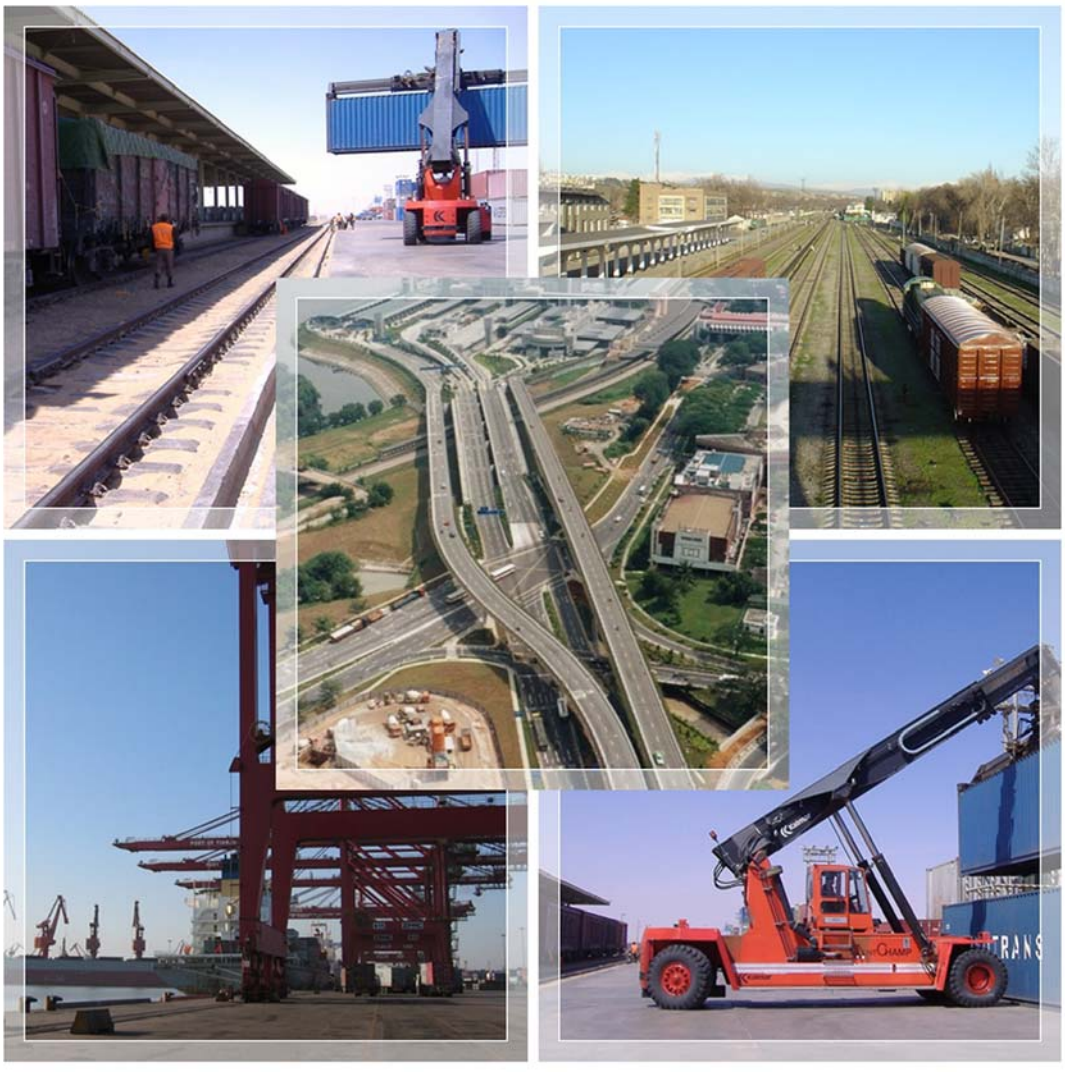
Logistics Sector Developments: Planning Models for Enterprises and Logistics Clusters



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ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

Logistics Sector Developments: Planning Models for Enterprises and Logistics Clusters

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1 Introduction

1.1 Background of the study

The Ministerial Conference on Infrastructure held in Busan, Republic of Korea, in November 2006 adopted the vision of an international integrated intermodal transport and logistics system for Asia and the Pacific which encourages inter alia the development of logistics activities around inland locations. The 2003 Almaty Programme of Action accords high priority to the establishment of dry ports in landlocked and transit developing countries. This study is part of the ongoing work of the secretariat in the logistics sector and examines policy options relating to the establishment and further development of inland logistics centres and dry ports.

The objectives of this study are to provide:

- An analysis of the most recent trends in logistics systems and supply chain management;
- Identification of the major factors governing the decision of enterprises to locate around ports and port related logistics zones;
- Detailed comment on replicating the concept of the seaports and logistics zones at inland locations including the necessary legal, administrative and institutional arrangements;
- Practical examples and analysis of success stories of inland clusters having formed around transport nodes; and
- An approach to applying the concept of traditional seaport based logistics clusters to inland locations in the ESCAP region, together with a step-by-step action plan.

Different types of inland logistics centres have existed for many years, although they have been mainly concerned with domestic (i.e., not international) logistics. This study covers inland logistics centres with an international role. It should however be borne in mind that any particular logistics centre can play both an international, and, a domestic role. Indeed, practically all international movements of goods ultimately require a domestic or inland component of collection at the point of origin, or delivery at the final destination. Given the focus on the international role in this study, a specific objective is to examine the extent to which the concept of a seaport can be applied inland. Accordingly, the focus of this work is on inland ports and logistics centres.

