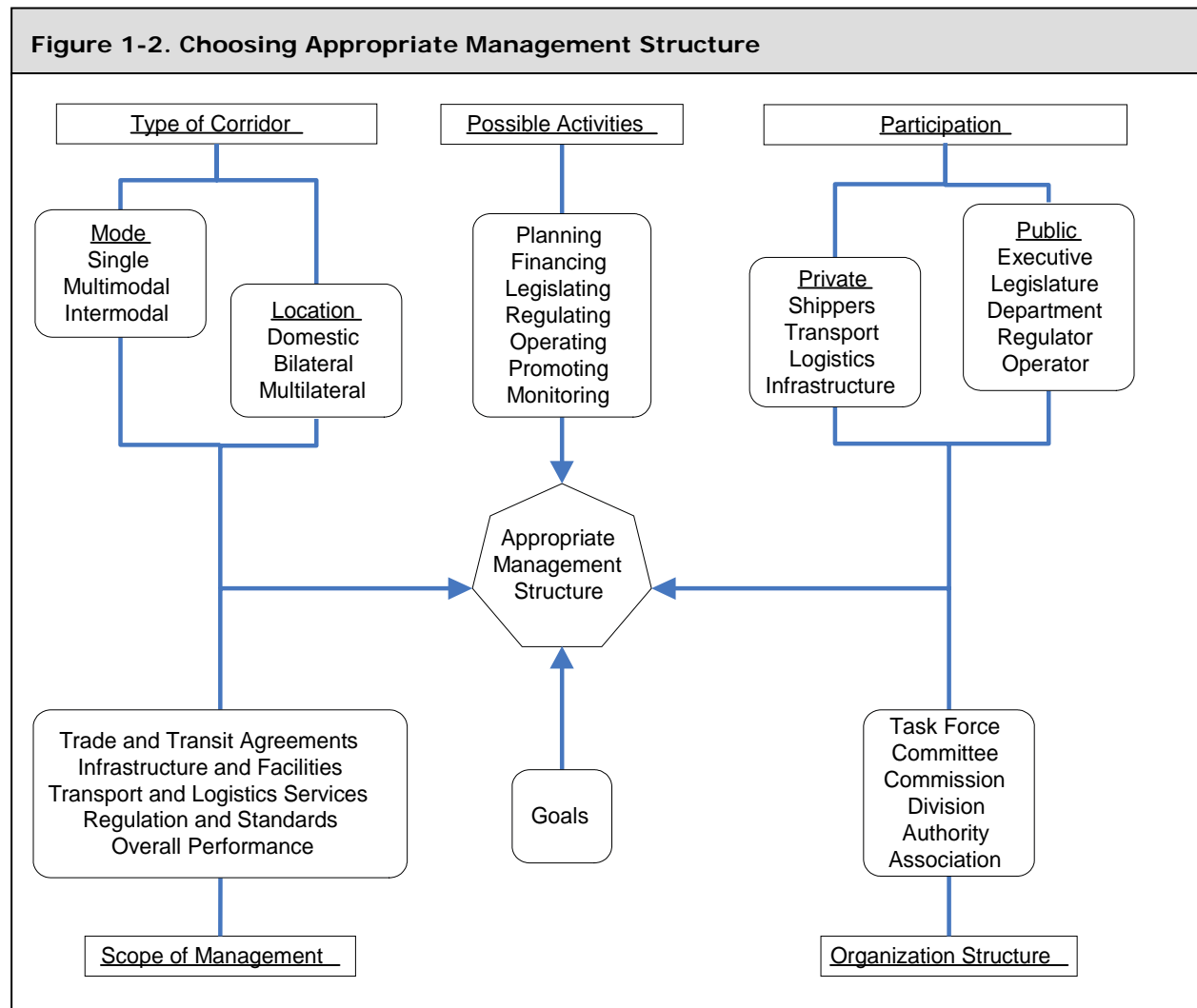
Trade corridors are generally used for both passenger and freight traffic flows. However, the demand characteristics and the equipment used for these two types of traffic flows are quite different. This report focuses mainly on freight traffic flows, but since passenger freight flows usually compete for the same route capacity, they do impact on the quality of freight transport and logistics services provided in the corridor. Trucks compete with buses and passenger cars for right of way. Slower freight trains are slotted in between faster passenger trains. Barges and freighters compete with passenger vessels for wharf space, navigation channels, and locks.

B. Corridor Management

The title of this report, "*Best Practices in Management of International Corridor Management*," implies that corridors are manageable. While both public and private entities were involved in the development and regulation of the corridors reviewed for this report, it is not clear whether these diverse entities can be easily managed. The term management also implies some form of control, but in practice, it is difficult to create a single point of coordination, given the diversity of stakeholders in managing transport corridors.

In addition to the large number of government agencies involved in developing transport corridors, there are a number of shippers, transport companies, and logistics service providers involved in the activities of transport corridors. As a result, the management of a corridor can involve organizations established by diverse actors including the government, the private sector, or jointly by both. The appropriate structure for corridor management depends on the nature of the corridor and the specific functions to be managed. Different organizations may be involved in developing the corridor infrastructure, regulating the transport and logistics services operating on the corridor and monitoring the efficiency of the corridor.

Because of the complexity of corridors and the different economic activities that are dependent on an efficient transport corridor, there is no simple answer to the question of best practices in corridor management. Instead we address the fundamental question of what is the appropriate form of corridor management for a specific situation. In order to address this question, it is necessary to develop a typology of corridors and usable management interventions for selecting the most effective management format. The format presented here has both the organizational structure and the role for public and private sector entities in corridor management. Connecting the typology and the format would be the goals to be achieved by establishing a corridor management (Figure 1-2).



C. Types of International Trade Corridors

Foreign trade corridors are used for promoting economic growth through increasing a country's trade competitiveness. They may serve the foreign trade of a single country or of several adjoining countries. Since they are composed of national transport links that also serve domestic traffic, there are conflicting demands on the transport corridors' capacity. Further, there are conflicting objectives for developing these routes. There are also issues relating to multiple jurisdictions since different agencies are responsible for maintaining these routes and providing funding for their development and maintenance. It is, therefore, important to distinguish between the roles of corridors in serving domestic, foreign and transit traffic.

National Trade Corridors

A national trade corridor refers to a designated route within the national transport network of a country for transporting goods to and from an international gateway, or through a border crossing. These corridors connect one or more of the country's major production and consumption centers. They usually cross provincial borders and are established through national legislation. The objective of establishing national corridor is to encourage trade flows along the corridor. The most common national corridors are those that connect a country's national capital or industrial heartlands to its major port (for example, the corridor connecting Delhi-Mumbai, Seoul-Ulsan, Sao Paulo-Santos, Santiago-Valparaiso, and Johannesburg-Durban).

The responsibility for developing and maintaining national trade corridors is usually shared by the national and the provincial governments. Both entities provide funds for developing the basic infrastructure and both share the responsibility for regulating the activities within the national corridor. Enforcement activities are generally assigned to the provincial government and the cost of developing and maintaining such corridors are usually met through general or earmarked tax revenues.

Bilateral Trade Corridors

Bilateral trade corridors are used to transport trade between two countries and to allow each country to use the international gateway of the other. As such, bilateral trade corridors include one or more border crossings and connect one or more international gateways. They are usually established by national legislation which stipulates the routes and locations where the bilateral trade may take place. The legislation may also establish regulations, such as those pertaining to moving goods across the border, moving goods under customs bond between a border crossing, and either an internal location (where customs clearance procedures can be completed) or moving goods through the international gateway.

The national government controls the land border crossings, but only regulates the international gateways, which are usually administered by the

Table 1-1. Types of Trade Corridors	
Bilateral	Multilateral
Bolivia-Chile	TEN, EU
Northern Corridor, Kenya	TRACECA, C. Asia
Maputo, Mozambique	Can-Mex (NAFTA)
Mongolia-China	Pan American
SAARC Corridors, S. Asia	Trans-Kalahari, Namibia
Mercosur, S. America	ECOWAS, W. Africa
Northern West Borneo	Turkey-Jordan
West Bengal, India	Asian Highway, C. Asia
West Bank-Gaza, Palestine	GMS Corridors, S.E. Asia

provincial government. Customs and related border agencies control border crossings, and usually provincial offices have administrative control over the agencies. The costs of maintaining the gateway and border crossings are generally recovered through user fees and duties and the costs for maintaining links and other nodes are covered through general tax revenues.

Multilateral Trade Corridors

Multilateral trade corridors are used for transporting cargo through three or more countries, of which at least one is a transit country. As a result, there are at least two border crossings and there may be a connection to one or more international gateways in multilateral trade corridors. Table 1-1 presents examples of bilateral and multilateral trade corridors. The routes in these corridors may be designated through bilateral agreements, although regional agreements may be required to ensure that consistent procedures are being followed for transporting cargo across borders and transiting countries. This includes regional provisions regarding insurance of goods and vehicles and levying of customs duties on goods and vehicles that fail to complete their journey through the transit country. The objective of these routes is to promote regional integration and economic cooperation between neighboring or adjacent states. The costs of maintaining multilateral trade corridors are covered in the same way as the costs of maintaining bilateral trade routes. However, the transit countries may collect fees to cover the costs of infrastructure used by vehicles transiting the country.

Multimodal and Intermodal Routes

Another method of differentiating corridors concerns the range of transport modes and routes included in the definition of the corridor. A single-mode (or a single route corridor), such as a road or railroad line, is relatively easier to manage. A single agency is responsible for developing the infrastructure and the same agency may be responsible for regulating that mode of transport. A multimodal corridor, in which there are parallel routes using different modes, is more difficult to manage. It requires coordination between modal agencies, both for developmental and regulatory functions. In order to achieve this coordination, participation by senior political leadership may be required (for example, prime minister, planning commission, a senior ministry, or legislative committee). An intermodal corridor is also difficult to manage as such corridors have individual routes that include more than one mode with intermodal connections. Such corridors require even greater coordination between the ministries/agencies responsible for each of the modes and therefore, such corridors require stronger leadership from senior government officials.

The distinction between a single mode, multimodal, or intermodal corridors is somewhat artificial, in that most international trade corridors are intermodal and include parallel routes with different modes. At issue is how inconclusive is the definition of the corridor and therefore, the scope and effectiveness of the corridor management. With the exception of a road corridor providing connections between adjoining countries, all foreign trade corridors include a domestic land mode and an international ocean or air mode. For corridors that end in a gateway port, it is important to include the seaport as the intermodal connection between the land and water

Table 1-2. Multimodal National Corridors

<p>Road/Rail</p> <ul style="list-style-type: none"> ▪ Seoul-Pusan, Republic of S. Korea ▪ Delhi-Mumbai, India ▪ Karachi-Lahore, Pakistan ▪ Johannesburg-Durban, S. Africa ▪ Moscow-Vladivostok, Russian Federation ▪ Chicago-Los Angeles, USA ▪ Klaipedia-Vilnius, Lithuania <p>Inland Water/Road/Rail</p> <ul style="list-style-type: none"> ▪ Rhine-Main-Danube, EU ▪ Grand Canal, China ▪ Mississippi, USA

transport. Unlike land transport, transit through the gateway port often requires more resources (both in terms of costs and in terms of time). Such transit may also affect the efficiency of land transport, by limiting the options for reliable scheduling of movements. Rail and air routes are also intermodal because road transport is required at both ends of the movement. Even road routes that cross borders can be treated as intermodal, since the border crossing generally acts as a point of transfer between transport services, albeit of the same mode. Although intermodal corridors are more complex to manage, efforts to limit the corridor to individual modes will, besides limiting the effectiveness of the corridor management, possibly lead to partial, or worse, ineffective initiatives.

D. Scope of Corridor Management

A number of areas in corridor management require management oversight. These areas can be grouped into five general areas: trade and transit agreements, infrastructure and facilities, transport and logistics services, procedures and regulations, and overall corridor performance. The managements of the various corridors examined in this report have tended to focus on one or two of these areas as shown in Table 1-3.

Trade and Transit Agreements

The effectiveness of trade corridors with cross-border movements depends on trade and transit agreements. These agreements establish the conditions under which movements of cargo and transport take place. These agreements are not fixed, but evolve over time. In recent decades, the trade agreements have been modified to allow more goods to be traded under favorable circumstances. Agreements to allow goods and transport to move in transit through a country, either through an international gateway or through an adjoining country, have however, been slower to evolve. Corridor management can be involved in not only seeking revisions of these agreements, but also in defining the implementing regulations and ensuring that these regulations are properly implemented.

Since the transit and trade agreements are negotiated between respective governments, it is important to have the involved government officials actively coordinate with the management of trade corridors. It is also crucial to have private sector representation of traders and logistics service providers. EU and ASEAN have attempted to manage this process with varying levels of effectiveness. They have been effective in the initial drafting of the agreements, but less successful in making adjustments over a sustained period.

Table 1-3. Focus of Corridor Management	
Project	Function
Can-Mex (NAFTA)	Infrastructure and Facilities
Pan American	
SAARC Corridors	
TEN	Trade and Transit Agreements Infrastructure and Facilities Standards and Procedures
TRACECA	
Asian Highway	
Northern Corridor	Infrastructure and Facilities Transport and Logistics Services Overall Performance
Maputo	
Trans-Kalahari	Standards and Procedures Overall Performance
ECOWAS	Trade and Transit Agreements Standards and Procedures
Asean	
GMS Corridors	
Mercosur	

Infrastructure and Facilities

Efficient movement of goods and transport through a trade corridor depends on the capacity and quality of the corridor infrastructure and facilities. Corridor infrastructure, including border crossings and international gateways, have usually been planned and funded primarily by the public sector in the past, but increasingly, these corridors are being constructed and maintained by the private sector. While capital costs for the infrastructure are covered through general tax revenues, user fees are often charged to cover maintenance costs. Capital costs for facilities located at the nodes and gateways are generally recovered through activity charges. For most corridor infrastructures, development implies upgrading existing assets rather than new construction. An increasing portion of these efforts are being undertaken by the private sector, which is increasingly being held responsible for designing, financing and operating the improved assets. The principal exceptions have been land border crossings which, so far, continue to be developed by customs and other border security agencies.

During the last two decades, there has been a dramatic shift from public to private operation and maintenance of corridor infrastructure. However, these processes are currently incomplete. In some cases, the transfer from public to private has not been well defined and hence, the transfer requires restructuring. In others, the role of the public sector as the developer of common user infrastructure requires clarification, especially with regard to funding.

Corridor management can be involved in planning, developing/upgrading, and maintaining infrastructure and facilities. It can also be involved in ensuring that the infrastructure is both effectively managed and fully utilized. This process, however, requires coordination with those line agencies involved in developing infrastructure and facilities. It would also involve efforts to improve the mix of public and private sector participation and designing user fees for promoting the efficient use of infrastructure.

Transport and Logistics Services

The effectiveness of a corridor depends on the variety and quality of transport and logistics services offered to the users (the shippers). Since most of these services are provided by the private sector in a competitive market, the role of corridor management would generally be limited to removing the impediments to the entry of new providers/new services. At the same time, there is a need to promote integration of services, particularly if such integration would improve the efficiency of movement along the entire corridor. In this regard, vertical integration offers advantages to the class of shippers who want to contract for door-to-door services, rather than be dependent on a sequential series of services. On the other hand, horizontal integration can provide scale economies in marketing and utilizing transport equipment and information technology. Corridor management can address these issues through participating in efforts to improve the economic regulation of this sector and promoting efforts to improve service quality. It could also aid in monitoring competition among service providers and identifying and addressing regulatory constraints.

Where some services continue to be provided by the public sector, rail services, for example, the role of corridor management may be more pro-active in promoting new public-private partnerships for improving the quantity and quality of rail services offered. Efforts to concession rail services are one example which was introduced in the Northern Corridor in East Africa and the Mali-Senegal corridor in West Africa, albeit with mixed success.

Standards, Regulations and Procedures

The performance of a corridor is often determined by the standards and these pertain to: (1) the physical infrastructure and transport vehicles; (2) regulations on their use; and (3) the procedures followed for enforcing these standards. These standards are particularly important at borders where differences in standards and regulations often result in complex procedures that impede the movement of cargo and transport.

Although corridors management can have some regulatory oversight over procedures that affect the movement of goods in the corridor and the transport and logistics services that operate in the corridor, they are usually not involved in enacting or enforcing these standards and regulations. However, they can have the responsibility of proposing revisions for improving performance. They can also monitor the effectiveness of the procedures used for enforcing regulatory procedures and thereby facilitating in encouraging greater consistency and procedure transparency. The management can act in an advocacy role in order to:

- promote revisions to procedures and regulations that inhibit competition and efficiency;
- simplify documentation and procedures for minimizing unnecessary delays and informal payments;
- introducing greater transparency regarding procedures;
- encouraging the expanded use of ICT and risk management; and
- promoting the harmonization of procedures on both sides of the border.

For this function, it is necessary that the management have formal interaction with the agencies responsible for regulating trade and transport services. These efforts should avoid opportunities for monopolistic behavior by ensuring contestable commercial operations and, if necessary, through economic regulation.

Security

For bilateral corridors, the difficulties confronting management are greater due to the addition of the border crossings and gateways. The concerns of management would include ensuring the security of the borders, enforcing trade agreements, and interdicting the movement of hazardous, dangerous, and prohibited cargoes. It would also involve preventing monopolistic behavior and resolving the inherent conflict between trade facilitation and increased security. The latter includes the problems of illegal immigration. For land border crossings, there is the problem of remoteness from headquarters, which makes it difficult to supervise personnel and enforce standard procedures in practice.

Multilateral corridors add to these concerns the problem of ensuring the efficient and safe movement of transit cargo through countries along the border. The primary problem is preventing leakage of cargo into the domestic economy. To remedy this, management must focus on improving coordination between border crossings and gateways while developing effective methods for verifying that the cargo is not tampered with during its journey across the country. The problems become daunting where there are serious security concerns, as discussed in Box 1-2.

Box 1-2. West Bank and Gaza: Securing a Corridor

Perhaps one of the most problematic set of corridors in recent times is the one linking Gaza to the West Bank with Israel, Egypt, Jordan, and through other countries. The difficulties derive from the security inspections, enforced to restrict the flow of weapons in and out of the West Bank and Gaza, and for preventing potential attacks by persons approaching and crossing over the borders into Israel. The approach adopted by the Israeli government has been to introduce an extremely cumbersome inspection procedure on the border with Gaza, a less-intensive inspection regime on the border with the West Bank and a series of random inspections at internal checkpoints within the West Bank and Gaza. The effect of these inspections has been not only to disrupt the lives of civilians living in the West Bank and Gaza, but also to drastically reduce the trade that is essential for the economic development of the West Bank and Gaza. This is one of the most critical issues to be faced, as a part of normalizing relations within the region.

There are two difficulties with the use of border crossings as the primary locations for security checks. The first is that security's main concern is reducing the risk of violence. Security officials use unpredictable procedures and these officials are not concerned with the cost, delays, or damage caused to the goods moving across the border. The second problem is that by focusing on the border, insufficient effort is made to secure the corridors that utilize the border crossing.

In recent years, there have been significant improvements in detection technology. The Israeli government is now in the process of upgrading its border inspection facilities to include container scanners and devices for detecting explosives. By itself, this technology only marginally reduces risk. To be effective, it must be integrated with other sources of information about the cargo. It is also important that these be designed for reducing the costs and delays associated with moving cargo across the border. This requires the introduction of simpler and transparent inspection procedures. It also requires that some of the inspection procedures be moved away from the border. This means extending the security envelope from the border to the corridor and using information from upstream activities for minimizing the interventions required at the border. This can be achieved through advances in supply chain management, which have significantly increased the amount of information available about goods moving through a corridor, the means for monitoring this movement and the protection provided by the transport units used to convey these cargoes. Further security can be provided by establishing cargo consolidation facilities near the source/destination of the cargo.

There is considerable overlap between good supply chain management and improved security. Both require that closer attention be given to the physical movement of goods through a corridor and closer coordination between those involved in this movement. They also require more active participation by those who benefit from trade. One of the current difficulties with improving procedures is the vested interests of various parties that stand to benefit from the current inefficiency and lack of transparency.

Overall Performance

The performance of a trade corridor can be evaluated by observing both its utilization and the speed and reliability of movement of cargo through the corridor. While there are a number of transactions and activities involved in moving cargo and transport through a corridor, it is important to measure the performance for the total movement.³ Since performance will vary depending on the type of trade, it is necessary to consider a range of traded goods when evaluating trade corridors. Efforts to improve

³ Specific methods for measuring performance are discussed in a later chapter.