Another key concept developed in this study is that of the cluster as applied to industry, and in particular to the logistics and port industry. There is no single ideal definition of an industrial cluster, and the various dimensions applicable to clusters are explored in depth. A step-by-step action plan is developed based on (a) current practice in seaports, (b) practice associated with existing inland logistics centres or ports, and (c) practice associated with industrial clusters, with specific regard to port and other logistics-related clusters. The extensive literature review conducted during this study reveals that some of the topic areas (e.g., seaports or intermodal developments) are much better documented than others (e.g., inland logistics centres). The study provides the ESCAP secretariat with a solid base to engage in further research and analysis in this area, in order to present countries with policy options in developing inland logistics centres and dry ports. It also provides Governments and industry with an initial step-by-step process to evaluate the potential of future inland logistics centres and dry ports.

1.2 Report structure and contents

Chapter 2: Trends in supply chain management and logistics systems

This chapter discusses recent trends in approaches to supply chain management and logistics systems with particular reference to logistics centres. It explores the various definitions of the supply

chain and supply chain management. It focuses on the integrating orientation of the supply chain management philosophy and the benefits gained through reduced inventory levels, faster cash flow and product cycle times, and lower cost of materials acquisition and of logistics. Logistics plays a leading role in integrating and managing the supply chain, and trends in logistics development are examined, including the changing relationships between logistics service providers and their customers. Particular focus is on concepts associated with logistics centres and the various functions undertaken in them, including newer forms of value added logistics. It introduces these concepts as a foundation for the rest of the study.

Chapter 3: Factors governing the decision of enterprises to locate at ports or port-related logistics zones

This chapter identifies the major factors governing the decision of enterprises to locate at ports or port-related logistics zones, to present examples of best practice in making such decisions, and to develop an outline approach to identify good practice suitable for application to inland ports or logistics centres. It examines the nature of port organization and structure, the responsibility for financing port development, services offered by ports, and who is responsible for assets and associated services in ports. The outcome of this chapter is a four-stage process in the nature of a checklist for enterprises considering locating at an inland port. It covers organization and structure; services offered; responsibility for assets and associated services; and responsibility for financing terminal development.

Chapter 4: Replicating the port concept at inland locations

This chapter considers inland logistics centres with an international role. It examines the various terms used such as “inland port” and “dry port” and discusses the difference (if any) in the meaning of each term. It proposes that the most suitable term is “inland logistics port” to describe an entity with an existing or potential high capacity direct link to an international port, the range of facilities offered at international ports, and a range of logistics services. The chapter describes the features that contribute to the operation of an effective inland logistics port and the role of Government in enacting enabling legislation with examples from the United States and the European Union. It looks at funding arrangements suitable for inland logistics ports, functions that can be associated with them and suitable institutional frameworks. The outcome of this chapter is a six-stage process in applying the concept of inland logistics ports which identifies local advantages; interested parties; potential functions; establishes operational quality and performance indicators; identifies potential operational problems; and establishes a framework of assessment.

Chapter 5: The concept of clusters

This chapter investigates the basis of clustering when applied to industry, and in particular to logistics and ports. The cluster concept is being used in many contexts, and there are various definitions of clusters, and a wide range of clusters. A number of theories associated with clusters are reviewed, as are the types of clusters within the generic types: industry-focused, and technology-based clusters. The ways in which clusters emerge and develop are considered, as well as the role of Government in cluster development. Specific clusters in logistics and ports are considered in detail. The outcome of this chapter is a seven-stage process which defines the cluster boundary; identifies existing and potential resources; identifies potential cluster members; determines the supportive role of Government; identifies the scope for shared resources; identifies the scope for innovation; and identifies barriers to clusters. The outcomes of Chapter 3 to Chapter 5 form the three main components of a step-by-step model that is the basis of an action plan assessing inland logistics clusters in the ESCAP region. The outcomes are converted into three diagrams that are presented at the beginning of each Chapter 6 “*Applying the model (Part 1) – Factors governing decisions of enterprises to locate”*, Chapter 7 *“Applying the model (Part 2) – Replicating port concepts at inland locations”* and Chapter 8 *“Applying the model (Part 3) –The concept of clusters”*.

Chapters 6, 7 and 8

The three chapters assess the status of inland logistics terminals or dry ports within the ESCAP region as described in publications by ESCAP and others by attempting to place them within the framework of the model. Obviously, such research was not carried out with the model framework in mind and therefore the results are circumscribed by the available material. This process is best seen as a preliminary desk-based testing of the model prior to the empirical enquiry that falls outside the scope of this study.

Chapter 9: Preliminary conclusions

Based on prior analysis the last chapter of the report provides preliminary conclusion laying the ground for further research and analysis in consultation with Governments and the industry in the ESCAP region.

2 Trends in Supply Chain Management and Logistics Systems

2.1 Introduction

The objective of this chapter is to discuss recent trends in approaches to supply chain management and logistics systems with particular reference to logistics centres. The literature on supply chains has grown substantially in recent years and covers a range of different topics, but focuses mainly on maximization of customer satisfaction, and tends to assert the win-win nature of supply chain partnerships (Chen and Paulraj, 2004). There is no common body of supply chain management literature with a generally agreed framework of analysis and classification, and the result can be a confusing mixture of terminology and meanings. There have been criticisms that the study of supply chain management is not yet a cognate discipline, that more rigorous and structured research is required, and that there is a need for the development of theoretical models (Croom and others, 2000).

On the other hand, there is a reasonable consensus about the set of concepts and techniques associated with logistics and a number of textbooks cover somewhat similar areas under the heading of logistics (e.g., Coyle and others, 2003; Bowersox and others, 2002). It is not the aim of this study to attempt to cover the entire content of such books, but to highlight certain logistical developments that are relevant to the main subject of this study, namely, inland logistics ports or centres.