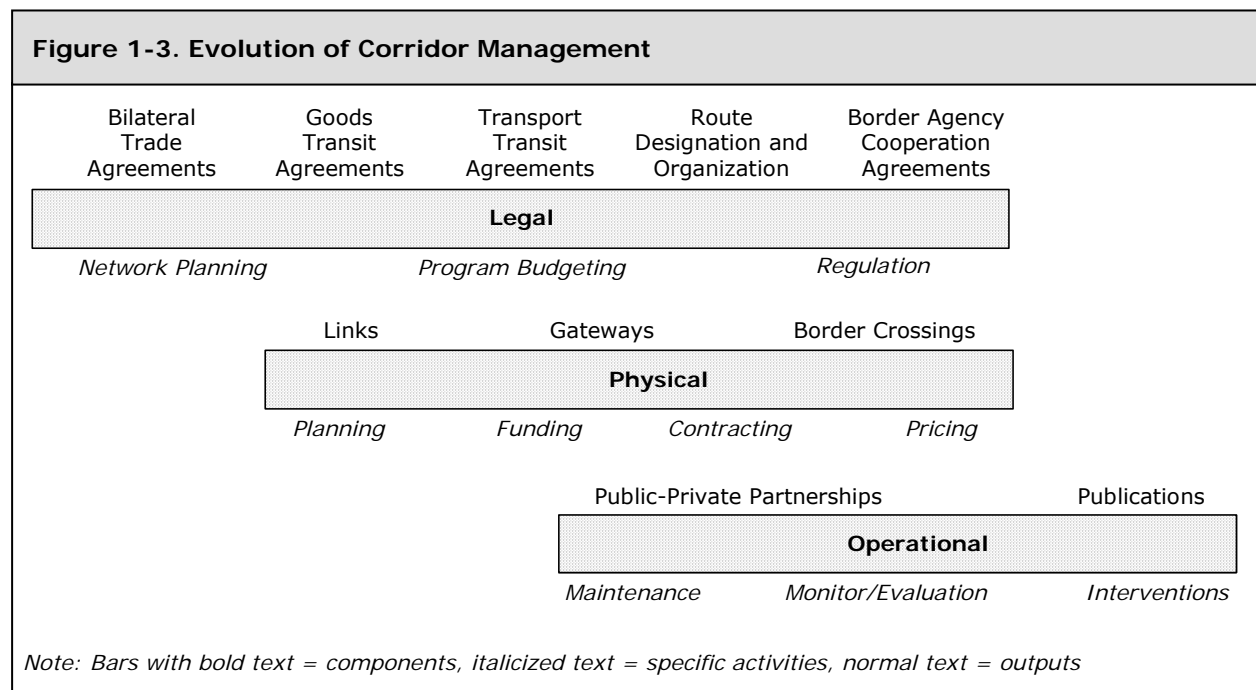
performance will require identifying specific activities that introduce excessive costs or time for a significant portion of these trades. It is then necessary to work with those involved in these activities to reduce the time and cost. Both the monitoring and the initiatives require a public-private partnership.

Corridor management can act as the nexus for this monitoring effort and can coordinate efforts to improve performance. Another option is for the management to supervise the monitoring of corridor performance and to advocate changes in procedures and policies for improving this performance.

E. Evolution of Corridor Management

The development of a corridor has three components: legal, physical, and operational (Figure 1-3). The legal component produces the bilateral or the multilateral agreements that allow goods to cross international borders. This component also includes the regulatory and the policy framework that governs the provision of transport and logistics services along the corridor and across the borders. The physical component is the infrastructure and facilities that make up the corridor, including border crossings and international gateways. The last is the operational component, which not only implements the regulatory and policy framework and maintains the infrastructure and facilities, but also modifies these to improve performance and promote improvements in the quality and variety of transport and logistics services. These three components are not sequential; the legal and physical components overlap and the operational phase cannot begin until the other components are well underway.

Corridor management can either focus on one of these components or attempt to coordinate between them. However, as each component involves different activities and constituencies, the more likely scenario is that corridor management will evolve, bringing changes in the scope of its efforts and the participants. The legal component requires interaction with the public sector for crafting the various agreements. The corridor management could coordinate these efforts for the public sector and/or act



as a forum for the interests of the eventual users of the corridor. The experience in developing the TEN transport network provides a good example of this form of management. The physical component requires participation in the planning and construction of infrastructure and facilities, either in the role of coordinator for the various public agencies involved or as an advocate for the individual projects needed to complete the corridor or increase its capacity. The continuing efforts to improve the West Bengal corridor demonstrate both the problems of managing the physical component and the role of international agencies in improving coordination among the agencies involved. The operational component requires more interaction with the users of the corridor for monitoring performance and developing strategies for improving that performance. The ongoing efforts to improve utilization of the Trans-Kalahari corridor and to improve corridor performance in Southeast Europe have been effective, although different approaches were applied.

The following chapter examines some of the more successful efforts at corridor management. Those that have been most successful have limited themselves to one of these components. This suggests that the most effective form of corridor depends on the stage of development of the corridor or, alternatively, where the most significant constraints exist.

F. Development Objectives

The role of a corridor management should be consistent with the goals that the trade corridor is meant to achieve. While there is the common objective of providing for efficient movement of trade through the corridor, some corridors may have other broader economic goals as well. While all corridors are nominally developed to support regional economic development, there are nuances to this objective that have impact on the way the corridor is developed. Some corridors have been developed to **promote economic** activity along the corridor. This was the case when the Maputo corridor developed as part of a Spatial Development Initiative (SDI). The route had earlier served as the outlet for the import/export trade of the industrial regions around Johannesburg. When the route was closed due to civil war, trade was diverted to Durban and Richards Bay. As a result, economic activity along the route declined. The restoration of the corridor was intended to help rebuild the economic activity of the region. While successful in achieving its objective, this outcome contrasted with the lack of success of other economic corridors developed under the SDI.

Other corridors have been developed to **increase economic activity at the international gateway** at the end of the corridor. An example is the Trans Kalahari corridor which was developed primarily to increase the use of the Port of Walvis Bay as the principal gateway for the Customs Union of Botswana, Namibia, and South Africa. In the US, the Alameda corridor was developed for providing a high-density rail connection between the ports on San Pedro Bay and the transcontinental rail network.

Alternatively, a corridor may be developed to **provide an international gateway for one or more landlocked countries**. While there is usually substantial trade between a landlocked country and its neighbors, due to their lack of access to the sea, a landlocked country's trade with third countries often must be conducted through intermediaries. Transit corridors allow the importers and exporters of landlocked countries to interact directly with the markets in which they trade, thereby reducing transaction costs. This was the rationale for the development of corridors, such as the Northern Corridor in Eastern Africa, the West Bengal Corridor in India, and various corridors leading to and from Laos.

Box 1-3. Alameda Corridor - Short and Green

The Alameda Corridor is a series of bridges, underpasses, overpasses, and street improvements constructed to separate road transport, freight rail, and passenger rail. The total corridor is only twenty miles, but costs more than \$2 billion. It includes ten miles of depressed rail line that eliminates more than 200 at-grade crossings, thereby reducing congestion and air pollution from idling trains, trucks, and cars. It consolidates branch lines of railroads connecting the ports of Los Angeles and Long Beach, including Burlington Northern, Santa Fe Railway, and Union Pacific Railroad. This corridor provides access to fast rail connections to the Mid-west, East, and Gulf coasts. The Corridor is managed by an Authority operating under the ports and joint powers of the cities of Los Angeles and Long Beach and the Los Angeles County Metropolitan Transportation Authority. It was funded through a combination of federal and state funds, plus contributions by ports.

Still other corridors have been developed as part of a broader effort to **promote an economic union**. This was the rationale underlying the development of the corridors in the Greater Mekong Sub-region, and Mercosur region. This objective may be extended to expanding an existing economic union, for example, the extension of the TEN transport network to Eastern Europe through TRACECA for supporting EU enlargement).⁴

Some corridors have evolved with no objective other than that of facilitating the **bilateral trade and multi-country trade** that is controlled through back-to-back agreements. This has been the case for the land routes in the Middle East, including those from the Eastern Mediterranean through to Iraq, from Iran up through the Central Asian Republics, and from Jordan through to Syria and Iraq. Efforts to create an Asian Highway have followed this incremental approach. The individual components are national roads which would be interconnected to permit cross-border transport to in turn foster bilateral and transit trade.

A similar rationale seems to have guided the development of the Pan-American Highway. Though a single road route, it is primarily a collection of interconnected national roads extending from Alaska to the southern tip of South America. With funding from the United States government, designating specific routes as part of this highway allowed for rehabilitation and upgrading; however, the construction was not coordinated with efforts to facilitate cross-border movements. As a result, the highway had little impact on regional trade until much later, when cross-border procedures improved under the auspices of NAFTA. The Can-Mex corridor appears to have a similar objective, but more limited scope.

2. TYPOLOGY OF CORRIDOR MANAGEMENT

The previous section examined the issues to be addressed by a corridor management. In this chapter the structure of that management as it relates to these issues will be explored. This structure is defined by who participates, how it is organized, and what activities it undertakes. These are affected by the type of trade in the corridor—national, bilateral or multilateral, since this determines the number of countries involved and the agencies within those countries. They also depend on whether

⁴ The stated goals were specified as follows: smooth functioning of the internal market, strengthening of economic and social cohesion, and ensuring the sustainable mobility of persons and goods, taking into account their comparative advantages (Appendix 5).

the primary focus of the corridor management is on the legal, physical, or the operational component of the corridor.

A. Participants

There are three categories of participants in corridor management. The first and most important is the leadership. To be effective, the management must have sufficient authority or mandate to obtain cooperation from the public agencies that develop the infrastructure and facilities, from the agencies that prepare the trade and transit legislations, and from the agencies that formulate and enforce the standards and regulations affecting services in the corridor. This implies that the leadership should be relatively senior officials from either the executive or legislative branches of government. For bilateral or multilateral corridors, the leadership would have to be senior political officials, with comparable status, from each of the participating countries.

The second most important category relates to the stakeholders from the public and private sector. Although the stakeholders can participate directly in the management, usually their involvement is on a part-time basis through representation on boards and/or working committees. It is important to establish an effective stakeholder network. From the public side, this would include senior bureaucrats from the line agencies involved in developing corridor infrastructure and facilities, regulating transport and logistics services, administering the operation of the border crossings and gateways, and formulating trade policies and CIQS procedures. From the private sector this should include associations representing users, both those involved in trade and those providing the transport and logistics services.

The third category is the professional staff employed by the corridor management. They provide technical competence in the areas on which the management will focus. Their skills would include expertise in engineering (if the management were involved in developing physical assets), trade and public policy (if the focus were on legislative matters), and logistics (if the focus were on operational issues). The practical difficulty is that the corridor managements often have limited budgets and an uncertain tenure. As a result, the staff will most often be hired as consultants rather than permanent staff.

For bilateral and multilateral trade corridors, the challenge is to include participants from all the countries involved. Multi-country participation is relatively easy for the private sector, but difficult for the public sector. One approach is to establish a mechanism for interacting between the individual management organizations in each country.

B. Form of Organization

The form of the organization depends on both the issues it will address and the period over which it is expected to be active. If the management's primary concern is with the legal component of the corridor, then it is likely that the organization would take the form of a standing committee within the legislature or a special section within the Ministries of Transport or Planning. The life of the organization would be linked to the time required for ratifying the treaties and enacting the legislation required for allowing the corridor to operate. The organization should have a flexible structure relying on consultants or seconded staff for technical support.

If the primary concern is project development, then the tenure would continue through the planning and construction of infrastructure and facilities. If management's responsibility is limited to planning, then a task force or inter-ministerial committee, as established in Pakistan and India, would be the suitable structure. However, if management were also responsible for construction, then a special department within a senior Ministry, for example, Finance or Planning, would be more appropriate.

Component	Duration	Form
Legal	Short-to-Medium Term	Committee
Physical	Medium to Long Term	Department
Operational	Long Term	Authority

If the primary concern is operational, then a more permanent organizational structure would be required operating independently of government. An association or commission could be set up if management's primary duties are monitoring performance and promoting the use of the corridor. If the duties include coordinating the activities of public agencies, for example, upgrading infrastructure and contracting for construction and/or concessioning, then an autonomous authority would be more effective.

In all cases, the corridor management should be a relatively small organization with a technical rather than administrative orientation, but with leadership that is involved in public dialogue. The requirement to interact with a large number of political and private sector actors does not require size, it requires flexibility. The same applies for the requirement to act across provincial and national boundaries. For the latter, working committees can be established involving senior officials involved in trade and transport to focus on the legal components, but the physical and operational components must be dealt with at a national level. The exception would be efforts to improve performance at the border, in which case bilateral working groups can be established. Overall, the organization must have critical mass of technical and public policy personnel to be credible. This implies an organization of at least ten professionals, but not more than fifty.

C. Activities

The activities that a corridor management could be involved in were referred to in the previous chapter in relation to the scope of its responsibilities. The principal activities can be categorized (Table 2-2). The management may undertake these activities directly, but more likely the management will be responsible for coordinating/promoting efforts by others.

Planning and financing refer to activities related to the development of the infrastructure and facilities. The

Activity	Component(s) Affected	Management's Role
Planning	Legal, Physical	Coordinate
Financing		
Legislating	Legal	Advocate, Direct
Regulating	Legal, Operational	Advocate, Coordinate, Direct
Operating	Operational	Direct
Monitoring	Operational, Physical	Direct, Coordinate
Promoting	Operational	Direct

role of corridor management is to coordinate the development of various assets within the corridor. It can pursue the objective of maximizing efficiency and utilization of the corridor by:

- prioritizing investments;
- ensuring compatibility and complementarity of the planned assets;
- balancing the capacity of infrastructure and facilities in the corridor to avoid choke points; and
- maintaining a consistent level of quality.

Legislating refers to developing the trade and transit agreements, the investment programs, and the regulatory frameworks. In situations where corridor management is a part of government, it might have a direct role in preparing these instruments. However, in most situations the corridor management would act as an advocate proposing initiatives and seeking government support for implementing the initiatives. As part of this effort, it might also provide references on current practices, available legislation, and lessons learned from experiences in other countries.

Regulating refers not to enforcement per se, but rather to the modification of the standards and regulations for allowing the corridor to operate more efficiently. This includes the simplifying and harmonizing of documentation and procedures related to standards and regulations. Again, the role of the corridor management would be to act as an advocate of the proposed changes. It might participate in the preparation of these proposals or coordinate the efforts of others to pressure government to enact proposals. For bilateral and multilateral negotiations, the corridor management can propose the use of international conventions. A list of some of the more important conventions pertaining to transit procedures and trade in transport services is provided in Appendix 3. Alternatively, it can work with counterparts in other countries to develop the regional standards and procedures to be adopted by the member countries.

Operating refers to the maintenance and upgrading of corridor infrastructure and facilities and improving and expanding transport and logistics services within the corridor. This could involve direct action by management through contracting construction or arranging operating agreements and concessions for some of the infrastructure and facilities. Alternatively, it would involve advocating or coordinating these activities undertaken by other agencies.

Monitoring the performance of the corridor involves collecting and evaluating data. This can be undertaken directly by the corridor management, but it is more likely that the users of the corridor, including the service providers, would perform the function of collecting data. The management would evaluate this data in order to inform the stakeholders of the level of service available, quantifying constraints, developing initiatives for improving performance, evaluating efforts to remove constraints, and developing targets for future improvements.

Promoting refers not only to the advocacy activities related to legislation and planning, but also to the marketing of the corridor for increasing utilization. This function would require the corridor management to collect and disseminate information to potential users concerning the time and cost of moving goods through the corridor and the procedures to be followed at the border crossings and gateways. It would also disseminate information on current practices in corridor management, available legislation, and lessons learned from other corridor developments.

D. Recent Approaches to Corridor Management

The history of corridor management is mixed. Large regional arrangements have proven more difficult, despite the initial success of the TEN transport network.⁵ The progress achieved by regional trade blocks, such as GMS, ASEAN, SAARC, and GCC, have been limited because of the time required to reach agreements on protocols that are acceptable to all participants. Consensus can also result in more cumbersome procedures, as was the case with the introduction of the ASEAN harmonized tariff, which is a far more complex structure than that of the Member States. In this regard, bilateral arrangements have been more effective since it is easier to achieve consensus, pass legislation, and harmonize physical standards, procedures and regulations. For example, the member States of ASEAN have already developed bilateral arrangements that allow for relatively unencumbered movements between Singapore, Malaysia, and Thailand.

Leadership for developing a corridor can come from different sources. For the TEN transport network, no separate organization guided its development. Instead, it developed through legislation formulated by the European Commission, with implementation left to responsible agencies in the Member States. In development of most other corridors, the central governments have not provided direct legislative support, but rather established or supported the autonomous organizations for promoting the development of the corridor. In this regard, high-level working committees are a popular mechanism, but their effectiveness depends on their support staff. The function of these entities is quite diverse, reflecting the differences in objectives and in the scope of the agreements that they are meant to support.

ICG-TRACECA, an intergovernmental ministerial commission, was established to implement the Basic Agreement signed at Baku in 1998. It receives some funding from the EC and member States and with this it:

- designs and funds small projects for alleviating network bottlenecks;
- conducts technical studies relating to improving the efficiency of border crossings;
- collects performance statistics; and
- organizes conferences to address the issues related to the corridor.

The Commission is supported by a small Secretariat that has a consultative role and is staffed primarily by consultants. Since the Commission operates on consensus, it is not able to respond rapidly to the problems involved in integrating corridors. Most improvements have been accomplished through national government initiatives.

In the case of the **Can-Mex** corridors, the impetus for development was the US transport legislation that encouraged the bilateral and multilateral efforts for developing corridors. This spawned a number of regional lobbying groups to promote the development of specific routes and capture Federal funds to upgrade the highways that make up these corridors. There appears to be no method for coordinating these proposals beyond the budgetary review process.

A different situation applies in **West Africa**, where there is no formal organization. The Economic Community for West African States (UN-ECOWAS) has taken the lead in efforts to facilitate cross-border movements, but has been unable to get participating countries to develop regional agreements. Instead, there have been some bilateral agreements. The major initiative was to have

⁵ This success came after ten years and, even then, the network was established on the back of efforts to develop a regional transport policy that spanned more than forty years.

the Chambers of Commerce introduce a system for bonded movement of transit traffic, similar to the TIR carnet (TRIE). This system, combined with the bilateral agreements, permitted the development of some transit routes, but traffic in the routes remains meager because of poor infrastructure.

In **East Africa, the Northern Corridor** has a permanent organization, the Transit Transport Coordination Authority (TTCA), an organization that has been in existence for many years. It was established initially to monitor the implementation of the agreement between Kenya, Uganda, Tanzania, Burundi, and Rwanda. Since its inception, the organization has developed into a relatively strong professional agency. It promotes procedures for more efficient cross-border movement of goods and has been instrumental in introducing a single administrative document. It has also worked with Kenyan customs to develop efficiency indicators.⁶

In **Southern Africa, the Maputo Corridor** is quite different in terms of organizational structure and effectiveness. The Corridor was established through a bilateral agreement between the Governments of South Africa and Mozambique for facilitating cross-border movements. They concessioned the infrastructure to the private sector in order to rehabilitate and upgrade the road and rail link and the Port of Maputo. Since then, traffic has grown rapidly in this corridor.

A quite different approach was used for the **Trans-Kalahari Corridor** since the road and port infrastructure was already in good shape and there was an existing customs union (Southern African Customs Union, SACU). Also traffic was growing rapidly, having tripled between 1998 and 2003. The principal objective was to promote the use of Walvis Bay Port as an international gateway. For this purpose, the Walvis Bay Corridor Group, a public-private partnership, was created. The group, which had a high level of involvement by the private sector, facilitated the agreement between Namibia, South Africa, and Botswana to introduce a SAD and to simplify border-crossing procedures. The agreement was formalized at the end of 2003.

The most successful multilateral corridor development programs have taken place within customs unions, since these simplify the border crossings procedures. In the case of the TEN transport network in the EU, the formalities for border crossings were addressed as part of the technical annexes to the treaty. These were prepared by the Director General for Transport. For Walvis Bay, the customs union between South Africa and Namibia had already simplified the movement of trucks across the border. In the case of the Can-Mex corridor, the procedures for trucks crossing between Canada and the US were well established prior to the NAFTA agreement. In contrast, the procedures for trucks crossing the Mexican-US border were never fully addressed due to resistance from the US trucking industry and the Mexican customs brokers (see Box 2-1).

E. Four Management Structures

While it is not possible to completely control corridor development, it is important to have a single organization whose purpose is to promote and coordinate this development. Where corridors have been successful, there has also been strong political and market support for their development. A corridor organization provides a point of focus for stakeholder efforts and a forum for identifying major constraints on corridor performance. It also provides a focus for the lending programs of multinational organizations which typically lend to individual line ministries. While there has been significant variation in approach to the development of international trade corridors, there are four general models that have been applied.

⁶ These efforts have been supported by USAID and the UN Economic Commission for Africa.

Box 2-1. Mexican-US Border Slowdown

NAFTA came into effect in 1994 during a period in which US-Mexico trade was growing rapidly (~twelve percent per annum). However, this agreement did not specify the mechanism for regulating the movement of goods through roads, even though about eighty-five percent of the trade in value terms were through roads across the approximately 3,000 km border. The agreement initially included a provision for trucks to operate in the transborder area, but this provision was unilaterally suspended by the US based on concerns put forth by the domestic trucking sector as to the safety of Mexican trucks. No effort was made either to introduce a vehicle inspection regime or to recognize the considerable improvement in the trucking fleet over the last decade. As a result, the delays at the border for the approximately 10,000 trucks crossing each day was considerable and the requirement for transshipment remained as a significant non-tariff barrier supported by vested interests on both sides of the border.

There are four corridors in Mexico: Chihuahua, Pacific, Central, and Gulf Coast. About one-half of all traffic crosses over at the Laredo crossing, a part of the central Corridor. Because of the restrictions on cross-border movements, two back-to-back trailer exchanges are required with a separate movement between a Mexican parking area near the border, across the Mexican and US Customs, to a US truck terminal near the border. For southbound movements, a further movement is required due to the Mexican customs procedures. From the US truck terminal, the trailer is moved to a Mexican brokers' warehouse where the cargo is unloaded, inspected by the broker for pre-clearance, and reloaded. From there, the trailer is transported through US and Mexican customs to the Mexican parking area. Added to this cumbersome procedure is the lack of coordination between the customs authorities in terms of documentation, limited hours for customs inspections, and significant congestion during peak hours.

The impact of these procedures on direct costs is significant, adding an estimated nineteen percent for the movement between Chicago and Monterrey (almost 3,000 km). There is a similar impact on transit time adding only about half a day to a two day trip. However, these problems are eclipsed by Mexican customs procedures, which can add up to three days for pre-clearance. This difficult border crossing contrasts with the seamless crossing at the US-Canada border where trucks cross over the border with minimum delay for checking. Both countries require the shippers to have a bond to guarantee payments for taxes and fees. There is no similar arrangement between Mexico and the US.

The unnecessarily complex procedure, which is maintained to protect the markets of the US trucking companies and the Mexican customs brokers, has been challenged in court. A 2001 decision made by the NAFTA panel found the US in violation of the treaty, but opponents then introduced a requirement for an environmental study of the impact of Mexican trucks on US roads. A 2004 ruling by the US Supreme Court overruled this requirement, but it remains to be seen if the US Congress will introduce new impediments to the implication of the NAFTA accords. While trade has continued to grow, one estimate is that these impediments have reduced trade by one to two percent.

Haralambides, H. and P. Londoño-Kent. "Supply Chain Bottlenecks: Border Crossing Inefficiencies between Mexico and the United States," International Journal of Transport Economics, June 2004.

Fox, A., J. Francois and P. Londoño-Kent. "Measuring Border Crossing Costs and their Impact on Trade Flows: The United States-Mexican Trucking Case" (draft).

The first model is **project coordination**, as part of a general corridor development plan. Efforts to expand and improve corridors are usually undertaken by government agencies on a project-by-project basis. The corridor management can coordinate these activities, either through direct interaction with the agencies or through providing oversight as part of a senior ministry or the prime minister's office. The government agencies would undertake corridor infrastructure improvements based on local

requirements and problems, but as the nature and importance of the corridor evolves, there would be a greater effort to relate these projects to corridor development. The management does not concern itself with the variety, quality and competitiveness of the transport services as these are expected to be developed through market forces and growth in trade. Nor does it become involved in issues pertaining to deregulation of transport and logistics, negotiation of agreements to expedite cross-border movements or improve access to international gateways.

This model can be quite effective for providing improvements in infrastructure, but is not suited to tackling the legal or operational issues. While it is effective for developing the domestic component of a corridor, it may not be particularly useful for addressing bilateral and multilateral issues. The effectiveness of this model depends on the level of government that is actively involved in corridor management. It also depends on the scope of the management. Where the scope is limited to a single mode or route, it does not include the entire corridor, for the management will be less effective. This form of corridor management tends to be informal and have a limited time horizon. As such, it relies on committees or similar structures rather than a formal corridor organization. An example of this type of model can be found in the development of the West Bengal Corridor (Box 2-2).

Box 2-2. West Bengal Corridor - Path to the Sky

The development of the West Bengal Corridor is part of a larger effort to develop freight corridors in the SAARC region. This north-south transport corridor extends from the river ports of Haldia and Kolkata to northern West Bengal, where the corridor divides into routes going northwest to Nepal and Sikkim, up to the Chinese border, and northeast to Assam, Bhutan, and beyond. The corridor also connects with Bangladesh at various points along the border. After years of disjointed efforts by various donors to upgrade components of the corridor, a strategic investment plan was prepared in 1998 under a technical assistance grant from the ADB to the Government of West Bengal.* This plan identified a number of high-priority investments in multimodal transport infrastructure. In the intervening years, ADB and World Bank have financed improvements in the interconnections to Nepal and Bhutan as well as various projects to upgrade the primary road route.

Both India and Bangladesh have invested in new facilities at the Benapole/Petrapole crossing. Haldia and Kolkata have dramatically increased their efficiency as part of the on-going reforms in Indian ports. In 2004, the government of Nepal awarded a concession for operation of the rail Inland Container Depot (ICD) at Birgunj that allows for unit train operations to Kolkata and Haldia. In Phuentsholing, efforts are continuing to develop a road ICD to facilitate cross-border movements. These improvements have significantly improved access of the landlocked countries to markets outside of the region; however, the majority of the traffic on the corridor will continue to be intra-regional. The profile of this corridor was raised when the Indian government designated it as an extension of the Golden Quadrilateral.

The development of this corridor was undertaken as small projects by various state and national government agencies, but with little coordination. The activities of the various donors are guided by a similar vision, but lack a common blueprint. Instead, the corridor remains a concept around which various projects are developed. While there is a growing interest in developing this region through trade and in improving security through economic development, there is no focus for this development. The corridor exists by virtue of its growing commercial activity rather than through any organizational structure or coordinated development program.

* *North-South Corridor Development Project in West Bengal, 2000, Halcrow and Partners.*

The second management model is the **legislative** model. Typically, the corridor management functions are embedded in the legislative committees that produce the policies and legislation for supporting corridor development. It is extremely important during the formative period of a corridor, as its objective is to produce:

- bilateral, multilateral and transit trade agreements;
- formal recognition of the importance of the corridor;
- designation of specific routes, border crossings and connected gateways; and
- programmatic funding for corridor infrastructure.

Such a management model can also be effective for initiating reforms to harmonize standards, simplify cross-border movements and reduce the regulatory impediments to efficient corridor services. This form of management resolves many of the difficulties with coordination among government agencies, but has relatively little impact on the physical and operational components of the corridor. Implementation of investments in infrastructure and facilities and changes in procedures are left to individual jurisdictions and line agencies. While the management structure is formal, it tends to be short-lived. It has been used successfully for developing the TEN transport network, but was less successful in producing an integrated Pan American highway and the Can-Mex corridor.

The third management model is a **consensus-building** institution. It is a formal institution created to mobilize support from stakeholders for improvements in the corridor and for reforms in regulations and procedures, especially border-crossing procedures. This model can be used for mobilizing support for the legal, physical, and operational components of the corridor, but with this management model there is less scope for direct action. Its primary activity is advocating improvements to the corridor by providing information to stakeholders, including government agencies, concerning current performance, need for improvement, and success of previous initiatives. The effectiveness of this model depends on the level of participation by public and private sector stakeholders, as well as its ability to maintain a professional staff that can address the issues related to planning, regulation, and performance. While its primary focus would be national, it can be used to develop consensus between the countries along the border.

This type of model has been most effective in addressing improvements in regulatory procedures in East Europe/Central Asia. It was also quite effective in the Tran-Kalahari Corridor where there was joint public/private participation, but the model was less successful in the Northern Corridor (Box 2-3). It can also be helpful for long-term efforts to develop large regional networks, such as the Asian Highway.

The fourth model is an institution responsible for developing **public-private partnerships** for improving the operation of facilities and services in the corridor. The management develops concessions, operating agreements, and other arrangements to involve the private sector in managing the corridor's infrastructure and facilities, and to mobilize funding for corridor development. This model is effective at the domestic level, but has some limitations for addressing problems with cross border improvements. However, it can be used to develop toll roads, rail concessions, dry ports, and multimodal services which extend across borders. Some examples are the recent concessions for the Maputo toll road and the Kenya-Uganda Railways (Box 2-3).

Box 2-3. Eastern and Southern Africa - Public-Private Partnerships in Corridor Development

The corridors in southern and eastern Africa have been developed using a variety of public-private partnerships, both to improve the transport infrastructure and to simplify the procedures for cross-border movements. Concessions were used to develop the Maputo corridor connecting the port of Maputo with the industrial area around the South African province of Gauteng. The concessions were used to rehabilitate the transport network while providing improved services. The port was converted to private operation through an operating concession that also provided for rehabilitation of its facilities. A BOT concession was used to rehabilitate 380 km of the highway between Witbank and Maputo and to construct an additional 50 km. It was to include a joint inspection facility at the border. A concession to provide rail services on the corridor, which included provisions to upgrade the rail link between Maputo and the border, was awarded as a joint venture that included South African Railways, Spoornet. This concession was also supposed to provide for a one-stop inspection at the border. These arrangements were successful in producing a rapid improvement in service and increase in traffic. However, the emphasis on a purely private initiative meant that insufficient attention was given to improving border procedures.

The Trans-Kalahari corridor was established in 1999 through the efforts of the Walvis Bay corridor group, a public-private partnership. This corridor connects the port of Walvis Bay with the rest of Namibia, Botswana, and the Gauteng in South Africa. It already had good road connections and required limited capital investment in the gravel road between Mamuno and the South African border. Also there was an existing customs union that simplified cross border movements. The Corridor Group, which was established to promote the use of the port, worked with Customs in the three countries to introduce a single administrative document, a single set of regulations, and a single bond as security for payment. This arrangement provided the industrial area of South Africa with an efficient outlet to the Atlantic. It allowed Walvis Bay to compete against larger rivals in Richards Bay and Durban. Although its traffic levels remain small, its general cargo volumes have tripled since 1999 and the number of vehicles handled has increased eightfold.

The Central Corridor provides road and rail-road connections between Tanzania's port of Dar Es Salaam and the land-locked countries of Uganda, Burundi, Rwanda, and D.R. Congo. It competes directly with the Northern Corridor through Mombassa for transit trade and has a competitive advantage in terms of time and cost for the countries. While there has been some investment in infrastructure over the past decades, the Central Corridor has had difficulty in improving the performance of its transit services. In 2000, the government concessioned the container terminal at Dar Es Salaam, with the result that the rate of growth in traffic increased four fold and exceeded 200,000 TEU. However, the transit trade continues to be constrained by the rail service. The government is now in the process of privatizing the operations of the Tanzanian Railways Corporation. The improvements should allow the Corridor to increase its market share vis-à-vis the Northern Corridor, even in Uganda where the distances are greater.

The Northern Corridor offers a number of potential benefits including the size of the Kenyan economy relative to its neighbors, its proximity to Uganda and its transport infrastructure which, though poorly maintained, provides better access. In order to promote transit, the Northern Corridor Transit Transport Coordination Authority (NCTTCA), which consists of ministers from the four member countries, was formed to enforce transit agreements, harmonize policies, and promote use of the corridor. It established a stakeholders' forum to develop consensus between the public and private sector, including manufacturers, logistics providers, and financial institutions. It was able to convince customs to simplify clearance procedures and introduce a single administrative document for road transit. It was also able to harmonize and reduce transit charges. Largely as a result of these efforts, the volume of transit traffic doubled in the period 1998–2003. Nearly all of this increase was transit cargo moving by road to/from Uganda. Despite the breadth of the participation and efforts to improve infrastructure, the Authority has been unable to improve the basic rail and port services. The poor condition of the Kenyan Railway, which had experienced a steady decline in traffic over the last three decades, prevented it from capturing much of this increase. It is now proposed to have a concession for joint operation of the Kenyan and Ugandan railways, in order to improve their performance. Even if successful, it is unlikely to resolve the problem of moving the cargo out of the port of Mombasa, which continues to be plagued by congestion and corruption after an earlier attempt to place the container terminal under a management contract failed.

The application of these different models in the corridors that have been evaluated is summarized in Table 2-3. The activities that are normally undertaken by each of these models are summarized in Table 2-4. While all the models can be used to promote investment, they are otherwise limited in their activities.

Despite the non-linear and often chaotic nature of corridor development, it is clear that a long-term plan is important to identify problems that need to be addressed. This requires a consensus concerning the objectives of corridor development and identification of the impediments to efficient *end-to-end* transport services. The latter can be determined by an elaborate regional economic/transport analysis, as was the case for West Bengal, or a simpler supply chain analysis of major trades that use the corridor. For continuous development of the corridor, it is necessary to undertake parallel initiatives including:

- short-term improvements in customs, border crossing procedures, and traffic control;
- medium-term improvements in infrastructure and interoperability; and
- long-term improvements in harmonization and trade facilitation.

Although a corridor is often amorphous, it is essential that its performance be monitored. The collection and dissemination of performance data is one of the more important responsibilities of a corridor organization. This data can be used by providers of transport and logistics services to improve quality of services. It can be used to identify chokepoints and evaluate the effectiveness of different initiatives for eliminating them. It can also be used to justify improvements and additions to the corridor infrastructure.

Project	Model
TEN	Legislative Project Coordination
TRACECA	
Can-Mex (NAFTA)	
Pan American	Project Coordination
Northern Corridor	Consensus Building Public-Private Partnership
Trans-Kalahari	
Maputo	Public-Private Partnership
ECOWAS	Project Coordination
SAARC Corridors	
GMS Corridors	
Asian Highway	Legislative
Asean	
Mercosur	

Activities Management	Planning	Investment	Regulation	Operations	Promotion	Monitoring	Scope
Legislative	X	XX	XX		XX		Bilateral, Multilateral
Project Coordination	XX	XX					Domestic
Public Private Partnership		XX		XX			Domestic
Consensus Building		X	X		XX	XX	Bilateral

Much of the data on physical performance is reported as part of specific activities within the corridor, for example, port operating statistics, customs trade, and operating statistics. Additional data on demand needs to be collected through surveys, interviews with shippers, and transport providers to determine the demand for different levels of service, negotiated costs, and range in transit times. There are several methods available for collecting the data needed for evaluating performance (Table 2-5).

Table 2-5. Sources of Data on Route Performance		
Measurement	Choke Point	End to End
Transport Provider Survey	√	√
Shippers Survey		√
Operator Diary	√	
O/D Survey		√
Entrance/Exit Data	√	√
Real Time Monitoring	√	

Supply chain analysis can be used to determine the relative importance of different activities in overall corridor performance and to identify the features of these activities that contribute most in terms of time, cost, and unreliability. Transport systems analysis can be used to identify the physical and operational problems that contribute to cost, time, and delays. Transaction analysis can be used to evaluate the time and cost for processing the information associated with typical shipments. These techniques are also useful in estimating the potential improvement in performance and relative cost for various initiatives.

Benchmarks or comparison between routes with similar modes can be used to identify activities with the potential for significant improvements. However, benchmarks must be used with care because of country differences in terms of external factors, such as geography, types of trade, competitive requirements, and skill levels.⁷ Comparisons based on historical data are more useful. Trends in costs (adjusted for inflation), time, and reliability indicate how effective efforts have been in improving corridor performance in the past. Unfortunately, these are not necessarily representative of what can be achieved in the future and provide little insight as to the cost of achieving the improvements.

3. MONITORING AND EVALUATING CORRIDOR PERFORMANCE

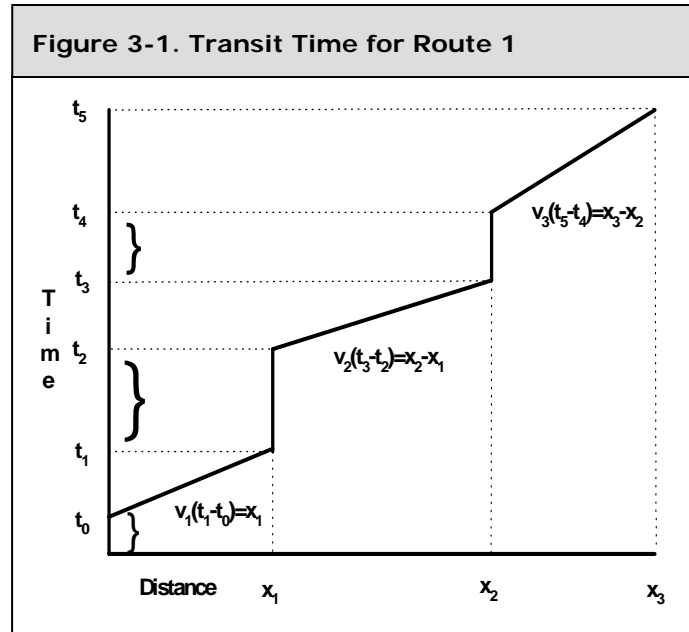
The performance of a corridor can be evaluated from three perspectives. The first is an **infrastructure** perspective, which considers the physical capacity of the links and nodes in a corridor and the utilization of these components. This approach is often used for deciding on requirements for additional capacity, but provides little insight into the effect of corridor performance on trade. The second perspective examines the **quality of the services** provided for the goods moving on the various routes. Performance is measured in terms of average time and cost for transport units moving through this corridor. These may be evaluated for individual links and nodes. The third perspective is the **shipment of goods** through the corridor. Once again, cost and time are measured, but this time for each of the principal supply chains. The costs and time can be disaggregated for the transport services on the links and the processing services at the nodes.

⁷ This is not to say that benchmarks don't have a demonstration effect in making policy makers aware of what is possible, but this is quite different from what is achievable in the short to medium term.

A. Quality of Service

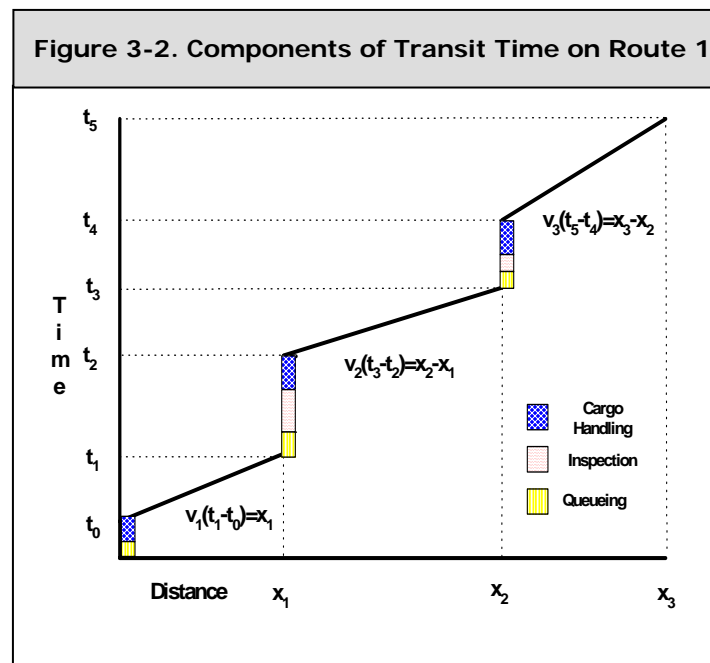
Cost and Time

Since a corridor is generally composed of several alternative routes, it is necessary to measure the performance of each route. This includes the movement across borders and through international gateways. In determining performance, costs are measured in terms of the out-of-pocket costs plus any loss or damage to cargo while en-route. Time is measured as the time to complete all the activities essential for moving from the beginning to the end of the route. This includes the delays associated with the frequency of services and with congestion at the nodes and can be presented as a function of distance along the route using a graph of the form shown in Figure 3-1.



The sloping lines represent the time spent moving along a link. The slope is inversely proportional to the average link velocity, " v_j ." The vertical lines represent the time spent at the nodes that connect these links. A variety of activities can occur at these nodes, some required and others discretionary.

One required activity is the transfer of cargo between transport units where there is a change of mode (for example, rail to road), type of transport (for example, linehaul to distribution), or regulatory requirements (for example, hazardous materials). Another is the inspection of the vehicle and its cargo occurring at the boundaries, especially international borders. The most common discretionary activities occurring at these nodes are storage, intermediate processing, consolidation/deconsolidation, repackaging, and labeling. It is important to exclude these activities when evaluating the performance of a route.⁸ The graph can be modified to display the non-discretionary components, as shown in Figure 3-2.



⁸ There are situations in which storage or consolidation/deconsolidation is complements to a required change of transport unit, in which case they would be included in the evaluation of the route performance.

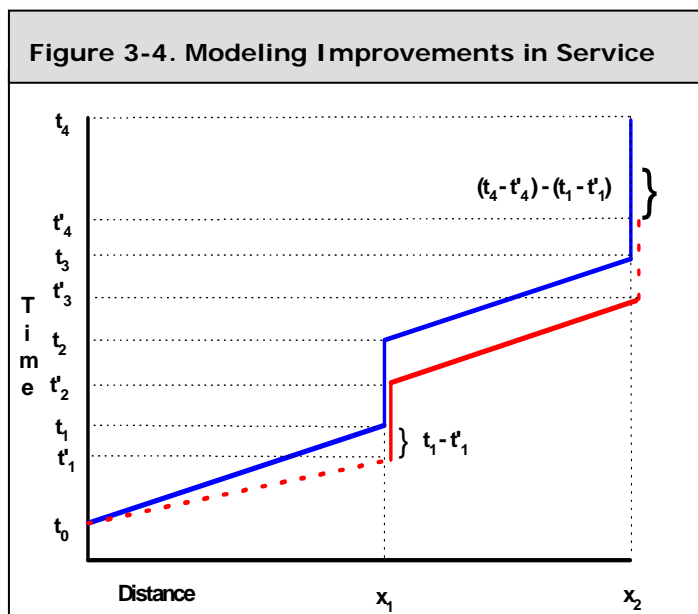
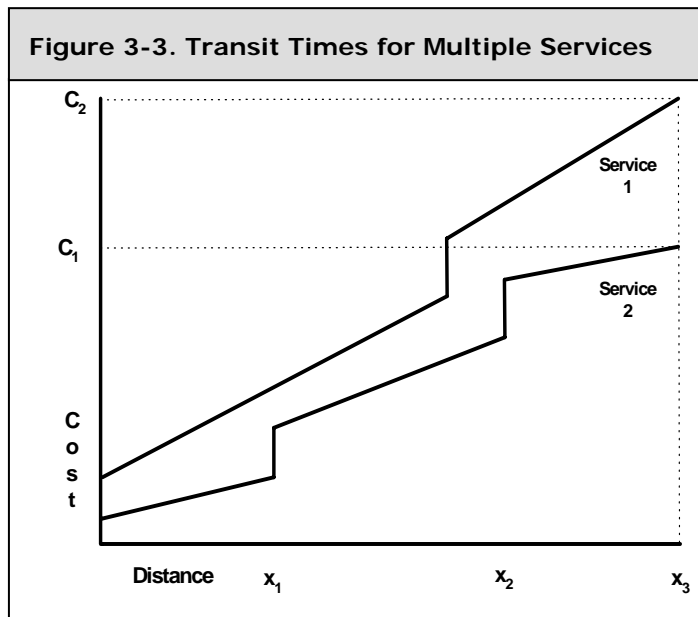
Where there are alternative routes, including modal combinations, the times can be compared, as shown in Figure 3-3. In this example, the first service is the fastest over the entire length of the route. In other situations one service might be faster over certain segments of the route, but not over other segments, in which case the lines might cross.