2.2 Definition of supply chain and supply chain management

According to different perspectives a supply chain can be defined as in Table 2.1. However, it is difficult to find a universal definition of supply chain management, because it has emerged from a number of disciplines (Croom and others, 2000; Lummus and Vokurka, 1999) and the concept has developed in a practical context. Indeed, the terminology has not yet stabilized and alternative expressions such as network sourcing, supply pipeline management, value chain management, and value stream management are also used (Croom and others, 2000).

Table 2.1. Perspectives on defining the notion "Supply Chain"

Functional Perspective	Process Perspective	Systems Perspective
… functions both within and outside the company to make products and provide services	… a process required to move materials from origin to consumption across various supplier and user companies.	… a system with sub-systems
	… a process not just of materials passing through the supply chain, but also of information and relationships	… a set of institutions
		… a set of relationships

Products or services can move through or along networks, channels, chains, pipelines or streams (Bichou and Gray, 2004).

There are a number of different types of definitions of Supply Chain Management (SCM), which are reducible to the following two categories (after Mentzer and others, 2001, but adapted from their original three categories):

Firstly, SCM as a management philosophy has three features:

- It adopts a systems approach with an overview of the entire chain from production to consumption;
- It assumes a cooperative strategy of synchronization both within and between firms; and
- It is customer-focused in that it seeks to add value for customers (Mentzer and others, 2001).

Secondly, SCM as the implementation of a management philosophy through a set of management processes is based on:

- Integration of behaviour and processes;
- Sharing of information, risks and rewards;
- A common goal and customer-orientation. Successful supply chain implementation requires compatible corporate philosophies on the part of supply chain partners (Min and Mentzer, 2000); and
- Cooperation through long-term partnerships and other relationships (Mentzer and others, 2001).

A supply chain is a complex entity making it difficult to define. This applies even more so to international supply chains where there are multiple layers of companies (Van Hoek, 1998), cultures, trading features and so on. Mentzer and others (2001) claim that there are three levels or degrees of complexity of supply chains: the direct supply chain, an extended supply chain, and an ultimate supply chain. This is a rather rigid interpretation and it may be better to assume a continuum or spectrum of increasing complexity possibly, although not necessarial, related to the length of the supply chain.

Supply chain orientation versus supply chain management

Mentzer and others (2001) make the distinction between a "supply chain orientation" and "supply chain management". The former is a management philosophy whereas the latter refers to the combined activities undertaken by management to realize that philosophy. Supply chain orientation is "the recognition by an organization of the systemic, strategic implications of the tactical activities involved in managing the various flows in a supply chain" (Mentzer and others, 2001, p. 11). With a supply chain orientation a company should be able to understand both upstream and downstream flows of products and other supply chain entities relative to its own position. Supply chain management is the application of a supply chain orientation to both suppliers and customers (Mentzer and others, 2001).

There are several different definitions of the supply chain and this can lead to confusion for both researchers and practitioners (Mentzer and others, 2001). The supply chain approach needs to take into account a number of different interfaces, namely functions, geographical regions and organizations (Van Hoek, 1998). The supply chain approach also requires a broadening of viewpoint. It is not just about purchasing and it is not just about the point of view of an individual firm (New and Ramsay, 1997).

2.3 "Supply chain thinking" and the "lean approach"

Some claim that there is an orthodoxy associated with supply chain management called "supply chain thinking". For example, Cox (1999) suggests that supply chain thinking focuses on operational effectiveness and efficiency based on the early successful experience in Japanese industry during 1970s and 1980s. Cox (1999) describes the "dominant paradigm" in supply chain writing as the "lean approach", which has eight defining characteristics (Cox, 1999, pp. 167-168):

> "Strive for perfection in delivering value to customers.
>
> Only produce what is pulled from the customer just-in-time and concentrate only on those actions that create value flow.

> Focus on the elimination of waste in all operational processes, internally and externally, that arise from over production, waiting, transportation, inappropriate processing, defects and unnecessary inventory and motion.
>
> Recognize that all participants in the supply chain are stakeholders and that we must add value for everyone in the business.
>
> Develop close, collaborative, reciprocal and trusting (win-win), rather than arms-length and adversarial (win-lose), relationships with suppliers.
>
> Work with suppliers to create a lean and demand-driven logistics process.
>
> Reduce the number of suppliers and work more intensively with those given a preferred long-term relationship.
>
> Create a network of suppliers to build common understanding and learning about waste reduction and operational efficiency in the delivery of existing products and services."

This approach to supply chain thinking is strongly oriented to the operational tools or techniques of logistics. However, supply chain thinking also concerns the strategic aspects of business-to-business relationships. This means taking account of such factors as vertical integration, the ability to prevent other companies from imitating, and the ability to build "defensible barriers to market entry" (Cox, 1999, p. 170). For example, the dominant relationship of Toyota with its suppliers enabled the introduction of demand-pull and Just-In-Time (JIT) systems. Because Toyota operates within a relatively competitive market, it needs to achieve operating supply chain efficiencies through high quality logistical techniques. However, in other supply chains a particular company may be so dominant that it can gain maximum value for itself simply through its channel power, either from customers or from suppliers (Cox, 1999).

Cox (1999) goes on to state that there may be intellectual flaws in some of the lean thinking literature resulting from a misunderstanding of what business really is about, which is the appropriation of value for itself. The concept of power does not appear in much supply chain writing, and when it is mentioned it is as an undesirable feature that should not be used for lean approaches based on "equity, trust and openness". In much of supply chain thinking there is an underlying assumption of unity and collaboration among supply chain members.