The performance of the services on a route can be improved by reducing time either on the links or at the nodes. Time on a link can be shortened by improving infrastructure, better traffic management, or a change in the regulations affecting use of infrastructure (for example, limits on type of vehicle, speed and frequency of service). The times at nodes can be reduced by introducing new technologies and equipment, improving management of services, simplifying procedures and providing additional facilities to handle the traffic without significant delays.

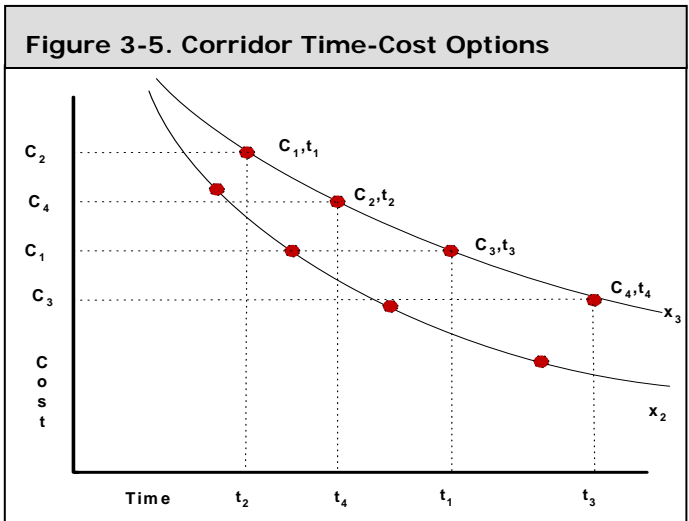
The value of these improvements for overall corridor performance can be evaluated, as shown in Figure 3-4, in which the dashed lines show the changes that have occurred. The reduction in slope indicates where average travel speed on a link has increased, $x[1/t'_1 - 1/t_1]$, whereas the shortening of the vertical lines indicates where time at the nodes has been reduced, $(t_4 - t'_4)$.

This comparison is useful not only for determining total time savings in corridor, but also for identifying those components that offer the greatest potential savings in time. While it may be possible to make a significant reduction in the time at certain nodes, if these nodes do not account for a significant portion of total transit time, then it is better to focus on other nodes where there is a larger vertical component. Similarly, links with the steepest slopes will usually offer the best opportunity for improvement, but if the time on this link is small relative to total transit time, then it is better to focus on other links.

An analysis similar to that shown in Figures 3-1 to 3-4 can be performed for the cost of using the corridor.



Where there are multiple services on a route, each service can be represented by its average cost and time for transit. Similarly for the corridor, different combinations of routes, modes, and services can be represented by the average time and cost for transiting the corridor. These combinations can then be combined to form a curve showing the range of services available for movement through the corridor (Figure 3-5). For movements that do not extend the full length of the corridor, i.e. shipments that have an origin, destination, or both within the corridor ($x_2 < x_3$), a similar curve could be produced by shifting down and to the left.



Reliability

Two additional parameters should be considered in evaluating corridor performance—reliability and flexibility. The importance of reliability varies for different trades. It is very important for manufacturers with capital-intensive production facilities that must coordinate the shipment of a wide range of inputs from multiple suppliers. It is also very important for just-in-time manufacturers that must adjust output to meet changing orders for the quantity and mix of different products. It has become increasingly important for large-scale retailers and wholesalers who want to achieve a cost advantage by minimizing their inventories in warehouses, in transit, and on their shelves. They accomplish this by reducing order sizes, shortening order cycles, and increasing their requirements for on-time shipments. Finally, it is important for pipeline-type operations, where the time in transit is less important than ensuring a continuous flow of product at the destination.

Because of increasing attention to the timeliness of shipments and the importance of order fulfillment as a component of competitive advantage, it is necessary to consider not only the average time and cost for moving through a corridor, but also the reliability in meeting specific transit times. For purposes of this discussion, reliability refers to the variation in transit time for a specific combination of services and origin-destination pair. This variation is due to a combination of controllable factors, such as condition and availability of equipment, coordination of sequential activities, labor productivity, and uncontrollable environmental factors, such as fluctuations in demand, level of background traffic, and weather conditions.

The greater the variation, the harder it is to predict actual transit time and, in turn, harder to coordinate sequential activities in the supply chain. Shippers and consignees accommodate this uncertainty by adding slack time to their planned delivery times. This increases the average order cycle time. An improvement in the quality of a transport service is one that reduces transit time variations, allows shippers/consignees to reduce their slack time, and thus the average order cycle. It also reduces the likelihood of bunching of arrivals and departures and of the associated delays. This positive feedback is modeled in Figure 3-6.

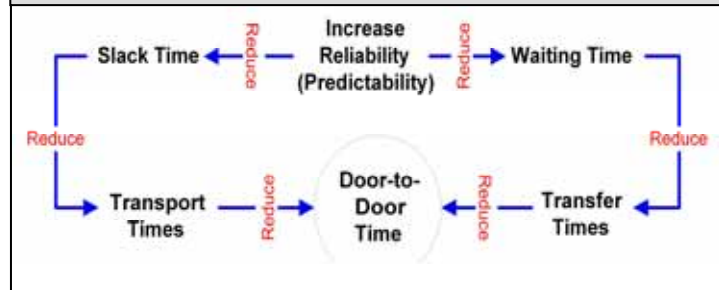
Variety and Flexibility in Services

The variety of services available and the flexibility provided by this variety, although difficult to measure, are becoming increasingly important in evaluating corridor performance. Manufacturers and other suppliers are introducing more flexible manufacturing in order to fill smaller orders, to allow more frequent changes in design, and to respond to modifications in orders that occur closer to the time of shipment.

Retailers are becoming more flexible as shelf life decreases and consumers demand better product quality and more up-to-date products. In this competitive environment, it is necessary to have flexible supply chains. Some orders may require shorter delivery times, others lower shipping costs. The shipping date and the destination may be revised until shortly before the actual shipment. In some cases, the cargo may be rerouted while in transit or even resold to another customer while en-route (Box 3-1).

The availability of multiple routes and modes is an important source of this flexibility, but more important is the availability of different types and qualities of transport services. The growing role of logistic service integrators (4PLs), which can provide different combinations of logistics services to meet the needs of individual customer, is evidence of the growing importance of flexibility. The industry leaders are capable of handling any size shipment anywhere in the world using various combinations of air, ocean, rail, and road transport.

Figure 3-6. Impact of Reliability on Transit Time



Box 3-1. Cargill - Flexibility in Trading

Cargill, one of the largest grain traders in the world, does not produce grain, but acts as a logistics company organizing the flow of grain from the farm to the international markets. Grain trading itself is a business of large volumes, narrow margins, and rapid execution of trades. Despite the large volumes in which grain is traded, there is increasing emphasis on flexibility. One consignment may be traded several times before finally being shipped. In the US, grain continues to be traded after being loaded into the barges for the journey down the Mississippi. The decision as to which ocean-going vessel the grain will be loaded into is delayed as long as possible in hopes of obtaining a better price for the shipment. Even after it is loaded onto the vessel, it can still be traded and the vessel rerouted. In this business, flexibility is the source of profits.

Cargill is now combining this flexibility with tighter control of its supply chain to deliver higher value identity-preserved grains. These are grains raised under specific conditions, for example, organic, exotic varieties. These grains are shipped using the same logistics as other cargoes, but are kept isolated, lest they become mixed with inferior grains. Separate holds are used in the barges. The conveyor belts at the loading terminals are cleaned prior to handling the grain. Because the shipments are often too small to occupy a full hold, the grain is placed in a separate layer in the hold sealed above and below to avoid contamination. By preserving the identity of the product throughout the supply chain, Cargill is able to earn a substantial premium. By using its normal supply chain in a more flexible way, it is able to minimize the cost of providing this service.

With increased flexibility comes the requirement for tighter control over the movement of goods and real-time integration of information on the status of shipments, the demand for these goods, and the alternatives for adjusting not only the time and cost to complete delivery, but also the options for diverting the shipment to meet more pressing demand.

As global competition increases and the difference in the production costs of competing suppliers diminishes, greater attention will be given to the quality of logistics that links buyers and sellers. In this environment, transport and other logistics service providers must compete in terms of cost, time, reliability, and flexibility (C/T/R/F). In a competitive market, there will be a range of transport services offering different combinations of cost, time, and reliability. In combination they will provide varying levels of flexibility. The total demand for transport services in a corridor depends on how well these services match the requirements for specific cargo movements.

B. Corridor Supply Chain Analysis

For each trade that uses the corridor, there is an average cost and transit time for the complete movement from origin to destination of which only a part may be in the corridor. There is also a level of reliability for the complete movement, which is equated with the variation in transit time. These factors can be combined into a generalized cost function by assigning values to time and reliability. Since reliability is measured as the additional time required for ensuring timely delivery, the values for the two can be estimated using the same value. As a result the generalized cost function for a unit of trade k is:

$$C_k = c_k + \alpha_k(t_k + \beta\sigma_{t,k})$$

where:

- c_k = direct cost for the movement of a unit of trade k from origin to destination;
- α_k = value of time for a unit of trade k;
- t_k = average transit time from origin to destination;
- $\sigma_{t,k}$ = variation in transit time from origin to destination used to measure unreliability, and
- β = reliability criteria, e.g., $\beta = 1.96 \Rightarrow 2.5\%$ missed delivery dates.

Value of Time

The marginal value of time can be estimated as the reduction in costs resulting from a reduction in transit time or, where there are alternative services, as the willingness to pay for a faster transit time. The lowest value of time can be estimated using the daily cost for financing goods in transit and in inventory. For goods valued in the \$2,000-\$5,000 per ton range, this cost amounts to only \$0.75 to \$2.50 per day per ton.⁹ An intermediate value of time can be computed where there is a range of competing services with different combinations of cost and time offered. For example, container shipping lines may offer more direct services with a higher freight rate and more circuitous routes with lower freight rates. A typical trade-off would be in the range of \$20.00-\$30.00 per TEU day, or about \$2.00-\$3.00 per day per ton. For land and air express services, it is increasingly common to differen-

⁹ This assumes average inventory is equal to half the average order size plus a 25% cushion. The annual cost of inventory is spread over the annual amount shipped. The cost in transit is the financing costs during the period of transit. For an annual financing rate of r%, the carrying cost of the cargo with unit value C is:

$$C \frac{r\%}{365} * \left(1 + \frac{1.25}{2}\right)$$

tiate services according to delivery time. A premium is charged for overnight delivery and the rates decrease as delivery time increases. The importance of time is linked not only to the value of cargo, but also to the competitive pressure on order times. Producers with shorter order times can obtain competitive advantage and higher prices for their goods. For example, the Bangladesh garment industry ships about ten percent of its output by air in order to offer a shorter order cycle and compensate for missed ocean shipments. Airfreight costs about \$2,500 per ton to northern Europe, whereas ocean freight plus port charges for containerized cargoes costs about \$180 per ton. The reduction in shipping time is twenty to twenty-five days, implying a value of about \$100 per day per ton.

Another approach to examining the impact of corridor improvement is to consider the discreet impacts. A reduction in delivery time may allow a shipper to compete in markets that require shorter delivery times. For example, a reduction in transit time that allows for a decrease in order cycle from two months to one and one-half months allows a shipper to compete in market niches that require more rapid replenishment. In this situation, the benefit to the shipper would be the profits earned from the additional volume shipped to this market niche. A similar but more dramatic impact occurs for trade in perishables where the reduction in transit time allows the shipper to extend the range in which goods can be sold.

Reliability

The cost of unreliable service can be estimated by considering the direct cost for missed delivery dates. In some cases, the buyer will charge a penalty or refuse to accept the shipment until the price has been discounted. In other cases, the buyer may cancel subsequent orders. The extent of the penalty is related to the impact on the buyer due to missed sales and/or over-stockages, as well as the availability of competing suppliers. As discussed above, shippers introduce slack time to avoid missed deliveries. The slack time will be set proportional to the standard deviation of the transit time. The greater the penalty the greater the multiple of standard deviation used for slack time.¹⁰ A shipper normally establishes a standard for on-time deliveries and adjusts the slack time to meet this standard.

4. MECHANISMS TO IMPROVE CORRIDOR PERFORMANCE

The concept of a corridor is a powerful construct for addressing most of the major issues confronting freight transportation, especially for freight movements between and through adjoining countries. The concept includes not only a collection of routes, but also a portfolio of transport services. It provides a mechanism for focusing public and private sector efforts on a common objective—that of moving goods efficiently throughout the corridor. It creates a framework in which initiatives to improve cross-border freight movements can be defined, appraised, and evaluated. This framework can accommodate intermodal transport and integrated logistics.

¹⁰ For example, with a normal distribution, a slack time of 1.65 times the standard deviation would result in a 5% probability of missed deliveries, whereas twice the standard deviation would result in a 2.5 percent probability of missed deliveries. If the goods have a value of \$2,000-\$5,000 per ton and the penalty for a missed shipment is 25% of the delivered cost, then the savings from increasing the slack time from 1.65 to 2.0 times the standard deviation would be \$12.5-\$31.0 per ton. For a standard deviation of two days, the marginal benefit of increasing slack time is \$18-\$44 per ton per day, but this is offset by the marginal value of the resulting increase in transit time.

The mechanisms available to the public sector for improving corridor performance include **capital investment, legislation, technical standards, and regulatory reform**. Capital investment was the key component of the strategy for developing Pan-American Highway, but its performance suffered from the lack of attention given to the regulatory reform and legislation for facilitating cross-border movements. The Northern and Central Corridors in East Africa initially relied on investment, but have since focused on legislation and regulatory reform to facilitate the movement of goods on the road and rail infrastructure. The EU relied on legislation to implement strategies for development of the trans-European transport network.

The basic strategies of the EU are worth noting:

- ensuring interoperability through harmonizing the technical standards for infrastructure and rules applied to transport service providers;
- improving interconnections of national networks designed primarily to meet domestic needs; and
- increasing the market access for transport services provided by one member State in other member States.

Responsibility for investment in infrastructure was assigned to individual governments. The private sector was given responsibility for improving the management of transport and other logistics services.

All efforts to develop a corridor have employed some combination of these strategies. Two of the basic mechanisms for implementing these strategies are the trade and transit agreements and related procedures for clearing cargo.

A. Trade and Transit Agreements

The protocols and procedures governing cross-border movements in an international corridor are set out in bilateral and multilateral agreements covering trade and transit. The agreements covering **trade**, combined with the implementing rules and regulations, stipulate the documentation required for clearing import/export cargo and the procedures involved for checking the documents/cargo and restrictions, if any, on goods that can be traded. The transit agreements stipulate the requirements for moving goods under bond either into or across the country, the cargoes to which this applies, the routes that can be used (including border crossings and international gateways), and the access granted to transport providers from other countries. These agreements specify the documentation and procedures required for clearing transit cargo. The latter is usually limited to an inspection of the cargo documents and customs seal on the vehicles and their cargo. The trade and transit agreements will set out the rights of transport companies in the participating countries to participate in these trades (Box 4-1). This will generally be complemented by other regulations covering the type of transport that can cross the border, the routes on which this transport can operate, and the period of time over which this transport is allowed to be in the country. As a result, these agreements have an important role in determining the efficiency with which the corridor operates.

Box 4-1. Mercosur Agreement: Cross Border Movements

The regional agreement for integration of the trading union among the MERCOSUR countries in Latin America introduced a uniform legal regime for international transport by authorized transport companies. It provided for the development of an international transport document, a customs regime modeled after the TIR Convention (but without a guarantee scheme), and obliged the participants to implement an international third party liability scheme. It provided for standards regarding carrier responsibility for lost, damaged, and delayed goods. Among the general provisions is:

“Each contracting Party undertakes to give, on the basis of reciprocity, national treatment to the transport companies authorized by other Parties to carry out international transport under the terms of the Agreement. Such transport companies from other countries can also be given exemption from domestic taxes duties and rates to reciprocal basis.”

The agreement has provisions that apply to both bilateral and transit road transport. It provides for reciprocity in the allocation of passenger and goods traffic between the parties. It also distinguishes between goods carried on own account and those carried by third parties. Finally, it allows for temporary use of the vehicles of third countries by an authorized transport company.

From the perspective of an international corridor, the most important issues these agreements address relate to:

- **Interconnection:** All major nodes along the corridor where cargo clearance takes place.
- **Border Clearance Procedures:** The documentation and clearance procedures applied for imports, exports, and transit cargo.
- **Interoperability:** Technical standards for infrastructure and services.
- **Transport Market Access:** Ability to offer transport services in other countries.
- **Liabilities:** The allocation of responsibility for damage or loss of goods and for duty due of these goods and associated requirements for insurance or guarantees.
- **Route Capacity:** Further development in available infrastructure.

The following discussion covers each of these issues. It examines the strategies available to the public sector either acting alone or in concert with the private sector. Within each strategy there are various mechanisms that can be employed, as shown in Table 4-1.

B. Interconnections

The major constraint on corridor performance is generally found at interconnections. These include not only border crossings and international gateways, but also the major nodes along the corridor. The transport units and their cargo are normally cleared at these border crossings and gateways. It is at these points that the majority of the unnecessary delays and informal payments occur. These delays and costs can be reduced by moving the clearance to an interior location, especially a node where there would normally be delays associated with intermodal transfer, equipment interchange, or cargo storage. If interconnections are to operate efficiently, it is necessary to provide sufficient investment in infrastructure and effective management of the services at these interconnections.

Table 4-1. Strategies and Mechanisms for Developing and Improving a Corridor

Strategy	Mechanisms	Areas Affected	Impacts Affecting	
			Costs	Time
Increase and Improve Interconnections	<ul style="list-style-type: none"> - Establish New Transfer Points - Add Facilities - Simplify Procedures and Documentation - Standardize Documentation - Consolidate CIQS Inspections - Relocate Inspection Inland or at Marshalling Yards (for rail) - Provide New Logistic Services - Monitor Performance 	<ul style="list-style-type: none"> - Border Crossings and Gateways 	<ul style="list-style-type: none"> - Shorten Door-to-Door Routes - Reduce Door-to-Door Delays - Reduce Administration - Reduce Processing Time - Increase Transparency - Simplify Handling of Vehicles and Cargo - Value added - Reduce Delays 	
Establish Interoperability	<ul style="list-style-type: none"> - Harmonize Technical Standards and Rules for Operators - Simplify Allocation of Liabilities - Standardize Certification 	<ul style="list-style-type: none"> - Transport Services 	<ul style="list-style-type: none"> - Increase Cross-border Competition and Provide Economies of Scale - Reduce Equipment Exchange 	<ul style="list-style-type: none"> - Reduce Equipment Exchange
Increase Market Access	<ul style="list-style-type: none"> - Allow Cross-border Movements - Eliminate Cabotage - Deregulate Pricing - Commercialize Public Services - Regulate Anti-competitive Behavior 	<ul style="list-style-type: none"> - Transport Services - Border Crossings and Gateways 	<ul style="list-style-type: none"> - Reduce Equipment Exchange and cargo handling - Improve Variety and Quality of Services - Increase Availability of Services - Introduce Competitive Pricing and Variety of Services 	

These interconnections have traditionally focused on investment in new capacity, but in the last few decades, increasing attention has been given to the quality and efficiency of cargo handling and processing services offered with the result that the public monopolies have been replaced by competitive private sector service providers. More recently, efforts have focused on reducing the regulatory constraints on efficient interconnections. All three—capital investment, commercialization, and simplification of regulations—continue to be important initiatives for improving corridor performance.

Improvements in Border Clearance Procedures

Nearly all of the corridors have adopted a strategy of improving the performance at border crossings and international gateways. In the case of TRACECA, it is the core strategy. This strategy has been most successful in corridors passing through a Customs Union. The TEN transport network and the Trans-Kalahari Corridor have been able to simplify cross-border procedures and significantly reduce delays through agreements developed as part of the Customs Union. In contrast, the Customs Unions on the Pan-American highway cover only the beginning (NAFTA) and the end (Mercosur). As a result, the efficiency of the border crossings has not improved in Central America and northern South America and relatively little traffic moves through the middle of the corridor.¹¹ The success of improving cross-border performance on the Maputo corridor, and the resulting growth of traffic at the expense of South African ports, contrasts with the difficulties in improving performance on the Northern and Central Corridors where there has been relatively slow growth in traffic even though these corridors provide essential outlets for landlocked countries.

The times for Customs clearance have declined over the last decade with many border crossings achieving clearance times for properly documented cargoes of less than two days for imports, a matter of hours for exports, and even less time for transit cargo. These improvements have occurred during a period in which the traditional responsibilities of the Customs authorities for revenue collection, enforcement, and statistical reporting have broadened. Revenues to be collected include not only duties and excise taxes, but also VAT and countervailing duties. Enforcement responsibilities have extended beyond prevention of smuggling and trade in banned commodities to enforcement of trade agreements and prevention of terrorist activities. During this same period, the participation of other agencies involved in certification of traded goods (CIQS) has increased and added to the total time for clearing cargo. In line with the [Geneva Convention on the Harmonization of Frontier Control of Goods](#) (1982), Customs is increasingly tasked with coordinating its activities with these agencies, especially those responsible for regulating imports and exports (for example, product standards, sanitary and phytosanitary requirements, restrictions on livestock, arms, illicit drugs, etcetera). Finally, Customs is responsible for collecting and publishing trade statistics and data on its activities.

Greater efficiency in border clearance has been achieved through simplification of procedures, greater transparency in implementing these procedures and providing better information to the public on these procedures. This has been complemented by a substantial increase in the use of computer systems, which not only increases the amount of information that can be processed, but also improves the quality of the data collection. Other reforms have been directed at improving operating procedures including improving training and compensation, extending operating hours on major international crossing points for freight and synchronizing operating times on both sides of the border.

¹¹ In part because of the waterborne competition.

Mechanisms for simplifying and automating procedures include the introduction of:

- Single Administrative Document (SAD) with a standard format, for example, UN layout key.
- Direct Trade Input for pre-notification using EDI and Internet-based systems.
- Channeling and risk management.
- Movement of transit cargo under improved one-time seals without border inspections.
- Better inspection facilities and equipment.
- One-stop services.
- Collocation of processing and inspection facilities.

These mechanisms can significantly reduce the time for clearance and inspection and, by implication, increase the capacity of the border crossings and international gateways. They can also reduce the costs of operating and maintaining these facilities.

The SAD replaces individual documents for imports, exports, and temporary imports and, in the process, reduces the administrative costs of shippers, consignees, and customs. It also increases the efficiency of the clearance process by reducing the discrepancies between documents and by preventing the proliferation of special procedures and signatures associated with multiple documents. While it is still necessary to provide a number of supporting documents from both public and private sources, the list of these documents, which includes commercial invoice, packing list and Bill of Lading or waybill, is relatively standard (Appendix 4). The addition of documents beyond this standard list is generally associated with non-tariff barriers to trade.

The concerns of shippers with excessive documentation and lack of transparency are universal. In some countries specific entities have been created to improve exchange of information between shippers and the public agencies responsible for border control, for example, Tradenet in Singapore. In other countries, either customs or the seaport authorities have taken the lead in developing information systems to facilitate data entry procedures and thereby minimize duplication of data. At the same time they provide better information to shippers and logistics service providers on the status of shipping lines. Freight forwarders and other logistics providers have become more sophisticated in their use of EDI and cargo tracking systems. Increasingly they have taken over the function of providing information for facilitating cross border movements and for tracking cargo to shippers, customs, and other agencies involved in clearing cargo.

Channeling, the segregation of traffic according to the level of risk, reduces the average time for clearance and permits better allocation of customs inspectors. Additional measures to assess risk can be introduced through computer-based analysis of past experiences with specific cargoes, trades, and shippers. This is combined with information obtained from intelligence gathering and the experience of customs inspectors. Customs can then adjust its clearance procedures according to the likelihood of misrepresentation by the shipper. With this information, customs can establish a relationship with “authorized traders” who assume responsibility for ensuring the conformance of their shipments and in return benefit from expedited cargo clearance procedures. Ultimately, this relationship allows customs to audit the traders’ records rather than individual trades.¹²

Transit cargo that moves in a sealed container under bond requires minimum checking at the border or international gateways. For land borders, the processing time can be reduced to a few minutes

¹² This approach has limits since in many developing countries it depends on effective audits of company accounts which are harder to verify than a program of random sampling of shipments.

through use of an express lane. Earlier practices requiring convoys accompanied by customs officials and movements along fixed routes are being gradually replaced by other forms of monitoring, including time limits and RFIDs. These require better communication between the points of entry to and exit from the transit country.

Improvements in inspection technology including the use of in-motion weighbridges, various types of scanners, and tamper-proof seals can reduce the time and cost for inspecting import and transit cargoes, provided proper implementation strategies are put in place. Proper design of the customs facilities can reduce congestion by taking into account traffic flow, queuing requirements, segregation of traffic, fewer movements by inspectors and transport units, loading/unloading docks, and space requirements for physical inspections.¹³ While most of these improvements have been introduced at the major gateways, it has been difficult to introduce them at land borders that are further from urban centers.

The one-stop shop, a much-touted effort to expedite Customs' procedures, has been less successful. While Customs in many countries have increased their use of EDI and computers to facilitate cargo clearance, the other border agencies have not. These agencies continue to require paper documentation and do not provide information on cargo status. Efforts by Customs to introduce one-stop services have been frustrated by limited cooperation from these agencies and incompatibility in data requirements.

Another tool for improving customs performance is to create incentives by introducing systems for monitoring and reporting this performance. This was the technique applied in the TTFSE project for Southeast Europe (Box 4-2). The type of performance measures to be monitored is shown in Table 4-2.

Relocation of Cargo Clearance Activities

One of the best options for increasing efficiency of cargo clearance is to relocate the clearance procedures away from the border. Indeed this is one of the basic insights of the EU's program. Inspections of truck registration, driver's licenses and certificate for road-worthiness can be conducted along the corridor but away from the border as part of the domestic program of roadside inspections. Trains can be inspected at marshalling yards where trains are reconfigured or shipments transferred to road transport, instead of at border crossing points. Cargo inspection and clearance procedures can be relocated at inland bonded warehouses, container depots, and dry ports. This approach was pioneered at international seaports in order to alleviate congestion, but is now being adapted for imports arriving through land borders. It allows for movement of goods under bond from the border to inland customs facilities or special economic zones or other enclaves that are granted duty free status. This can include allowing cargo to be cleared at factories.

Table 4-2. Performance Measures

- Measures for different cargo groups (Transship/transit/re-export/export/import cargoes):
- percent in each group;
 - percent cleared at border;
 - average value for each group;
 - percent requiring inspection;
 - percent detections;
 - average time for inspection;
 - percent requiring more than specified time;
 - average number of collateral inspections;
 - average time for collateral inspection
 - method of valuation
 - average number of documents required; and
 - average number of signatures.

¹³ Outline of border processing: <http://www.gfptt.org/Entities/ReferenceReadingProfile.aspx?id=18d15931-4fba-4857-83f0-9c28b68e8ccc>

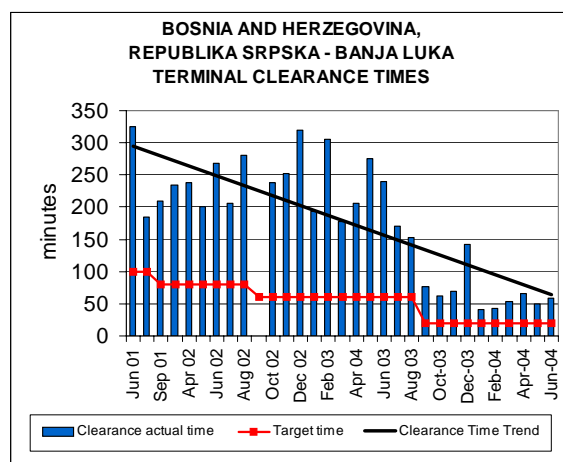
Box 4-2. Measuring Performance (www.seerecon.org/ttfse)

The regional program of trade and transport facilitation in Southeast Europe (TTFSE) was developed by The World Bank in cooperation with the EU to support efforts to modernize the border agencies, in particular their Customs Administrations, in Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Moldova, Romania, and Serbia and Montenegro. The core components were institutional reforms including changes in laws and regulations, simplification of procedures simplification in line with EU practice, improvements in training of staff and investments to upgrade information technology, and border crossing facilities. The program was overseen by a high-level regional steering committee supported by public-private partnership working committees. Over twenty-five pilot projects were established at specific border crossings and inland clearance facilities to reduce the impediments to trade.

An essential component of this effort was the introduction of a harmonized set of indicators to measure general performance and to assess the impact of pilot project initiatives. Among the measures introduced were:

- percentage of documents inspected;
- percentage of containers/trucks inspected;
- percentage of containers/trucks cleared in less than 15 minutes;
- irregularities detected per number of inspections;
- average border crossing time for outbound vehicles;
- average border crossing time for inbound vehicles;
- revenue collected versus salaries for staff;
- average number of declarations processed/staff;
- average trade volume/staff; and
- total administration cost/revenues collected.

The collection of data was done periodically and the results were reported in graphical form to provide an indication of how effective various initiatives had been. In addition, sampling techniques were developed to collect more detailed information on the time required for different activities in the border crossing and attitudinal surveys were developed to obtain users' opinions as to the success of efforts to improve performance. These efforts not only provided a basis for assessing performance and evaluating the impacts of various initiatives, but equally important, provided a greater level of transparency.



The pilots improved interaction between border agencies, which increased productivity. While the program benefited from the requirement that the participating countries prepare for accession to the EU, it was also constrained by the reality that the procedures would be dramatically changed following accession. Perhaps the most important benefit was to introduce a greater level of attention to the problems of border crossings as an essential component in trade facilitation (See 12H www.seerecon.org/ttfse for more on the program and its indicators).

C. Interoperability

For international corridors, interoperability refers to the ability of transport units to operate across the countries through which the corridor passes. This requires compatibility of transport infrastructure on both sides of the border. It also requires harmonizing the physical characteristics, policies, and procedures that would otherwise prevent cross-border movements. Without harmonization, it is necessary to perform back-to-back transfers of cargo between transport units at the border. This adds to the costs and time for the crossing and the losses during cargo handling. Most of the features of interoperability are achieved through bilateral agreements and back-to-back agreements where there are more than two countries within the corridor.

Harmonization is needed for both **transport infrastructure and transport units**. It requires an agreement on a common set of technical standards or an acceptance of the technical standards applied by adjoining countries. Harmonization of infrastructure is difficult to achieve because it implies a modification of existing infrastructure or a change in engineering practices. There is often an agreement to gradually adjust designs towards a common standard as was done in the Mekong subregion.

For **railroads**, it is necessary to have a common set of standards. The critical standard, rail gauge, has been a problem for the countries in South Asia and the Mercosur area where there is a colonial legacy of mixed gauges. It has not been a problem for East Asia and Southern Africa where the rail system was developed on a regional basis. Other standards, such as length of sidings and type of signaling, affect maximum train length. Additional standards such as rail strength and track geometry (minimum curvature and maximum incline) affect the type of wagons that can be used and their capacity. Even where a rail network is well integrated, there can be problems when modifying the system to perform new functions (for example, the introduction of double stack trains or high speed services).¹⁴

For **seaports and airports**, most of the standards are based on general engineering standards, many of which are promoted by international agencies (for example, ICAO). The physical parameters for individual facilities (for example, draft, backup area, runway length, and terminal size), are determined primarily by market forces. As such, there is less risk of incompatibility. Standards are also applied to the transport units crossing the border. The EC has developed an extensive set of technical standards for transport units covering the parameters shown in Table 4-3.

Table 4-3. Technical Parameters for Transport Units	
Road	Truck length overall Axle Weight Gross Vehicle Weight Registration Plate
Rail*	Axle Load Vehicle Loading Gauge Minimum Braking Distance Maximum Train Length
IWT-vessel Coastal Vessel	Freeboard Vessel Class and Certification
Aircraft	Type Certification Certification for Airworthiness
<i>Source: EU Directives</i> <i>*Many derived from UIC (International Union of Railways)</i>	

¹⁴ In Europe, there have been difficulties with the introduction of High Speed Train operations since this requires a much higher standard for rail strength and alignment.

For **road transport**, the principal criteria are the gross vehicle weight, which is constrained by the capacity of bridges, overall vehicle length, which is limited by road geometry in urban areas, and safety of operation on the main arteries. There are also standards regarding vehicle emissions. It has been difficult to develop a common set of standards for road transport or to gain acceptance by one country for the standards of the other. However, this has not been a serious impediment to efficient corridor operation since private operators are willing to procure trucks that satisfy the different sets of standards applied on the route. Restrictions preventing trucks from crossing borders are generally associated with efforts to create barriers to trade.¹⁵ However, private operators are willing to establish cross-border alliances to overcome this problem.

For rail transport, the compatibility of rolling stock depends on the physical constraints associated with both the rail network and the characteristics of the domestic rolling stock. Differences in axle configuration and braking systems can prevent efficient operation and thus discourage cross-border movements. There is almost no cross-border movement of locomotives, in part because they are in short supply and in part because they are critical to efficient operation of a country's rail network. Cross border movements of wagons are more common, but still limited. Sometimes there are problems of incompatibility in terms of wagon size and braking systems. Since the power and availability of the locomotives determine total train weight, trains must often be reconfigured at the border. There are additional delays for inspecting wagons and testing of brakes. The national railroads usually have the responsibility for deciding whether wagons can cross the border. Their decision depends not just on physical limits, but also on agreement as to charges for track access and responsibility for returning wagons.

For **vessels and aircraft**, there are international and regional standards. These apply to both transport units and the supporting navigational systems. For vessels, the IMO is actively involved in developing these standards, whereas for aircraft this responsibility is left largely to national civil aviation authorities. From time to time, countries have introduced restrictions on the foreign vessels and aircraft allowed to use their seaports and airports, but these are usually considered to be barriers to trade. The growing international concern for security in the movement of goods is expected to introduce new restrictions, but it is unclear whether these will be determined by international standards or more parochial interests.

Certification

Associated with physical standards for transport units are the procedures for certifying transport units that meet these criteria and the documents that confirm that these procedures have been performed. Harmonizing inspection procedures and frequency of these inspections can be accomplished on a bilateral or multilateral basis. The most common mechanism is bilateral agreements that provide for mutual recognition of the other country's procedures and documents.

The three modes that present the greatest challenge for certification are trucks, inland water, and coastal shipping. Their certification is traditionally governed by local rules. Where they operate on a multi-country corridor, it is necessary to have agreement on inspection procedures and reciprocal recognition of the documentation. Trucks are inspected for road-worthiness and emissions. Inland water and coastal vessels are inspected for seaworthiness based on domestic classification requirements. The procedures for licensing truck drivers and the officers and crew of inland water and coastal vessels are also determined by local regulation. There must be reciprocity through mutual

¹⁵ This was the situation on the US-Mexican border where Mexican trucks were prohibited from crossing over, ostensibly for safety reasons, but also in large part to protect US trucking companies.

acceptance of qualifications and licenses or each country must issue licenses for operators from the other country. These arrangements are generally achieved through bilateral agreement, but there have been efforts by regional associations to introduce regional procedures (for example, ASEAN).

There is no demand for certification of rail equipment. Instead, the national railroad determines whether foreign wagons are in a condition to be hauled. For seagoing vessels, there are international societies that certify the vessels, but the officers and crews are locally certified. Aircraft, pilots and crew are certified by their local civil aviation authorities, but may also be subject to certification by the country of destination.¹⁶

D. Market Access

An important complement to interoperability is the ability of service providers from one country to compete in the provision of transport services in other countries along the corridor. In order to have meaningful competition between countries, there must be a legal framework that gives transport operators access to the transport market throughout the corridor. Without this, an international corridor is merely a collection of interconnected domestic corridors.

Improvements in market access increase the pool of transport operators, thereby offering more options in terms of the cost and quality of service. There is also a greater potential for economies of scale. In order to improve market access, it is necessary to have an effective transit agreement and supporting agreements on standards and certification. In addition, it is necessary to allocate the liabilities so that transport operators can obtain the necessary insurance coverage. Finally, the government must guarantee a level playing field in which the transport operators can compete.

Allocation of Liabilities

Effective allocation of liabilities requires identifying the parties responsible for various actions and providing financial services that cover these liabilities for the complete movement through the corridor. A general problem for intermodal freight transport, and a special problem for cross-border trades, is the liability in the event that cargo is lost or damaged. Many countries require transport service providers to carry only third party liability coverage. Coverage for the cargo is generally at the discretion of the shipper. However, for cross border movements, there is a need for cargo insurance. This is not usually a problem for ocean and air transport as these modes have access to regional coverage, but it is a problem for truck and rail transport. While some regions have a liberalized insurance market, it is more often the case that the transporters must obtain insurance from local companies upon entering each country. It is anticipated that this problem will diminish with liberalization of domestic insurance markets as part of reforms associated with the General Agreement on Trade in Services.¹⁷

¹⁶ FAA for the US.

¹⁷ The GATS provides for trade in financial services including insurance and insurance-related services. It covers trade from the territory of one member into the territory of any other member, in the territory of one member into the territory of any other member, by a service supplier of one member through commercial presence in the territory of any other member, and by a service supplier of one member through presence of natural persons of a member in the territory of any other member. So far 102 WTO members have multilateral commitments in these sectors. Nations accounting for over ninety-five percent of the trade in banking, insurance, securities, and financial information have brought financial services under international rules.

In addition to coverage for loss or damage of cargo, there is also a need for coverage of the liability for taxes and duties on cargo moving in transit through a country. For European road transport, this concern has been addressed through a self-insurance program managed by transport associations as part of the TIR convention coordinated by a secretariat in the UN/Economic Commission for Europe. Under this convention, the goods are transported under a bond covering possible duties. The transporter carries a carnet that is presented to customs at each border crossing. While this system has been extended for some shipments to Central Asia and the Mahgreb countries, it has yet to achieve wider acceptance. Attempts to create similar systems in West Africa (the *TIE* system), in Southeast Asia (ASEAN), in Mercosur, and in Southern Africa (COMESA) have had limited success. Different arrangements are available for goods moving to an inland customs facility under a combined bill of lading or a marine bill of lading. The shipping lines and forwarders arrange for coverage through a Customs bond or guarantee that is maintained to cover all shipments.

Cabotage

Once agreement has been reached among the countries along the corridor concerning standards and certification and restrictions of cross border movements of transport units have been eliminated, there remains the contentious issue of cabotage. Foreign transport service providers are usually prohibited from carrying domestic cargo. This applies to all modes.

In order for transport services to operate efficiently, they must have the opportunity to carry cargo and achieve reasonable load factors on all legs of their journey. Where trade is balanced, this can be accomplished, but where it is not there is a risk of a significant portion of empty backhauls, which increases transport costs. This situation can be mitigated through an accommodation which allows one country's transport service providers to carry the other country's domestic cargo in specific situations (for example, while en-route to the border). However, this accommodation has rarely been achieved outside of a customs union (for example, the European Union and SADC) or in areas linked by regional trade agreements (for example, NAFTA and SAARC). Most countries enforce cabotage laws to protect domestic shipping, trucking and air services, but some allow cross ownership of transport companies or other forms of participation that allow cross-border movement.¹⁸ There are other forms of accommodation. The most important is allowing one country's transport service providers to carry the imports and exports between two other countries (for airfreight this is referred to as the Fifth Freedom).

Commercialization of Services

Another opportunity for improving market access is commercialization of the operations at intermodal transfer points along the corridor and at gateways. In most cases, the replacement of public sector monopolies with private sector management of seaports, airports, rail ICDs, road ICDs, and other intermodal terminals has provided significant improvements in the time and cost of moving cargo. Commercial management allows fixed tariffs to be replaced by negotiated prices and uniform standards of service to be replaced with services designed to meet specific needs of the transport operators and their cargo. Different levels of service can be provided for high-value, time-sensitive cargoes and for low value, time-insensitive cargoes. This change in management allows the replacement of policies that discriminate between domestic and foreign transport operators with ones that discriminate between efficient and inefficient operators. It encourages the introduction of value-

¹⁸ While the EU restricts domestic movements, European trucking companies can employ foreign drivers and tractors and transport domestic cargoes provided the trailer is registered in the EU.

added services including automated document preparation and cargo tracking. The overall result is lower cost and fewer delays when transferring cargo at intermodal transfer facilities.

Competition Policy

Assuming that market access has been improved for transport service providers and there is sufficient commercialization of the activities at the multimodal transfer points, then it is necessary to ensure that a high level of competition is maintained. While independent truck operators and small trucking companies cannot manage international shipments, there are few barriers to entry or exit into this business and very limited economies of scale. Ocean and inland water transport offer significant economies of scale, but have traditionally enjoyed strong competition with few barriers to entry or exit. Rail transport does not have these advantages, but faces strong competition from road transport which has captured significant market share from the railroads in recent times. Air transport had been a problem in regions where national flag carriers are dominant, but competition has increased dramatically as the markets for both local and international services have been liberalized.

The only area in which competition is likely to be constrained is the provision of services at the transfer nodes, especially at the international gateways. For these, it is important to ensure either direct competition in the provision of services or sufficient contestability in the granting of concessions for these services. Further protection can be provided through general legislation against anti-competitive behavior. The EU has taken this approach as shown in Box 4-3.

Box 4-3. EU Competition Laws

The EU competition laws apply to the transport sector. These are set out in Council Regulation (EEC) No. 1017/68 of 19 July 1968, which applies to transport by rail, road, and inland waterway. As last amended by the Act of Accession of 1994, it prohibits:

- (a) "directly or indirectly fix purchase or selling prices or any other trading conditions;
- (b) limit or control production, markets, technical development, or investment;
- (c) share markets or sources of supply;
- (d) apply dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage, and
- (e) make the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts."

Exclusions had been granted for air and maritime transport sectors including:

- "certain categories of agreements and concerted practices concerning joint planning and coordination of schedules, joint operations, consultations on passenger and cargo tariffs on scheduled air services and slot allocation at airports;
- exemption for agreements between carriers concerning the operation of scheduled maritime transport services, and exemption for agreements between transport users and conferences concerning the use of scheduled maritime transport services), and
- certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia)."

These were revised in Council Regulation (EC) No 1/2003 of 16 December 2002: "On the Implementation of the Rules on Competition Laid Down in Articles 81 and 82 of the Treaty."

The benefits from improving market access for transport operators from different countries within a corridor include not only lower costs and greater diversity of services, but also savings in cost and time from not having to transship cargo at the border, and greater ability to respond to peak demands without substantial price increases.

E. Route Capacity

Since the corridors reviewed for this study were developed from existing routes, investments in new links are relatively rare. Even programs for developing a national highway network, such as the Golden Quadrilateral in India (Box 4-4) generally upgrade an existing network rather than develop entirely new links. Most investments are made to remove choke points or increase quality of transport services by adding capacity or improving the configuration in order to reduce average transit time and accommodate larger transport units.

Capital investments for extending transport network to the border are rare. A number of factors limit the opportunities for investing in these connections (in particular, physical constraints since borders frequently conform to natural barriers, for example, mountains, rivers, etcetera). There are usually a large number of low capacity roads developed by local interests to facilitate informal cross-border trade, but national governments have been reluctant to formalize these connections because of the low traffic volume relative to cost. Even where cross-border connections can be developed at reasonably little capital cost, there is the associated cost for the facilities and staff to monitor cross-border traffic. Furthermore, border areas tend to be in locations where the government has limited control and there is the concern that efforts to improve interconnections will facilitate cross-border movements of contraband, illegal immigrants, and insurgents. Such concerns have prevented the completion of Pan-American Highway, restricting the official crossings between Sabah (Malaysia) and West Kalimantan (Indonesia), and Sabah and East Kalimantan to single roads.