Another concept sometimes associated with the "lean" supply chain is that of the "agile" supply chain. The concept of "agility" is more frequently applied to manufacturing (Goldman and Nagel, 1993; Goldman and others, 1995), but is also relevant to supply chains (Christopher and Towill, 2000). Agility has been defined as "the ability to thrive and prosper in an environment of constant and unpredictable change" (Maskell, 2001, p. 5); as "all about customer responsiveness and mastering market turbulence" (Van Hoek and others, 2001, p. 127); and as "a business-wide capability that embraces organizational structures, information systems, logistics processes and, in particular, mindsets" (Christopher and Towill, 2000, p. 206).

2.4 Supply chain structure

The supply chain structure may focus on the configuration of institutions within the supply chain (Cooper and others, 1997), or it may refer to functions. It is desirable to take both functions and institutions into account and identify how they relate to each other. One rather arguable interpretation (Morash and Clinton, 1997) assumes that the supply chain structure should include the organizational activities by three or more firms to integrate material and information flows. Presumably, this is to present a supply chain as more than the trading between a single buyer and seller, or the trade between branches within a single multinational corporation. It is fair to assume that not everyone agrees with the requirement for three or more participants. A less restrictive definition of the supply chain structure is that it is associated with coordination of functions both within and between firms to achieve a unitary or holistic process (Morash and Clinton, 1997). This may imply a process for the

general good of all participants in the supply chain, but not all organizations within a supply chain structure are equal and there may be a structure of “dominance and dependency” (Cox, 1999). Transport plays a key role in supply chain structure in contributing to time-compression, reliability, standardization, just-in-time delivery, information systems support, flexibility and customization (Morash and Clinton, 1997).

Conventional supply chain thinking sees the structure of supply chains moving away from centralized and vertically integrated companies with a single manufacturing site to geographically dispersed networks with the collective aim of creating customer value (Stock and others, 2000). A single supply chain structure can be complex, and the nature of companies may change along the supply chain from “upstream speculative and mass manufacturing driven by forecasts” to “downstream postponed customizing manufacturing and service activities” (Van Hoek, 2001, p. 171). However, it is difficult to state categorically that a particular supply chain structure is the most suitable for a particular company (Ernst and Kamrad, 2000).

2.5 Supply chain members

Supply chain members are differentiated by the extent to which:

- They are prepared to commit themselves to supply chain integration;
- They will cooperate and coordinate; and
- They are prepared or able to exert power.

2.5.1 Commitment to supply chain integration

The supply chain management approach assumes that each member of the supply chain influences the performance of others and the overall supply chain performance (Mentzer and others, 2001). Various factors can lead to greater integration among supply chain members. These include the planning required for just-in-time techniques based on “demand pull”, sharing transport information, and greater integration of information technology among members of the supply chain. Customizing transport services can lead to greater integration of the supply chain in those parts of the chain affected by the customization (Morash and Clinton, 1997).

Different supply chain members may be involved in the supply chain operations at different levels of management, and members of the supply chain will need to determine which level of partnership they require for specific links in the supply chain (Cooper and others, 1997). If individual work units are required to provide accountability this may act as a deterrent to effective supply chain coordination (Metz, 1998).

2.5.2 Cooperation and coordination

The supply chain management philosophy claims that members seek solutions to create customer value in the supply chain, requiring them to share information for planning and monitoring, as well as sharing risks and reward. This requires a cooperative approach with “cross-functional coordination” across supply chain members, and “policy integration” to achieve the same goals and focus among supply chain members, and is only possible if the different members have similar or compatible cultures and management styles (Mentzer and others, 2001). A key assumption of the supply chain approach is that improved communication leads to the reduction or elimination of waste (Cox, 1999).

2.5.3 Ability to exert power

Resources owned and controlled by specific supply chain members are “power attributes” which will be used to control other supply chain members (Cox, 1999). For example, various commentators have stated that inventory is held by the weaker members of a supply chain in order to meet delivery

schedules of the more powerful supply chain members (Chen and Paulraj, 2004). Every supply chain requires inventory and some members may be required to hold excessive inventory (Cooper and others, 1997). This is sometimes a criticism of the JIT approach, where inventory-holding is transferred to weaker supply chain members, whereas a more efficient supply chain removes unnecessary inventory from the entire supply chain system.

2.6 Supply chain activities

An ideal of effective supply chain management is to achieve synchronization of all supply chain activities in order to create customer value (Mentzer and others, 2001). Supply chains do not exist in a vacuum, but have a social and economic context that influences the development of supply chain activities (New, 1997). A further factor that needs to be taken is into account is the extent to which many supply chain activities have been outsourced to third party providers. This applies in particular to transport and other logistics activities, which should be an integral part of the supply chain. A more modern integrated approach to delivery and the use of advanced electronic information systems has enabled transport to become an integral part of a supply chain (Morash and Clinton, 1997).

2.7 Supply chain integration

Supply chain integration can occur in a number of different ways. These include strategic alliances or regular meetings with customers to share information about areas such as logistics; instituting just-in-time demand-pull; and creating information technology links (Morash and Clinton, 1997). Traditionally, competition has been assumed to be between companies, but the supply chain approach assumes competition between supply chains (Cox, 1999). This implies that supply chain competition can only be successful if the organizational relationships between companies within a supply chain are close (Mentzer and others, 2001). Many companies have moved away from pure competition to one of supply chain partnerships (Chen and Paulraj, 2004). Supply chain partnerships have changed the nature of entire industries through the creation of long-term vertical relationships, and may prove superior to traditional vertical integration through acquisition, although there are risks attached to such partnerships. An atmosphere of openness and trust may be required for such partnerships and this may be difficult to achieve. In recent times there has been a move to create 4PL (fourth party logistics) arrangements for greater supply chain integration. As the name suggests this is a development from 3PL (third party logistics) where the traditional service offered is normally restricted to transport and warehousing services.