<p>Box 4-4. Golden Quadrilateral - Upgrading Corridors</p>
<p>The Golden Quadrilateral is approximately 12 thousand kilometers of limited access four lane roads connecting the four major cities in India, Mumbai, Delhi, Kolkata, and Chennai. This massive construction program was begun in 1997 under the direction of the newly formed National Highway Authority and implemented through a mix of financing strategies and public-private collaborations.</p>
<p>The introduction of the four lane highways on traditional corridors has dramatically changed the freight logistics of India, allowing for the introduction of modern trucking using articulated trucks and creating the opportunity for national trucking services. While the network has not been extended to the borders, it provides access to the seaports at Nhava Sheva, Kolkata, and Chennai. It also connects to the West Bengal Corridor. This system is complemented by the expanding unit train services of Concor. The principal services are from Nhava Sheva to Delhi and other major markets, but are expected to expand in parallel with improvements in Indian ports as a result of the increased role of the private sector in port operations.</p>
<p>All of these improvements are occurring as the country rapidly expands its trade and positions itself to become a major exporter.</p>

For rail border crossings, the principal constraint is the relatively small volumes carried by branch lines between the existing network and the border relative to the cost for these extensions. This cost includes not only the branch line to the corridor, but also significant investment in cross-border infrastructure including sidings for inspection, switching of locomotives and reconfiguration of trains. Furthermore, this investment must take place simultaneously on both sides of the border. Finally, there is the difficulty of changing the allocation of network capacity to allow for through movements to the border and the reassignment of trains to this route.

The capital investment in road and rail connections to the border are undertaken as part of development of the domestic network and funded through the domestic budget. As such, these investments must complement the rest of the network while competing with other domestic priorities. Where fees are charged to international transit traffic for the use of the national network, they rarely cover anything other than a portion of the maintenance and operation costs.

The development of corridors can be used as a mechanism to mobilize support for development of links to the border that would otherwise receive relatively low priority in domestic budgets. This was the situation for the corridors in the SAARC region, East Africa, and West Africa where financing for development of land routes to the borders has been justified in terms of the benefits of providing an outlet for the trade of landlocked countries. In some cases, corridors have been established to provide a focal point for investment. This is the case for the Can-Mex corridor where the various routes have been identified in order to obtain funding from the Federal government. For the GMS and SAARC regions, ADB has developed lending programs specifically for developing corridors that serve two or more countries in these regions (for example, the East-West and West Bengal Corridors).

Gateways

Since most of bottlenecks on corridors occur at the gateways and border crossings, especially seaports and land border crossings, much of the investment for improving corridors has focused on these facilities. Simplifying procedures and increasing efficiency of operations can eliminate many of the bottlenecks, but in the long run, changes in technology and growth in traffic will require capital investment.

Public investment in **port infrastructure** is justified as a means to support a country's foreign trade and to maintain global competitiveness. Where ports handle transit cargo from other countries, this traffic normally uses the same facilities as import/export cargo and thus does not require additional infrastructure.¹⁹ Instead, it improves the utilization of existing capacity and increases the profitability of the port. The exception occurs where customs and border agency regulations require isolation of these cargos and in turn separate facilities and operations. This not only adds to the costs of port operations, but can also reduce overall efficiency. This is less of a problem with the growth in experience of handling transshipment cargo, which has similar requirements. Also, the procedures for handling transit cargo have been simplified. It remains to be seen what the impact of new security regulations will have on the handling of transit cargo, but over the long run there should be no reason for segregating this cargo.

Investments in **border crossings** have similar benefits for foreign trade, but often receive less attention. Because the borders are usually far from the major urban centers, congestion and poor

¹⁹ There are exceptions, such as Djibouti, where the volume of transit cargo is much greater than domestic cargoes or Aqaba, where fluctuations in transit cargo can create serious shortages of capacity.

service quality at these crossings receive less attention than at the seaports. As a result, the facilities provided are generally minimal and the performance of customs and other border control agencies is of a lower standard. In some sense, this has benefited cross border trade. While there is less transparency there is also less opportunity for delaying shipments because of the lack of facilities for storage and inspection of goods and queuing of transport units. The crossing between Bangladesh and India at Petrapole/Benapole provides a useful lesson in this regard. Petrapole has experienced horrific queues because of the lack of processing capacity. In contrast, Benapole has a land port with several big parking areas and a large number of go-downs.²⁰ However, transit time at the latter is longer because the additional capacity compensates for inefficient procedures and encourages rent-seeking activities by the participants in the land port.

In the case of seaports and airports, the physical requirements for efficient operation are well understood and the planning techniques are relatively standard throughout the world. Inefficiencies are generally caused by insufficient investment and ineffective management. Unfortunately, less attention has been given to the design and operation of land border crossings. In most countries, the design and traffic engineering for similar types of facilities are understood, but this knowledge is rarely applied to the design of land border crossings. The result is often elaborate facilities constructed with donor funding in locations where there is relatively little traffic, for example, Savannahkhet on the EWEK and Karkarbhatta and Birgunj on the India/Nepal border, while minimal facilities are provided at sites where there is a large volume of traffic. The design of these facilities is more difficult in remote areas with relatively poor infrastructure, lacking reliable power and communications, and subject to minimal management oversight. There the border crossings must be simple, but designed to encourage transparency and consistency in clearance procedures.²¹

Capital investments address physical capacity constraints, but not underlying problems of efficiency. If the objective is to have a seamless border, then the number of activities occurring at the border and the time to complete them needs to be minimized. The only reason for providing substantial infrastructure facilities at the border is to accommodate structural impediments to the free movement of goods and transport. Two areas in which capital investment can increase productivity are the facilities for cargo inspection and supporting ICT systems. The former are truck docking facilities that allow quick off-load and reload cargo for physical inspection and full truck scanners for goods that are fragile, perishable, or otherwise require special handling. To better coordinate activities with shippers and transport companies, as well as to facilitate the submission of cargo documents, communication systems link border crossings with central customs offices and other border agencies. They also provide links with other border crossings to monitor the entry and exit of vehicles and cargo moving in transit. These are supported by information systems that expedite the processing and inspection of cargo and their documents (for example, ASYCUDA and ACIS, as well as the transmission of documents and trade data through EDI).

Other Nodes

While the border crossings and gateways are the major nodes for the international corridors, there are additional nodes that are part of the domestic transport networks but contribute to the performance of these corridors. These include intermodal terminals that increase diversity of routes by providing for

²⁰ This is partly explained by the dominance of export traffic at Petrapole and import traffic at Benapole.

²¹ Where border crossing procedures are not uniformly applied, the traffic will usually shift to those border crossings that are more efficient or where procedures are less intrusive and total cost including informal payments is lower.

an efficient exchange of cargo between modes. These are primarily rail-based terminals of which the most important are Inland Container Depots. There are also single mode terminals that provide an interface between urban and interurban transport. Among these are truck terminals and rail yards located at the periphery of cities. The development of this infrastructure is usually a local undertaking and is increasingly funded by the private sector.

A summary of the basic strategies that were applied in the corridors examined in this study is shown in Table 4-4. Most of the corridors employed a combination of strategies, but nearly all included a strategy for improving interconnections, land border crossings in particular.

F. Evaluation of Initiatives

The possible initiatives discussed above and summarized in Table 4-5, are well established. In order to choose from among them, it is necessary to evaluate their expected benefits and costs using an approach similar to that shown in Table 4-4. This evaluation should be done from the frame of reference of the shippers taking into account their requirements to move their cargo between origin and destination within a given time period. Since most of these initiatives will involve changes in policies and procedures rather than capital investments, it is also necessary to consider the level of stakeholder and governmental support.

Table 4-4. Strategies Employed in Different Corridors					
Project	Establish Inter-operability	Increase Inter-connections	Improve Inter-connections	Improve Market Access	Increase Route Capacity
TEN	√	√	√	√	√
TRACECA	√		√		
Can-Mex (NAFTA)		√	√		√
Pan American					√
Bolivia-Chile	√		√		
(Mercosur)			√		
Northern Corridor	√	√	√	√	√
Maputo Corridor			√		√
Trans-Kalahari			√	√	
West African Corridors			√	√	
Turkey-Jordan			√	√	
Asian Highway			√		√
Mongolia-China			√		
SAARC Corridors			√	√	√
GMS Corridors	√		√		√
Northern West-Borneo		√	√		

Table 4-5. Types of Initiatives

ASSET MANAGEMENT

- capital investments to increase capacity and/or improve quality
- private financing of facilities
- better maintenance of these assets
- private operations and maintenance
- user fees to cover maintenance costs
- new transport technology

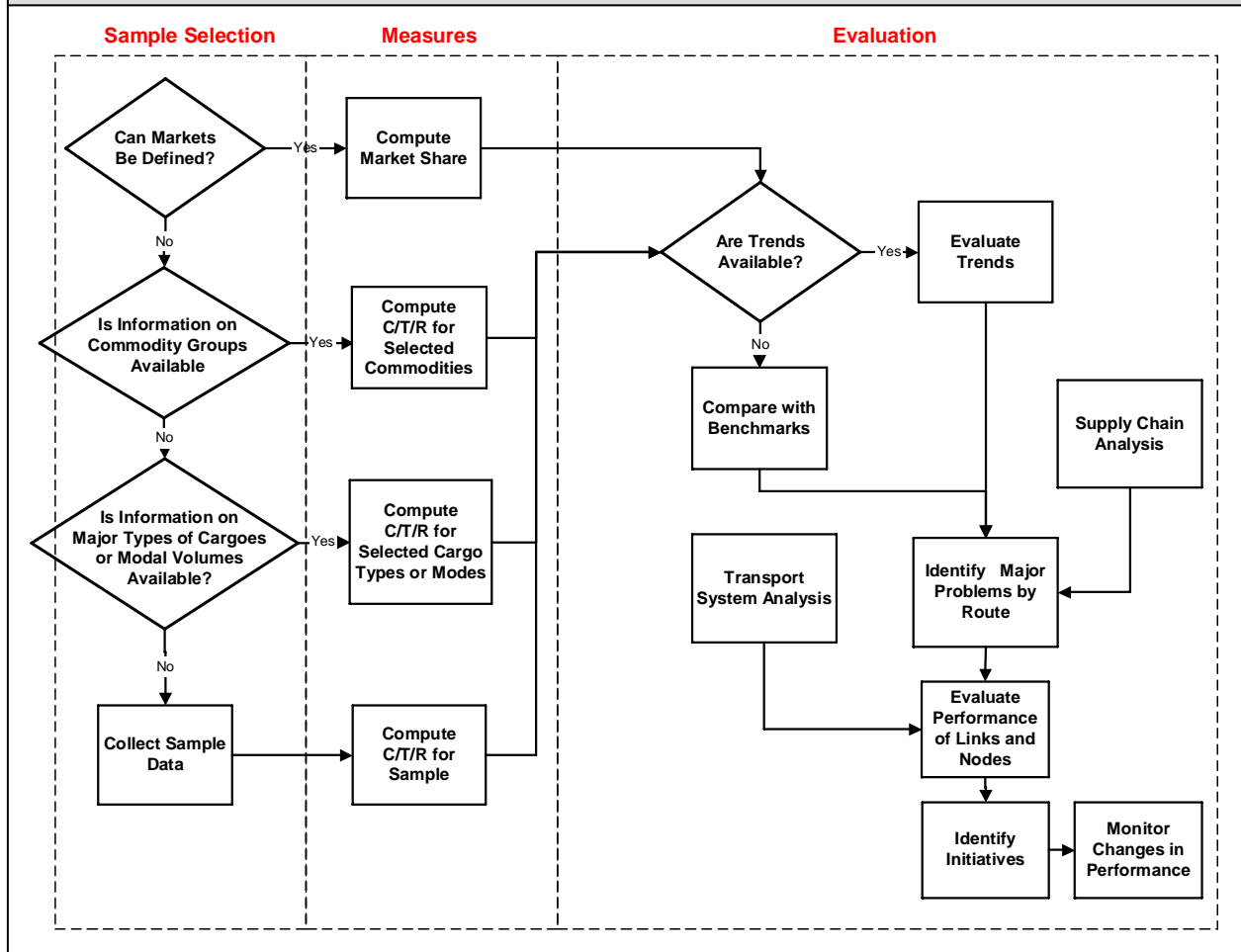
REGULATION

- reduced level of regulation of transport and logistic services
- increased competition in the provision of these services
- reform of customs regulations
- simplified clearance and transit procedures
- relaxation of cabotage laws
- increase in transparency and reduction in informal payments for border crossings
- revised incentive structures

INFORMATION

- simplified documents
- simplified financial transactions
- IT systems for:
 - entry and processing of cargo data;
 - tracking and tracing cargo;
 - electronic transfers and direct debit arrangements;
 - scheduling and control of transport services;
 - coordination between customs and other agencies involved in CIQS; and
 - coordination between officials on each side of the border.

Figure 4-1. Evaluation of Corridor Performance



5. CONCLUSIONS AND RECOMMENDATIONS

The current interest in transport corridors follows from the earlier efforts to promote regional economic growth. These include efforts made in the 1960s and 1970s to create growth poles. These had limited success, especially when they involved Greenfield developments. In the 1990s, there were attempts to create growth triangles and other relationships between neighboring countries that apparently had complementarities, but these efforts had little success. The development of trading blocks has been more successful since these efforts focused on removing barriers to existing intra- and inter-regional trade.

Corridors offer a similar opportunity, but emphasize the traditional expansion of economic activity from market centers along routes connected to these centers. The increasing interest in development of transport corridors is a logical extension of themes in transport planning and development that have evolved over the last four decades. Among these are:

- Multimodal freight transport, which has made significant gains since the 1970s when unitization of cargo allowed for more efficient intermodal transfers (which increases the flexibility of transport services but also requires efficient intermodal transfers).
- Quality of transport services measured in terms of speed and reliability. During the last decade, these have increased in importance relative to costs, as greater attention has been given to supply chain management.
- Efficient logistics are an important source of competitive advantage especially for landlocked countries for which the lack of effective access to global markets is a major competitive disadvantage.
- Timely interchange of information through EDI is important for coordinating activities not only in multimodal networks, but in the for entire supply chain.
- Commercialization of the management of public infrastructure and services through autonomous authorities or private sector participation for greater efficiency and accountability.
- Trade facilitation requires reforms in regulation to eliminate unnecessary regulations and ensure greater transparency in application of these regulations.

A. Summary of Observations

This report has concentrated on corridors that service international trade. It has identified a number of issues related to managing corridors, a summary of which is as follows:

- Corridors serve three types of trade: domestic, bilateral, and multilateral.
- A corridor is less a physical structure and more a collection of transport and other logistic services with a set of policies and procedures that control the movement of cargo and transport through the corridor.
- Most of the transport and logistics services used in the corridor are provided by the private sector.
- The public sector affects the efficiency of these services by providing infrastructure and facilities and by regulating their activities.
- The effectiveness of a corridor depends on the availability of overlapping modes and services offering different prices and quality of service.
- Quality of service is measured in terms of transit time, reliability of schedules, and flexibility in routing.
- The value of improvements in time and cost should be measured relative to the door-to-door movement for the different trades using the corridor.
- The three leading sources of inefficiency in international corridors are poor interconnections, lack of interoperability, and limited market access for transport providers.
- The corridor components that offer the greatest opportunity for improvement are the border crossings and international gateways.
- Customs reform and trade facilitation are critical for improving corridor performance.
- Information is an essential component of all logistics and ties together the various transport and transfer activities.
- The four institutional formats that have been used to “manage” corridors are project coordination, legislative development, consensus-building, and public-private partnerships.
- For all four, the principal role of management is to facilitate the actions of others, either by coordinating their activities or advocating changes to improve the performance of the corridor.

Poor interconnections, especially difficulties at the border crossings, are the primary problem of most international trade corridors. This is most evident for TRACECA, North Borneo, West Bengal, and the Central American portion of the Pan American Highway. It also applies to the corridors in West Africa, and Central Asia as well as the Northern and Central Corridors, but the problems of these corridors are further compounded by limitations on infrastructure. Restrictions on transport market access have been the other major problem. Their most common occurrence is the requirement for transshipment or cargo at the border, as is the case on the US-Mexico border and in much of Asia.

Both governments and the donor community have had difficulty in coordinating the activities necessary to develop successful corridors. Improvements in public infrastructure continue to be planned on a modal basis. Investments in gateway ports and road and rail arteries often include a passing reference to the development of corridors, but rarely provide the complementary inputs necessary to improve corridor performance. In particular, these investments are often made without efforts to improve the services that use this infrastructure.

B. Recommendations

The three factors that determine corridor performance are quality and competitiveness of transport and logistics services, capacity and condition of public infrastructure used by these services, and domestic, bilateral, and sometimes multilateral regulation of these services and the trades that they serve. The organization responsible for corridor development must address all three factors; however, one area usually dominates. Transport and logistic services are rarely the primary concern. The exception occurs where the government is heavily involved in providing these services or there are significant constraints on market access. Where infrastructure is the problem, it may be due to poor condition, insufficient capacity or lack of physical integration. Policy and regulation is more likely to be the major problem, especially as it relates to border crossing procedures for both import/export trade and transit shipments.

Efforts to improve corridor performance require a cooperative effort by the public and private sector. While there are some initiatives that can be undertaken by the public sector, most require private sector involvement to ensure that the quality of services offered in the corridor are improved. The configuration presented in Figure 5-1 suggests that most initiatives improve some combination of market access, interoperability, and interconnection. The initiatives at the center of the figure take longer to implement, but have a more substantial effect on corridor performance. These are generally the subject of continuing efforts at improvement. The initiatives at the periphery can be achieved in a shorter time frame, but must be built on developments in the core areas.

The range of public and private sector stakeholders involved in a corridor and diversity of their goals limit the ability to control development of the corridor. The major challenge is to define a common set of objectives and, based on these, to coordinate the activities of the stakeholders. The private sector should take the lead where there is sufficient infrastructure and an appropriate regulatory environment. The public sector should take the lead where there is a requirement for significant improvements in infrastructure or for major regulatory reform.

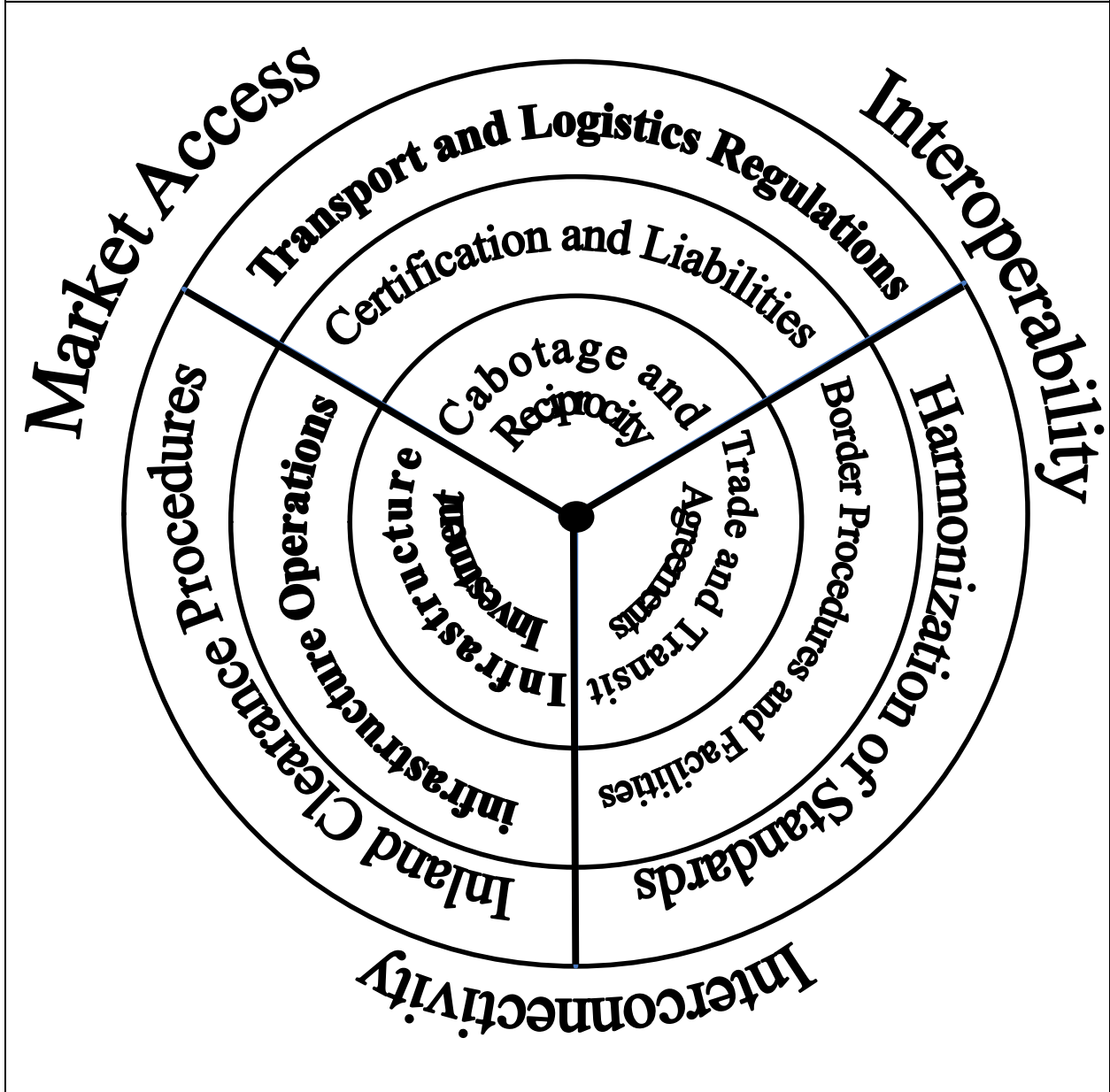
The four institutional formats mentioned above can provide this coordination, but their effectiveness depends on the situation. The legislative development model is useful when dealing with large networks including several corridors and several countries, where there is already some level of political integration and where the corridors are in their formative stage. This model was effective in organizing the TEN and TRACECA networks, but less effective in the attempts to develop the Can-Mex

and ASEAN corridors. The project coordination model applies when dealing with individual corridors that have poorly developed infrastructure. This approach is less effective for integrating corridor development across multiple jurisdictions. It works best when there is a broad-based effort to upgrade infrastructure as was the case in West Bengal and Northern Borneo, or as required in the Northern corridor.²² The consensus-building model is most effective when the major concerns are simplification of regulations and border-crossing procedures, improving transport market access, and removing specific choke points. This model was effective in developing the Trans-Kalahari corridor, but less so in the Central corridor or in West Africa. It is being used to develop the Asian Highway, but as this is a more extensive and difficult network, progress has been slow. The public-private partnership model is effective at the national level, but has some limitations for addressing problems with cross border improvements.