Successful supply chain integration should reduce inventory levels, cash flow delay, product cycle times, cost of materials acquisition and cost of logistics. Successful supply chain integration should also improve employee productivity and customer service (Lummus and Vokurka, 1999). However, the supply chain literature makes many claims about the benefits of supply chain integration that do not always appear to have been met (Chen and Paulraj, 2004). This may result from the difficulty in some circumstances of implementing the integration of supply chain processes, covering a wide range from product sourcing through manufacturing and on to distribution (Mentzer and others, 2001).

As stated earlier, some claim that competition is now between supply chains rather than between individual companies, and the strongest competitors will be those who can successfully operate a fully integrated supply chain (Lummus and Vokurka, 1999). This leads to the question of how an integrated supply chain of independent partners is managed compared with a vertically integrated single company (Cooper and others, 1997). Traditional vertical integration was intended to exploit economies of scale to obtain large production runs and consequently large inventories of finished products (Ernst and Kamrad, 2000). Companies within an integrated supply chain should restrict their ownership to those supply chain resources that are difficult to obtain elsewhere and for which there are difficulties of market entry, and they should outsource those supply chain activities or resources for

which there is a high degree of competition. Thus, a true understanding of the relative value of different elements of the supply chain is only possible if we understand the nature of ownership and control of supply chain resources (Cox, 1999).

Traditional competitive strategy has been concerned with horizontal rivalries or relationships rather than with relationships within a supply chain. It is only possible to understand the true nature of the supply chain environment if consideration is given to the relative power of buyers and suppliers in a supply chain as well as the horizontal competitive environment (Cox, 1999).

2.8 Supply chain logistics

Logistics plays a leading role in integrating and managing the supply chain, which means managing the link between each node, and managing across traditional functional areas both within the company and between companies (Lummus and Vokurka, 1999). Logistics has played a major part in the development of principles of supply chain management, mainly because of the importance of maintaining low inventory levels but at the same time providing stock availability (Min and Mentzer, 2000). This means that logistics managers face a situation where their decisions have to be integrated into supply chain activities (Stank and Goldsby, 2000). The supply chain concept (or supply chain management) is "bigger" than logistics, but logistics forms an important part of it. Certain key words closely associated with logistics appear in many definitions of the supply chain concept; they include integration, sequential flow, value added. Coyle and others (2003) suggest that supply chain management has evolved from logistics management over the past thirty years or so in the following way.

Stage 1: Fragmentation to physical distribution (1960s and 1970s)

Different related functions (e.g., warehousing, order processing, transport, customer service) were originally fragmented and became treated in a more integrated way for various reasons (e.g., product line expansion, increasing transport costs, products with higher value-to-weight ratios).

Stage 2: Integrated logistics management (1970s and 1980s)

Cost savings through integrating inbound (materials management) and outbound (physical distribution) functions were identified under the heading of "business logistics". This process was accelerated through greater transport deregulation, more international competition, and more overseas sourcing for raw materials or components. Much greater emphasis was placed on reducing inventory levels. Integration within a company linked purchasing, manufacturing, warehousing, inventory management, sales order processing and transport.

Stage 3: Supply chain management (1980s to present time)

Partnerships were established between different members of the supply chain, not only suppliers and customers in the distribution (or marketing) channel, but also third party logistics providers. Collaboration between supply chain members enables much greater efficiency of delivery combined with lower inventory levels throughout the supply chain.

Obviously, the evolutionary pattern described by Coyle and others (2003) is a simplification and not all industries or companies have developed at the same rate. However, influences from a number of disparate sources are likely to continue to exert pressure on companies to establish integrated supply chains where appropriate. Such influences include (Coyle and others, 2003):

- Changing consumer market (greater focus on customer satisfaction);
- Globalization of markets;

- Increased power of retailers vis-à-vis manufacturers;
- Improvements in information technology;
- Deregulation by Government;
- Acceptance of logistics concepts (e.g., time compression, JIT);
- Emphasis on quality (e.g., TQM);
- Asset productivity (e.g., transferring services to third parties); and
- Reengineering (improving internal company processes, including transfer of services to third parties).

2.9 Trends in logistics developments

The Technical University of Berlin (2002) and its partners produced a European Community-funded report showing the main social, technological, economic, environmental and political (STEEP) drivers of logistics practices, and the resultant logistics trends. Although they are writing in a European context, most of their results should be universally valid.

The first table summarizes the trends in logistics management, while the second provides the detailed STEEP drivers for trends in supply chain management and logistics management.

Table 2.2. Trends in Logistics Management

Restructuring of logistics systems
○ Spatial concentration of production
○ Spatial concentration of inventory
○ Creation of hub-satellite networks
○ Development of break-bulk/transshipment systems
Realignment of supply chains
○ Vertical disintegration of production
○ Rationalization of the supply base
○ Postponement/local customization
○ Increased direct delivery
○ Wider distribution of finished products
○ Wider geographical sourcing of supplies
○ Concentration of international trade on hub ports
Rescheduling of product flows
○ Time-compression principles applied in retail and manufacturing
○ Growth of “nominated day” deliveries and timed delivery systems
○ Reverse logistics
Management of transport resources
○ Changes in freight modal split
○ Reduction in international transport cost
Changes in product design
○ Modularity

Source: Adapted from Technical University of Berlin (2002, p. 8).

Table 2.3. Drivers for Trends in Supply Chain Management and Logistics – STEEP Level

Social

- Increase in the total population in the EU
- Changes in working hours and leisure time
- Changes within and between social hierarchies
- Increase in ICT use in the society

Technological

- Information technology advancement
- ICT integration and development of logistics decision
- supporting software
- Evolution of data transmitting technologies
- Network infrastructures
- Data interchange standards
- Identification systems
- Telematics
- Standardization of loading units
- Increase of capacities in intercontinental transport
- Drive and vehicle technologies
- Automation of warehouses
- Automation of in-house transport

Economical, industrial and managerial

- Changes in GDP
- Interest rates
- Intra and extra European trade levels
- Concentration of industry/services
- Globalization of industry/services
- Shift from industrial to service sector
- Proliferation of product types
- Organizational restructuring
- Supply chain integration
- Mass customization and customer integration
- Outsourcing of non-core activities
- Increased use of information and communication technology

Environmental

- Increased number of vehicle kilometres
- Increased attention for reusing (raw) materials

Political

- Privatization of tasks and financing
- Growth of an agreement culture
- Harmonization and regulations of laws
- Introduction of circular flow economy acts
- Transport industry deregulation

Source: Adapted from Technical University of Berlin (2002, p. 7).

Most of the above developments or trends are directly relevant to inland logistics centres, and the subsequent discussion is restricted to concepts of specific application to this report. Interestingly, although the majority of the logistics trends mentioned in the above extract are centre, terminal or depot-oriented, the report by the Technical University of Berlin is largely about transport. This probably reflects the fact that they were researching within a programme of the European Union, where the focus of research has been on intermodal transport. Much published research associated with Government tends to be of this nature, because, in many parts of the world, Government is directly involved in transport through both policy decisions and finance, but not involved in terminals or depots, apart from seaports or airports. The remainder of this chapter presents a number of current concepts in logistics considered relevant to the subject matter of this report.

2.10 Relations between logistics service providers and their customers

Traditionally, the managers in manufacturing or shipper companies responsible for purchasing logistics services have often been relatively low in the hierarchy of their company, and their focus has been on operational details in their partnerships with logistics companies. A partnership is a form of interfirm relationship that can be placed on a continuum from pure arm's-length transaction to full vertical integration (Webster, 1992). Within these two extremes, this continuum contains a range of relationship styles (Makukha and Gray, 2004). In the context of logistics, authors have suggested various series of relationships: for example, vendor-partner-strategic alliance (Coyle and others, 2003); typical small account relationship-national account selling-strategic alliances-joint ventures (Cooper and Gardner, 1992); purchasing of logistics services-outsourcing-third party logistics (3PL)-fourth party logistics (4PL) (KPMG, 2000); repeat purchase-partnership agreement-3PL arrangements-integrated service agreements (Wood and others, 1995); single transaction, repeated transactions, partnership agreement, third party agreement, integrated logistics service agreement (Bowersox and others, 1989). Skjoett-Larsen (2000) suggests that the final three categories of Bowersox and others form the options for strategic alliances in third party logistics. He states (Skjoett-Larsen, 2000, p. 114):

> "In *partnerships* the partners try to maintain their independence, while simultaneously collaborating to develop more efficient systems and procedures. Normally, the client will maintain the planning and management functions internally and externalize the logistics functions, while the provider tries to make standard solutions to the client requirements.
>
> *Third party agreements* are more formalized and binding than partnerships. Services are much more tailored to the requirements of a specific client. An agreement often requires specific investments in equipment, plant or employee training to meet the service requirements of the client. Cooperation is based on mutual trust and free information interchange. Sometimes, the agreement stipulates that the service provider fully or partly assume responsibility for the personnel, equipment and plant of the client.
>
> *Integrated service agreements* are the most extensive means of cooperating, both in terms of formality and mutual obligations. In integrated service agreements, the provider offers to take over the whole or large parts of the logistics process, including management and control of logistics activities, facility management and personnel administration. The logistics solution will be tailored to the requirements of the client and typically include a number of value adding services. Partial integration of the parties' information systems will often occur, and inter-organizational teams of employees from the affected functions will be established."

Skjoett-Larsen defines third party logistics (3PL) as all the logistics service arrangements under those three headings (partnerships, third party agreements, integrated service agreements), although third party arrangements can vary over time, between countries, and in the level of integration between the partners.

A 4PL is sometimes seen as a supply chain "manager", a coordinating intermediary between the shipper and 3PLs, and as an "upgraded" 3PL. The term 4PL was registered as a trademark by the consultancy Accenture, formerly Anderson, in 1996 (Bumstead and Cannons, 2002), but is widely used in a generic sense. Bumstead and Cannons (2002) define a 4PL provider as (p. 25):

> "An integrator that assembles the resources, capabilities and technology of its own organization and other organizations to design, build and run comprehensive supply-chain solutions."

And as:

> "An entity outside the organization that assembles and integrates capabilities from other third parties to achieve transformational efficiencies."

According to Accenture, the 4PL market can be classified according to the extent of the relationship between the 4PL and its customer. The "synergy plus" model is a partnership where a 4PL operates within a 3PL organization. Both organizations combine their market reach and capabilities, with the 4PL complementing the 3PL's capabilities. A "solution integrator" is a 4PL that manages an integrated supply chain for a single client. It is the core model of the 4PL concept, in which the 4PL combines the

resources and capabilities of several 3PLs. The last and most complex arrangement is the "industry innovator", where a 4PL develops and runs "supply chain solutions" for several clients within an industry (Bumstead and Cannons, 2002).