In all cases, the role of coordination is primarily one of facilitating the flow of information between the parties to develop consensus on the initiatives to be taken. This is most effective where there is an autonomous entity with regular staff, funding commensurate with the scale of initiatives required, and an executive board that includes the principal stakeholders from the public and private sector. For multilateral corridors, the corridor management can contribute to this effort by providing advice on initiatives that have proven successful in other corridors and technical support for implementation of pilot projects as was done in the case of Trade and Transport Facilitation Program in Southeast Europe.

²² This categorization does not ignore the important effort of the TTCA to develop consensus among stakeholders, but rather recognizes the need for substantial improvement in services and supporting infrastructure for the road, rail, and port components and the likelihood that these will be addressed as individual modal initiatives.

Figure 5-1. Initiatives Related to Market Access, Interoperability and Interconnectivity



APPENDIX 1: COMPONENTS OF THE TRANSPORT CORRIDOR

Transport networks are generally defined in terms of a series of links that are interconnected at nodes. Some of these nodes generate the traffic that travels over the links nodes while others merely provide a connection between links. Since a transport corridor is a subset of a network, these same concepts can be used. However, it is necessary to substitute gateways for nodes and routes for links to simplify the discussion.

Gateways and Other Interfaces

Gateways are nodes that serve as entry/exit points for the corridor. These are mostly located in major metropolitan areas where cargo is collected from or distributed to the surrounding region. Gateways may also be points of connection with international routes. Many corridors terminate at seaports and airports or at border crossings where cargo is transferred from domestic transport services to international services. Border crossings can function as gateways for corridors that end at a national boundary, but increasingly, corridors extend beyond borders and the border crossings act as an interface between the regulatory functions of the adjoining nations. Similarly, airports, seaports, and rail yards are often located along the corridor and act as interfaces between services of the same of different modes.

These gateways and interfaces typically perform functions in addition to transfer between services. Among these are storage and processing of cargo. The performance of these gateways is measured in terms of the time and cost to move cargo through the interface assuming that the shipper does not undertake any warehousing or processing of the cargo.

Links and Routes

The transport links connecting gateways and interfaces include both physical infrastructure and transport services. The physical infrastructure is important for road and rail transport since they determine the capacity of the transport units and the maximum throughput. It is less important for air and water transport where capacity and throughput are determined by the airports and seaports.² The frequency of transport services and the size of the transport units are more important than physical infrastructure in determining the performance of the links. The cost and time for transiting these links are determined by these service providers, which respond to demand in a competitive market. Regulation is important to the extent it has an impact on operating costs and the level of competition.

The shippers using a corridor have a choice of a number of routes, which are constructed from these links. The performance of individual links is less important than the performance of these routes. The service providers will determine the number of intermediate locations at which cargo is loaded and unloaded. Increasing the number of these locations provides access to more cargo origins and destinations, but also increases the time required to transit the corridor and reduce the reliability of

² The notable exception is locks on inland waterways which determine capacity. While there are throughput limits on channel for ocean transport and air corridors for air transport, these are not usually the constraining factor on throughput.

service. With sufficient demand, these service providers can offer multiple strings that provide access to different combinations of origins and destinations with less increase in transit time.

Information Flows

The most important information flows related to the functioning of a corridor are:

- scheduling, reservations, and tracking shipments;
- documentation and certification of cargo;
- financial transactions related to trade and transport;
- planning and coordination among transport service providers; and
- management of inventory both in storage and in transit.

Although these have separate sources and uses, it is important to provide an efficient means for exchanging this information between the cargo owners, service providers, and government officials participating in the movement of goods through the corridor. This may involve development of a single system of data transfer, as was the case in Singapore, Malaysia, and Tunisia, or may be a more distributed system taking advantage of the Internet.

Regulatory Processes

The regulatory processes that affect the performance of a corridor can be grouped into those affecting cargo and those affecting logistics services. The former are more extensive for international shipments and include customs, standards, security, and sometimes insurance and trade finance. The latter covers safety, anti-competitive behavior, and in some cases, pricing and service frequency.

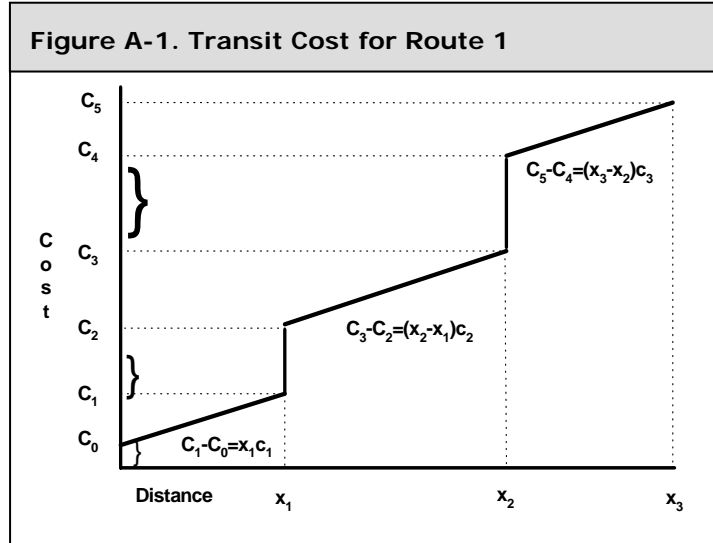
Evaluating Corridor Performance

Among the information, that it is important to exchange among users of the corridor are performance measures. These provide users with information that can be used in planning movements, predicting transit times and avoiding choke points. This information provides public agencies with a mechanism for performance evaluation. This can be used to identify areas where changes need to be introduced and to evaluate the impact of these changes. Finally, this information gives service providers insight on where improvements can be made to increase market share and increase the range of services provided.

In order to produce useful information, it is necessary to identify the appropriate measures of overall corridor performance as well as measures for performance of individual components (for example, transport links, intermodal interfaces, orders and gateways). These measures can then be evaluated using transaction-based supply chain analysis and marketing analysis.

APPENDIX 2: MEASUREMENTS OF CORRIDOR PERFORMANCE

An analysis similar to that shown in Figures 3-1 to 3-4, Chapter 3, can be performed for the cost of using the corridor. The costs include the out-of-pocket costs plus any loss or damage to cargo while en route. For this analysis, the sloping lines in Figure 3-1 represent the costs incurred while transiting a link with the slope proportional to the average variable cost, “ c_j .” The vertical lines represent the costs incurred at the node for non-discretionary activities and any fixed costs associated with using the subsequent link. As with the time analysis, the costs can be presented explicitly, as shown in Figure A-1.



Improvements in the performance of the transport services can produce a reduction in fixed, variable costs, or both. These can be achieved through introducing larger transport units (for example, longer trucks and trains, bigger vessels and aircraft, or through complementary improvements in physical infrastructure). It can also be achieved through policy changes that reduce restrictions on the size of transportation units or barriers to entry for competing suppliers of transport services. Reductions in the cost of the services at the nodes can be achieved through greater competition between logistic service providers, as well as improvements in the technology and infrastructure at the nodes. They can also be achieved through a change in the procedures performed at the nodes and the regulations that govern these procedures. As with the measurement of time, a reduction in costs for transiting a link is represented by reducing the slope and a reduction in the costs incurred at a node is represented by shortening the vertical line. A comparison of the costs on two or more transport services can be presented by multiple lines in format similar to that shown in Figure 3-2, Chapter 3.

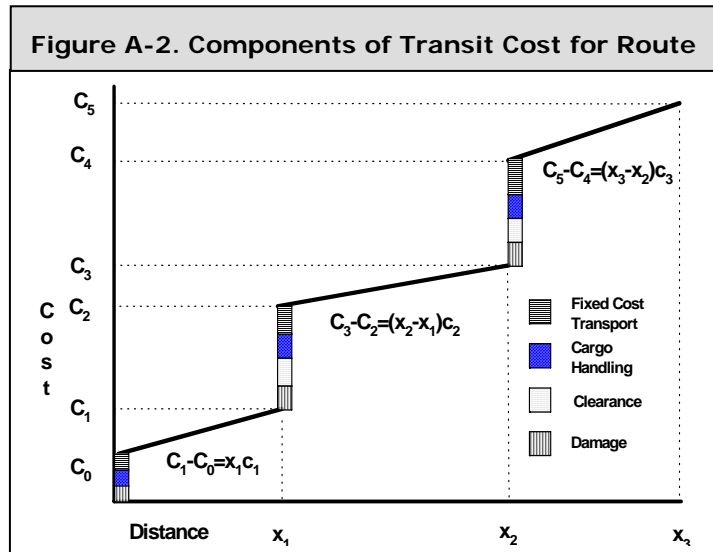
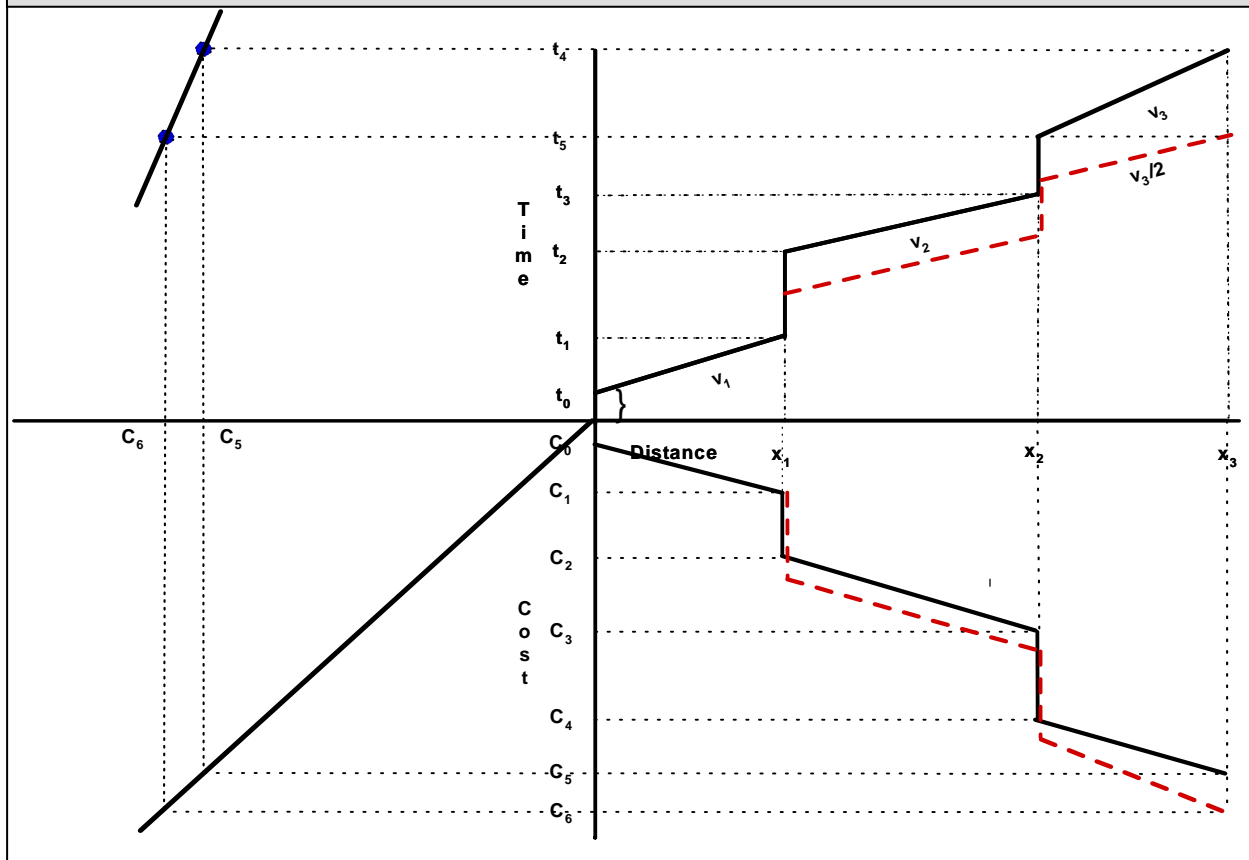


Figure A-3. Relationship Between Changes in Time and Cost



The impact of improvements in both time and cost can then be modeled by combining the time and cost relationships using the graph shown in Figure A-3.²³ In this example, it is assumed that the improvements at node x_1 increased the costs by twenty-five percent and that the increase in average speed in the last link increased the transport cost for that link by fifty percent. The effect of these improvements is to shift the time and cost from c_5, t_4 to c_6, t_5 . This improvement is attractive for shipments where the value of time is greater than $(c_6 - c_5)/(t_4 - t_5)$.

The benefit from reducing the variation in transit time can be measured by estimating the slack time required to achieve a certain probability of arriving on or before the scheduled time. For the example given in Figure A-4, a reliability of ninety-five percent for delivery at or before an agreed time would require that slack time equal to 1.65 times the standard deviation of the transit time, σ_1 , be added to the time allotted for delivery. If the variation in transit time is reduced so that the standard deviation decreases from σ_1 to σ_2 then the slack time will be reduced by a factor of $1 - \sigma_2/\sigma_1$. The value per unit of reduction in slack time will be similar to that for savings in transit time since they have the same effect. However, the reduction in variation has the additional benefit of reducing the waiting time for subsequent services and thus additional savings in slack time.

²³ This is a classic engineering graph for representing three variables in two dimensions by using the lower left quadrant to transform the relation of one variable, cost, between the other two variables, distance and time.

The alternative to shippers adding slack time to their schedule is for the transport service to add slack time in order to operate to a fixed schedule. This increases the cost for transport services because the transport equipment is used less efficiently. However, this increase is offset by the savings from allowing better coordination in the supply chain and less time at the nodes waiting for the connecting transport service.

An initiative to improve the performance of some of the services in a corridor will change the cost, time, and/or reliability for all of the trades that use these services. The resulting change in total cost for a unit of trade k would be:

$$\Delta C_k = \Delta c_k + \alpha_k(\Delta t_k + \beta \Delta \sigma_{t,k})$$

If an improvement in the corridor:

- increases the cost by twenty-five percent from \$200 to \$250, but
- reduces the time in the last link by 50 percent from 10 days to 5 days, and,
- in so doing, reduces the standard deviation in total transit time by 3 days,

then the net savings can be estimated for a typical shipper based on their value of time and demand for on-time delivery. Assuming the shipper has a target of 97.5 percent on-time delivery and values each additional day in transit at \$10, then the improvement provides a savings per shipment of $50 + 10(5 + 1.96 \cdot 3)$ or \$58.8 per shipment.

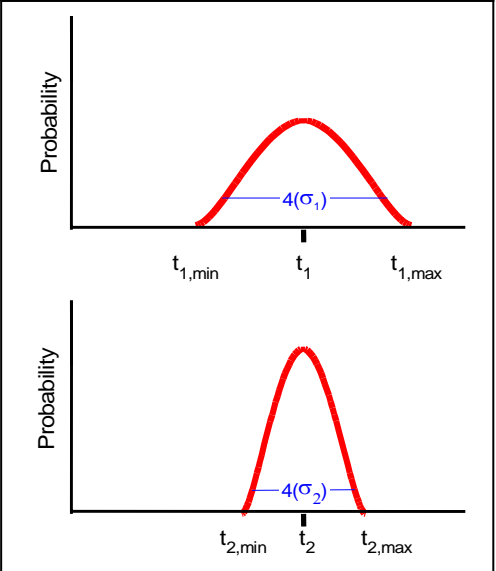
If this change is significant as a percentage of total cost for the door-to-door movement, then it may also affect the volume of traffic. The change in cost for trade "k" would be computed by multiplying these changes in cost per unit of trade by the expected volume of cargo as follows:

$$V_k \Delta C_k \left[1 + \varepsilon_k \left(\frac{\rho \beta \Delta C_k}{2 C_k^T} \right) \right]$$

The parameter ε_k is the elasticity of demand with respect to total delivered cost of good k , C_k^T and ρ is the proportion of the reduction in cost that is passed on to buyers. These relationships highlight the importance of the volume of the trade, V_k , the sensitivity to transit time, α_k , and the combination of the elasticity of demand ε_k , and the percentage savings of origin-destination cost that is passed on to the buyers.

The elasticity generally has a limited impact, although most international trades involve competition for market share and the sensitivity to a change in cost can be relatively high, the costs incurred in the corridor are only a small portion of the total delivered cost of the product. For example, transport costs will typically account for about ten percent of delivered cost. If the corridor accounts for about one-half of this amount and an improvement is introduced which reduces the cost for services in the corridor by one-quarter, of which one-half is passed on to the buyer, then the impact for the buyer is only 0.6 percent.

Figure A-4. Reduction in Variation in Transit Time



APPENDIX 3: INTERNATIONAL CONVENTIONS AND DOCUMENTS

UNECE ROAD CONVENTION AGREEMENTS

Principal Agreements

With a mandate from the UN for the development of all international conventions in the field of land transport facilitation, the ECE has developed the following Road Conventions:

- The Customs Convention on the Temporary Importation of Commercial Road Vehicles 1956 (currently being updated);
- The Convention on the Contract for the International Carriage of Goods by Road 1956 (CMR Convention - legal relationships between road carriers and consignees and consignors);
- The Convention on Road Traffic 1968;
- The Vienna Convention on Road Signs and Signals 1968;
- Customs Convention on the International Transport of Goods under Cover of TIR carnets (TIR Convention) 1975;
- The Customs Convention on Containers 1972 (temporary importation of road goods vehicles and loading units); and
- The International Convention on the Harmonization of Frontier Control of Goods 1982 – (minimizes border control measures, harmonize inspection requirements, and provide joint inspection facilities).

General Agreements

European agreements on definition of the corridors include:

- Main International Traffic Arteries (AGR), 1975 (legal framework for construction and development of a coherent international road network);
- Main International Railway Lines (AGC), 1985;
- Important International Combined Transport Lines and Related Installations (AGTC), of 1991 (development of combined transport infrastructure and services, particularly combined road/rail, and improvement of efficiency); and
- Main Inland Waterways of International Importance (AGN), of 1996.

Road Transport

For Road Transport the harmonization of physical and fiscal standards was provided for in the:

- Agreements concerning:
 - Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment, and Parts which can be fitted, and/or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, 1958.
 - Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections, 1997.

- Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment, and Parts, which can be fitted and/or be used on Wheeled Vehicles, 1998.
- Conventions on the Taxation of Road Vehicles:
 - For Private Use in International Traffic, 1956.
 - Engaged in International Passenger Transport, 1956.
 - Engaged in International Goods Transport, 1956.
- Conventions on the Contract for the International Carriage of:
 - Goods by Road (CMR), of 19 May 1956, Protocol 1978.
 - Passengers and Luggage by Road (CVR), 1973, Protocol 1978.
- General Agreement on Economic Regulations for International Road Transport, 1954.

Traffic and Road Signs and Signals

The legal framework and set of uniform traffic regulations governing traffic on the cross-border routes includes the following:

- Convention on Road Traffic, 1949 and 1968.
- Convention concerning the Dimensions and Weights of Vehicles Permitted to Travel on Certain Roads of the Contracting Parties, 1950.
- European Agreement on Road Markings, 1957.
- Convention on Road Signs and Signals, 1968, Supplement 1971, Additional Protocol 1973.
- Agreement on Minimum Requirements for the Issue and Validity of Driving Permits (APC) of 1 April 1975.

Inland Water Transport

The conventions introduced to harmonize the physical and fiscal standards for inland water transport were:

- Unification of Certain Rules concerning Collisions in Inland Navigation, 1960.
- The Registration of Inland Navigation Vessels, 1965.
- The Measurement of Inland Navigation Vessels, 1966.
- The Limitation of the Liability of Owners of Inland Navigation Vessels (CLN), 1973, Protocol 1978.
- The Contract for the International Carriage of Passengers and Luggage by Inland Waterway (CVN), 1976, Protocol 1978.

Border Crossing Facilitation

The basic convention covering cross-border movements was the International Convention on the Harmonization of Frontier Controls of Goods, 1982, which reduced the requirements for completing formalities and the number and duration of all types of controls (for example, for health, technical standards, and quality standards). This applied to all goods being imported, exported or in transit in the European Community. The International Convention to Facilitate the Crossing of Frontiers was introduced with separate agreement to cover rail movements, specifically for:

- Passengers and Baggage carried by Rail, 1952.
- Goods Carried by Rail, 1952.

In addition there is a series of Customs Convention on the Temporary Importation for:

- Private Road Vehicles, 1954.
- Private Use of Aircraft and Pleasure Boats, 1956.
- Commercial Road Vehicles, of 18 May 1956.

A similar agreement was the Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention), 1959 and 1975, which permitted "the international carriage of goods by road from one Customs office of departure to a Customs office of destination, through as many countries as necessary, without any intermediate frontier check of the goods carried, but required secure sealing and standards for the design of the load compartment or the container. It also required an international guaranteeing chain, the TIR carnet, to cover duties and taxes at risk throughout the journey.