Other contemporary expressions are reviewed by Makukha and Gray (2004). One currently used term is "lead logistics manager" (LLM), which Langley and others (2002) describe as an ultimate strategic logistics partner capable of designing, building and managing shippers' supply chains and of developing shippers' strategies. Gordon (2003) defines a "lead logistics provider" (LLP) as a 3PL provider that manages all other 3PL relationships for the client, or acts as a "supply chain master". Despite such conceptual development, in practice logistics service providers are still often viewed as "resource providers" and "performers" rather than strategic "designers" (Langley and others, 2002; Mentzer and others, 2000). The dynamic and changing nature of the logistics industry is reflected in the range of new expressions for types of logistics providers, which can lead to confusion. The confusion engendered by these names is discussed succinctly in Box 2.1.

Box 2.1. Name your Terms

The term "3PL" [third party logistics operator] was first used in the early 1970s to identify intermodal marketing companies (IMCs) in transportation contracts. Up to that point, contracts for transportation had featured only two parties, the shipper and the carrier. When IMCs entered the picture – as intermediaries that accepted shipments from the shippers and tendered them to the rail carriers – they became the third party to the contract, the 3PL. But over the years, that definition has broadened to the point where these days, every company that offers some kind of logistics service for hire calls itself a 3PL.

The term "4PL" has generated even more confusion. The term is generally considered to have been introduced by Accenture, which registered it as a trademark in 1996. Accenture described the 4PL (or fourth party logistics provider) as an integrator, but today consultants, software companies and even 3PLs lay claim to being a 4PL. (And if Accenture decided to pursue every company that called itself a 4PL in violation of its trademark, no courthouse would be large enough to contain all the litigants.)

The term LLP, or lead logistics provider, is probably the most transparent of the three. As the name suggests, a lead logistics provider "takes the lead" in providing some functions and subcontracting for others while providing one central control point. But wait, isn't that a 4PL?

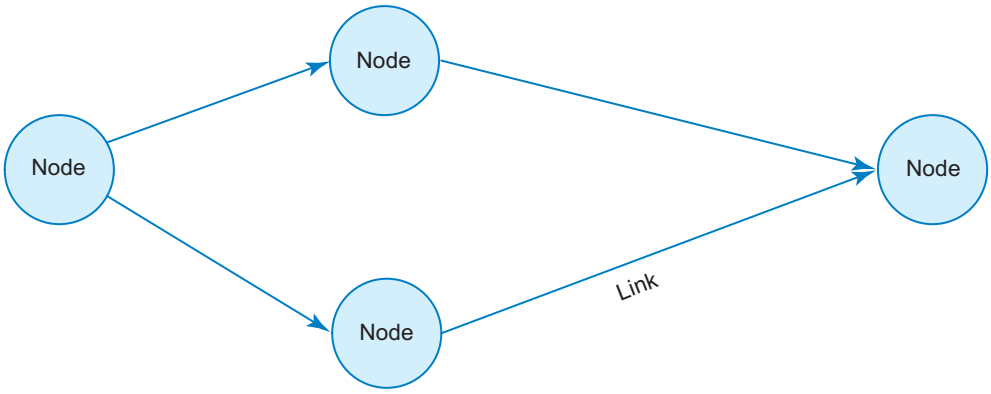
Source: Lynch, C.F. (2005).

2.11 Logistics centres

Warehousing is traditionally associated with the storage of goods. A more modern concept is that of the logistics centre where throughput and other activities are as important as storage. Modern logistics attempts to reduce inventory levels and cycle times, whilst at the same time providing a high level of customer service. This has resulted in a need for shorter periods of storage. The role of the modern warehouse has as much to do with switching or transfer as it has to do with storage in the traditional sense, when goods were produced, stored and subsequently sold and delivered from the warehouse inventory. Nowadays, many more goods are made to order. Furthermore, modern distribution warehouses or distribution centres (DCs) may undertake value added activities such as minor assembly, repackaging, repairs etc.

At an abstract level, the main function of a logistics centre is to act as a node in a node-link system. A typical node-link system is shown in Figure 2.1, where nodes are locations where goods are stored, transferred or processed. The links form the transport network. The complexity of node-link systems can vary substantially, and generally it is reasonable not to consider the node and link entities in isolation as neither can exist without the other. An important issue when considering logistics centres, is whether the focus should be on the cluster of institutions and functions surrounding a node, or on the corridor that links two or more nodes.

Figure 2.1. A node-link system



Source: Own illustration.

2.11.1 Functions of logistics centres

Logistics centres may perform a number of functions including, but not only the traditional warehousing function of storage. This section describes some of the key functions, all of which may be performed at seaports, although they are not necessarily associated with maritime transport.

Storage

This is the traditional function of warehouses. There are various reasons for storing goods, associated with different types of inventory. The following functions of warehouses, although not necessarily new, have been developed in more recent times, and it will be seen that they are not necessarily associated with storage of inventory. Indeed, they are often designed to reduce or even eliminate storage. Modern logistics approaches emphasise flow (in distribution to markets the approach is called flow-through distribution) rather than storage of inventory.

Materials handling

Coyle and others (2003, p. 308) define materials handling as "efficient short-distance movement that usually takes place within the confines of a building such as a plant or a warehouse and between a building and a transportation agency". Sometimes the term materials management is used. Effective materials management seeks to minimize materials handling, at the same time making effective use of time and space (e.g., stacking goods high in a warehouse, transferring them rapidly to and from factory or transport). Coyle and others (2003) state that the general objectives of materials handling are:

- Maximize warehouse or terminal capacity;
- Minimize non-storage or stacking space (e.g., aisle space);
- Reduce the number of handling times;
- Effective and safe working conditions;
- Minimize manual labour;
- Enable effective overall logistics flow; and
- Reduce costs.

The activities associated with materials handling can be performed by manual labour, or by simple or sophisticated equipment. Broadly, materials handling equipment appears in three design categories (Coyle and others, 2003):

- ❑ Flexible-path equipment (e.g., manual hand trucks, forklift trucks);
- ❑ Continuous-flow fixed-path equipment (e.g., conveyors); and
- ❑ Intermittent-flow fixed-path equipment (e.g., cranes, stacker cranes).