Other Conventions were established for imports related to transport services, including:

- Customs Convention concerning Spare Parts Used for Repairing European Wagons, 1958.
- Customs Convention on Containers, 1956 and 1972.
- European Convention on Customs Treatment of Pallets Used in International Transport, 1960.
- Convention on Customs Treatment of Pool Containers Used in International Transport, 1994.

Transport of Dangerous Goods

Agreements covering the transport of dangerous goods include the European Agreement concerning the International Carriage of Dangerous Goods, specifically:

- By Road (ADR), 1957, Protocol 1993.
- By Inland Waterway (ADN), 2000.

and the Convention on Civil Liability for Damage caused during Carriage of Dangerous Goods by Road, Rail, and Inland Navigation Vessels (CRTD), 1989.

Transport of Perishable Foodstuffs

For perishable foodstuffs there was a specific Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be used for such Carriage (ATP), 1970.

Important Conventions for Transit Movements

As mentioned earlier, there are a set of international conventions that are used to facilitate the movement of cargo in-transit to third countries and movements of goods between adjoining countries. The three most important provide for the duties and tax regime that apply to these movements, including the Customs Convention on International Transport of Goods Under Cover of TIR Carnets (1975), Temporary Importation of Commercial Road Vehicles (1956), and Containers (1972 Geneva). The major points of these are as follows:

The UN Geneva Customs Convention on the International Transport of Goods under Cover of TIR Carnets, 1975²⁴

Intent: The intent of this Convention is to facilitate the international carriage of goods by road vehicles, through establishing simplified Customs procedures and tax and duty exemptions for international transport of goods in transit.

Policy: The Convention applies to all forms of vehicular and container transport provided that some portion of the journey is by road (art. 2). Under the TIR procedures, goods are allowed to pass through as many countries as necessary between the "Customs Office of Departure" and the "Customs Office of Arrival" without payment or deposit of taxes or duties or examination of the goods en route, except in case of suspected or actual irregularities (arts. 4, 5, 22 & 23). Risks of leakage are addressed through specifying Customs seals requirements, technical standards for vehicles and container compartment design to inhibit smuggling, and setting up an international system for guaranteeing duty and tax payment should the goods fail to exit at the appropriate point (arts. 3, 8 & 19). National authorities may also prescribe time limits and approved routes for travel in their territory (art. 22).

Implementation: Participating states authorize associations to issue TIR carnets, either directly or through corresponding associations, and to act as guarantors (art 6). The guaranteeing association fixes the period of validity of the TIR carnet and is liable for goods enumerated in the TIR carnet and any other goods contained in the sealed container or the sealed section of the vehicle in the event the TIR carnet is not duly discharged by Customs. The Convention directs Customs authorities to seek payment from the persons directly liable before making a claim against the guaranteeing association (arts. 8-11). For identification purposes, a vehicle operating under TIR procedures must bear special TIR plates and the TIR carnet must be produced at each Customs office en route (arts. 16 & 21). In the case of bulky or heavy goods, the Convention provides for special procedures as regards affixing of customs seals and related matters (arts. 29-35). Irregularities in violation of the Convention subject the offender to penalties prescribed in the country where the offence was committed. (art. 36). States may exclude from the TIR procedures any person guilty of a serious Customs offence, subject to notice to the Customs authorities on whose territory the offender is established or resident, and to the applicable guaranteeing association or associations (art. 38).

UN Geneva Customs Convention on Temporary Importation of Commercial Road Vehicles, 1956

Intent: The intent of this Convention is to facilitate the international movement of road vehicles used for commercial carriage, through providing for the use in such cases of simplified Customs procedures and exemption from tax, duty, and import restrictions.

Policy: The Convention provides for temporary admission of road vehicles engaged in international traffic for commercial use, without payment of tax and duty, and free of import restrictions and prohibitions (art. 2). To qualify, the vehicle must be registered in a country that has also accepted the Convention and must be operating from that territory (art. 2). Admission of vehicles is subject to temporary importation papers/carnets describing the vehicle and guaranteeing payment of taxes, duties, and Customs penalties should the need arise. It is also subject to re-exportation of the vehicle

²⁴ This convention was originally adopted in 1956, but was revised in 1975 to apply to Railway transport in the context of multimodal transport.

in the same general condition except for wear and tear, within the period of validity of the importation documents (arts. 2 & 13). Similar exemptions from tax and duty and import restrictions apply to the personal effects of drivers and crew, spare parts for repair of the vehicle, and fuel in ordinary supply tanks (arts. 3-5).

Implementation: Participating States authorize associations to issue temporary importation papers for commercial road vehicles, either directly or through corresponding associations (art 7). The papers may be issued for admission to one country or several countries with a maximum period of validity of one year from date of issue (art. 7). The papers must state net weight and value of the vehicle and describe any spare parts and accessories not considered normal equipment of the vehicle (art. 10). Countries can deny the exemption from taxes and duties to vehicles that pick-up and drop-off goods or passengers within the country of importation (art. 13). The general requirement of re-exportation is waived in the case of vehicles that become badly damaged in the country of importation and is abandoned to the government of that country or are destroyed under official supervision, or in the event that applicable taxes and duties are paid (art. 14).

UN Geneva Customs Convention on Containers, 1972

Intent: The intent of this Convention is to facilitate the use of cargo containers in international trade by providing for simplified temporary admission of such containers.

Policy: The Convention provides for temporary admission of containers, whether loaded or empty, on a tax-free and duty-free basis, subject to re-exportation of the containers within a period of three months (art. 3). Such temporary admission is to be granted without the production of Customs documents or the furnishing of a security guarantee (art. 6). Similar treatment is given to spare parts for repair of temporarily admitted containers and accessories or equipment of such containers (arts. 10-11).

Implementation: Temporarily imported containers may be used for internal traffic one time, on a reasonably direct route, before their re-exportation (art. 9). Customs may extend the three month requirement for re-exportation (art. 3). The re-exportation requirement is waived in the case of seriously damaged containers that are abandoned to the authorities, destroyed under official supervision, or on which tax and duty are paid (art. 5).

EU Road Transit Documents - Entry/Exit Documents

The following are a list of the documents used for the movement of goods across borders including the certification of the driver and vehicle.

Documents for Vehicle / Drivers:

- Domestic Vehicle Requirements, and
- ECMT.

Documents for Exportation of Goods (under TIR carnet):

- ECMT;
- Multimodal Dangerous Goods Form;
- Required Documentation; and
- TIR Carnet.

Documents for Temporarily Exported Goods (under ATA carnet):

- ATA Carnet;
- ATA Carnet Procedure;
- Countries That Accept ATA Carnet; and
- ECMT.

Other documents (without TIR or ATA carnet):

- Cargo Manifest;
- ECMT;
- Forwarder's Certificate of Transport (FIATA-FCT);
- Forwarder's Warehouse Receipt (FIATA-FWR);
- Forwarding Instructions (FIATA-FFI);
- Multimodal Dangerous Goods Form;
- Negotiable FIATA Multimodal Transport Bill of Lading;
- Non-negotiable FIATA Multimodal Transport Way Bill, and
- Required Transport Documentation for Legal Persons.

APPENDIX 4: CARGO DOCUMENTATION

Bills of Lading

The Bill of Lading (B/L) originated in the 14th century as a receipt for delivery of cargo to the ship, but at this time the exporter traveled with the goods. With improvement in communications, the goods were sent without the owner and the bills of lading transmitted to the recipient of the cargo. The B/L became the primary transportation document since the captain of the ship could not deliver the cargo without the recipient presenting the original bill of lading. The B/L further evolved into a document establishing the liability of the different parties involved in the transportation of the goods. As such, the B/L has a value that can be negotiated. The holder of the original B/L has the right to direct and change the destination depending on the shipping agreement and what is stated in the B/L. Currently the document serves three purposes:

- a receipt providing evidence that the goods have been shipped as agreed and are in the possession of the carrier for delivery to the consignee at destination;
- a statement or evidence of the terms of contract with the carrier; and
- a transferable document of title that can be pledged to a bank as collateral for international payments.

The B/L also functions as a source of information in which the cargo is declared for international circulation. It provides the government with information on what goods are transported to ensure compliance with import/export regulations, the duties, and taxes to be charged. As such, it is normally submitted together with the Customs declaration.

The B/L provides the following information:

- place and date where issued;
- issuer's signature – who is responsible (captain of ships agent), but can be a stamp, fax, or electronic;
- name of vessel – assures that carrier is contracted and assigns liability while in transit;
- declaration of quantity and quality – captain confirms that cargo is in good shape;
- explanation that goods are on board;
- to whom the goods are to be delivered at the port of destination; and
- indication if freight has been paid.

The entry for "to whom" can be "to order," a specified named party or "order or a specific person." If the entry is "not to order," then the B/L is not negotiable. A straight consigned B/L is made out to a named consignee and is not transferable, but not all jurisdictions agree that it is a document of title.

When the B/L is transferred to a third party, the underlying contract of carriage remains valid regulating the rights and liability between the initiating parties. The term negotiable refers to a set of circumstances under the law by which the transferee of the property acquires rights that are better or greater than the rights of the transferor. That is, the transferee will be entitled to the terms stated in the contract even if the transferor had agreed to accept a lesser condition. It would also be free of any encumbrances negotiated previously. Whereas two parties can essentially agree to whatever terms

they want within the limits of the law, negotiability involves a third party that is not bound by the agreement.

Under US law, a B/L made out to a named person and marked non-negotiable is a document of title and required to take receipt of cargo. If the B/L is made out to a specific person, but another person attempts to claim the goods, then the consignee must establish an unbroken chain of names verifying the transactions of the document. A negotiable B/L can be pledged as security for Letter of Credit (L/C) financing, but this is less important for shipments where there is a long-term relationship between buyer and seller and payments are not made through an L/C.

For containers there are now two types of B/L to take account of the fact that the shipping lines assume possession of the box when it arrives at the terminal. These two are the received B/L for containers issued when they are received at terminal, but not yet shipped and the shipped B/L issued after the container has been loaded on the vessel.

The difficulties and costs associated with negotiable B/Ls in international trade have encouraged the use of non-negotiable transport documents where there is no intention to transfer ownership while in transit. For example, the seaway bill performs the first two functions of a B/L, but not the third. It also does not conform to the Hague-Visby Rules,²⁵ since these refer to bills of lading or similar documents of title. Nevertheless some countries have extended these rules to non-negotiable seaway bills. Another problem with seaway bills is that some customs will not accept it as an appropriate document for clearance of cargo. Another example is multimodal and combined transport documents. These may be represented as negotiable documents of title, but their legal status is unclear and varies with jurisdiction.²⁶ Other transport documents that do not act as documents of title include consignment notes for carriage by road, air, rail, freight forwarders receipts, and ship delivery orders.

Electronic B/Ls

The lengthy process for transmission of the B/L is one of the primary reasons for delay of shipment. Shipping lines have developed some mechanisms for overcoming this, including issuing the cargo in exchange for a letter of indemnity (back letter), even though this is in breach of the contract in B/L. Various attempts have been made to introduce electronic B/Ls as a way of reducing the time and cost for transmitting these documents. The problem is that it lacks the authority granted to a written document. In particular, the use of an electronic B/L by someone other than the "named party" on the document would create a significant, but not an insurmountable, problem. Since the document is treated in the law as a physical thing that must be physically transferred between shipper and consignee, there is also a problem of transferability. This transferability is recognized in a large number of countries and legal jurisdictions. The B/L acts as a contract between two parties for the transfer of title to the cargo. It also operates under an objective system to protect the seller's creditor based on a physical transfer.

²⁵ The Hague-Visby Rules are the Hague rules from the 1924 Brussels "International Convention for Unification of Certain Rules Relating to B/L" as amended by the Brussels Convention in 1968 undertaken by Comité Maritime International at Visby in France. They revised the shipper's minimum compensation for loss and destruction while increasing the carrier's protection against tort litigation.

²⁶ Efforts by the UN to establish a Convention on International Multimodal Transport of Goods (1980) has not been ratified and the UNCTAD/ICC Rules for Multimodal Transport Documents (1992) have not been widely adopted although they have served as the basis for most regional documents.

Under the CMI Rules for Electronic Bill of Lading, the shipper and consignee agree not to argue that the contract or any other document involved in transportation are not in writing; however, a third party does not have to accept this agreement. For an electronic B/L to be effective there must be complementary laws affecting banks dealing with an electronic B/L. The legal core of the CMI Rules is the concept of the holder who can claim delivery of goods, nominate the consignee, transfer right of control to any other party, and instruct the carrier in accordance with the terms and conditions of the contract of carrier. The transfer of title would be done through a Private Key. For non-negotiable B/Ls, most of the problems of an electronic document go away since this is an agreement between two parties. In this regard, ACL developed the Data Freight Receipt in 1971, which is in effect a non-negotiable seaway bill. However, there would still be problems with the document serving as collateral in documentary credit transactions.

The UN Commission on International Trade Law (UNCITRAL) established a Model Law on Electronic Commerce to recognize and validate contracts made by electronic means. However, EDI has not been visible in commercial law because of the costs and complicated technical system which users have to invest in. This situation should change with increased use of the Internet.

The US Customs Modernization Act allows parties subject to its provisions to keep information in electronic form, but there is still need for international agreements and legislation supporting authentication of documents, evidential requirements for computer generated data, and control for access to computer systems and records.

APPENDIX 5: EC-ROAD TRANSPORT-RELATED LEGISLATION

The effectiveness of the Trans-European Network has been due largely to the simplification of cross border movements. In 1989, Council Regulation (EEC) No 4060/89 abolished border crossing checks and formalities at the road and inland waterway crossings between Member States. This regulation covered both bilateral and transit traffic. The regulation addressed ten issues as follows:

- functioning of the market access;
- fiscal harmonization;
- social harmonization;
- technical harmonization;
- road statistics;
- road infrastructure;
- combined transport, telematics, and satellite communication;
- research and development;
- public procurement; and
- relations with third countries in central and eastern Europe.

The first issue included:

- recognition of qualifications in respect of the professional activities;
- competition rules related to freight and passenger transport; and
- general liability and insurance.

The second issue covered vehicle taxes, excise on fuel, tolls accounting for infrastructure costs, the use of TIR for transit, customs and border inspections, and veterinary controls.

Technical harmonization covered limits on the dimensions and other physical characteristics of the transport units including emission and noise. The regulation recognized the right of Member States to conduct inspections of vehicles and inland waterway vessels relating to technical characteristics, authorizations, and other documentation, but that these should be moved away from the border and applied in a non-discriminatory fashion throughout the territory of a Member State. The border was defined as either an internal frontier within the Community or an external frontier, where carriage between Member States involved crossing a third country.

Each Member State was to recognize the roadworthiness test issued in another Member State. While it allowed for random checks of vehicles as regards weight standards, checks for dimensions were only to be conducted where there was a suspicion of non-compliance. For documentation, the Directive required a single plate established and attached in accordance with Directive 76/114/EEC and a single registration document issued by the competent authorities of the Member State. It also indicated the information that must be provided on these documents.

For inland waterway vessels, there was a reciprocal recognition of navigability licenses, but the regulation allowed for checks at any time check that a vessel was carrying a valid certificate.

The maximum authorized dimensions for national and international traffic and the maximum authorized weights in international traffic were set out in Council Directive 96/53/EC. The standards were meant to balance rational and economic use of commercial road vehicles and protection of infrastructure, road safety, and environment. This directive allowed Member States to apply additional technical requirements to commercial vehicles registered or put into circulation in a Member State, but only if they did not impede the movement of commercial vehicles between Member States. It also allowed Member States to apply dimensions for vehicles or vehicle combinations used for national transport operations that were different from Community standards, provided they did not significantly affect international competition. The Directive required Member State to adapt their road infrastructure to meet these conditions and be able to accept trucks meeting these standards by the beginning of 2004.

BIBLIOGRAPHY

- ADB (Asian Development Bank). (2000). *Economic Cooperation in the Greater Mekong Sub region: An Overview*.
- . (2000). *Greater Mekong Subregional (GMS) Program for Subregional Cooperation*.
<http://www.adb.org>
- ASYCUDA (Automated System for Customs Data). *World: Information Sheet- General Concept*.
[http://Ints017:8080/Transport.nsf/3b8b3d27260832ec852569fa0059675f/66222517f0e6e0c685256caa00562e79/\\$FILE/General%20Concept%20%20AW-IS-GC-v2.pdf](http://Ints017:8080/Transport.nsf/3b8b3d27260832ec852569fa0059675f/66222517f0e6e0c685256caa00562e79/$FILE/General%20Concept%20%20AW-IS-GC-v2.pdf)
- Canamex Trade Corridor. <http://CANAMEX.org>
- Canadian/American Border Trade Alliance. <http://www.canambta.org>
- Cudmore, E., J. Whalley. (2003). *Border Delays and Trade Liberalization*.
- Development of the CANAMEX Trade Corridor: A Background Paper. <http://www.americas-society.org>
- Gegeshidze, A. (March-May 2000). *The New Silk Road: A Georgian Perspective*. Journal of International Affairs, Volume V - Number 1.
- Howe, B. (2001). The Forgotten Highway: Why you still can't drive from the top of the Americas to the bottom. *Atlantic Monthly*.
- Kylaheiko, K., D. Cistic, P. Komadina. (2002). *Application of Transaction Costs to Choice of Transport Corridors*.
- IRU. (2001). *Handbook on the European Harmonisation of Road Transport Legislation and Practice*, 3rd edition. TRANSLex.
- Munyaradzi, R. (2003). *Technical Report: Consultative Survey Regarding Current Customs Transit Procedures in the Dar es Salaam Corridor*. USAID.
- North American Trade Corridors: A Survey of Current Endeavors. <http://www.ops.fhwa.dot.gov>
- OECD (Organization of Economic Development and Cooperation). (2003). *Trade Facilitation: The Benefits of Simpler, more Transparent Border Procedures*.
- Olivier, G. (2003). *Trade and Transport Facilitation: From Diagnostic to Implementation: Our CIS7+2 and Southeast Europe Experience*. World Bank, Washington, DC.
- Trelawny, C. (24-26 Sept 2003). *Expert Meeting on the Development of Multimodal Transport and Logistics Services*.
- TRACECA, (Transport Corridor Europe, Caucasus and Asia) Website. <http://www.traceca-org.org>

UEMOA. (June 12-19, 2002). *Note de Presentation du Programme de Simplification et D'Harmonisation des Procédures Administratives Et De Transit Portuaire Au Sein De L'Uemoa.*

UN (United Nations). (2003). *Transit Transport Issues in Landlocked and Transit Developing Countries.*

———. (2003). *Report of the Expert Meeting on the Development of Multimodal Transport and Logistics Services.*

———. (2002). *Report of the Expert Meeting on Efficient Transport and Trade Facilitation to Improve Participation by Developing Countries in International Trade: Problems and Potential for the Application of Current Trade Facilitation Measures by Developing Countries.*

———. (2001). *Compendium of Trade Facilitation Recommendations.* Secretariat of the United Nations Centre for Trade Facilitation and Electronic Business.

———. (2001). *Notes on TIR Insurance and UNCTAD Programs. Facilitation Measures Related To International Trade Procedures.*

UNECE (United Nations Economic Commission for Europe). (2004). *Transport Trends and Economics: Euro-Asian Transport Links.* Inland Transport Committee.

———. (2003). *Achieving Trade Security within a Standardized, Efficient and Transparent International Framework.*

———. (2002). *Facilitation measures related to International Trade Procedures.*

———. (2002). *Eliminating Obstacles to Efficient Trade Finance in Transition Economies: Practical Aspects.* Proceedings of the Seminar.

UNCTAD. (United Nations Conference on Trade and Development). (2003). *The Use of Transport Documents in International Trade.* UNCTAD Secretariat.

———. (2001). *Transit Systems of Landlocked and Transit Developing Countries: Recent Developments and Proposals for Future Action.*

———. (2001). *Implementation of Multimodal Transport Rules: Comparative Table.* UNCTAD Secretariat.

———. (2003). *The Feasibility of an International Legal Instrument.* UNCTAD Secretariat.

———. (2000). *Guidelines to Recommendation No. 4, National Trade Facilitation Bodies*

University of Cape Town. (2001). *Institutional Aspects of the Maputo Development Corridor.* Policy Brief No 01/P16.

———. (2000). *How will the Maputo Development Corridor impact freight flows?*

World Bank. (2005). eds. De Wulf, and Sokol. *Policy and Operational Lessons Learned from Eight Country Case Studies.* Chapter 6, Customs Modernization Handbook. Washington, DC.

- . (2003). *Trade and Transport Facilitation in the South Caucasus*. Georgia Policy Note. Washington, DC.
- . (2003). *Iraq: Investment Climate and Trade Facilitation Engagement Strategy*. Washington, DC.
- . (2001). *Integration of Transport and Trade Facilitation. Selected Regional Case Studies*. Washington, DC.
- . (2001). *GFP TTFSE Indicators*. Washington, DC
- . (1989). *Staff Appraisal Report: Bolivia: Export Corridors Project*. Infrastructure and Energy Operations Division, Washington, DC.
- WCO (World Customs Organization). (2002). *Recommendation of the Customs Co-operation Council Concerning the Unique Consignment Reference Number (UCR) For Customs Purposes*.
- . (2002). *Guide: To Measure the Time Required For the Release of Goods*.
- . (2002). *Guidelines on Application of Information and Communication Technology (Kyoto Convention)*.
- WTO (World Trade Organization). (2002). *Business Benefits of Trade Facilitation*. Working Party of the Trade Committee.
- Zinn, W. (April 1999). *Mercosur: A Preliminary Assessment of the Transportation Infrastructure Supporting Supply Chain Efficiency*.