Most logistics textbooks contain examples of materials handling equipment, although they tend to focus on warehouse equipment, rather than container or bulk transfer equipment (a useful review of the latter is in Muller, 1999). A different categorization of materials handling equipment is given below (Table 2.4).

Table 2.4. Components of material handling

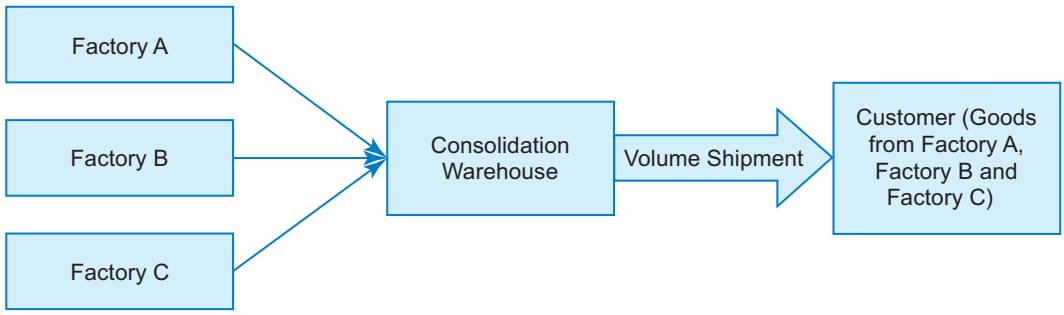
Material transport equipment	Material storage equipment	Unitising equipment
❍ Industrial trucks ❍ Automatic guided vehicles ❍ Monorails and rail-guided vehicles ❍ Conveyors ❍ Cranes and hoists	❍ Static storage (shelves, racks etc.) ❍ Dynamic storage (automated storage and retrieval)	❍ Tote pans or containers ❍ Pallets ❍ Palletising and depalletising equipment

Source: Material Handling Industry of America (2006).

Consolidation

Smaller consignments are consolidated at a warehouse and subsequently despatched as a volume shipment. This process is illustrated in Figure 2.2. Consolidation may be in-house or provided by a third party. Freight forwarders offer consolidated services, particularly in international shipping. There is usually an element of storage in consolidation, whilst awaiting departure of the consolidated consignment. The main advantage of consolidation is the saving of transport costs by sending volume or full-load shipments.

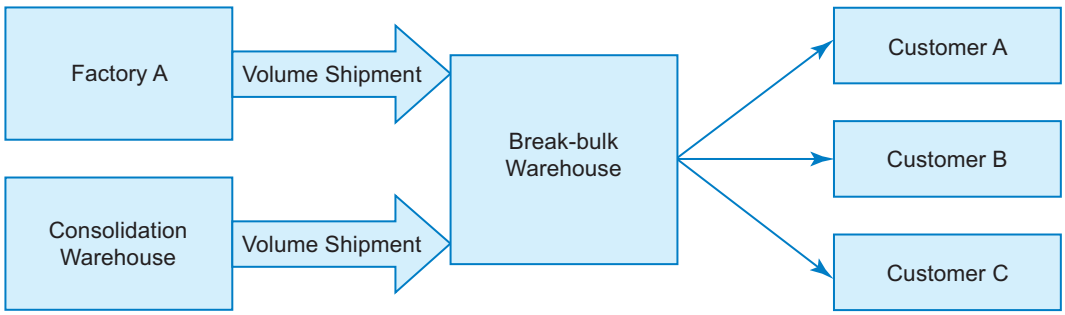
Figure 2.2. Consolidation



Break bulk

This is the reverse operation to consolidation and, indeed, may be combined with consolidation. In third party consolidated services it is a necessary part of the service, undertaken at the destination. Break bulk is illustrated in Figure 2.3.

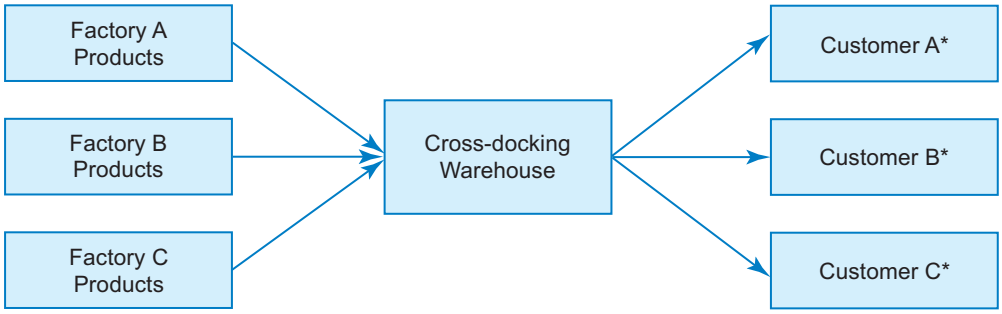
Figure 2.3. Break bulk



Cross-docking

Goods enter the warehouse from various suppliers, and are (ideally immediately) transferred to vehicles in the required combinations for shipment to customers (or to a production plant). Cross-docking is therefore associated with product assortment or product mixing. In this case, the warehouse is not really used as a storage point but as a transfer location. The term cross-docking refers to the fact that goods move directly across from the receiving dock to the despatch dock in the warehouse. An example of cross-docking is shown in Figure 2.4. There are various different forms of cross-docking.

Figure 2.4. Cross-docking



* The customers receive different combinations of products from Factory A, B and C.

Value added logistics (VAL)

Apart from key elements of logistics such as transport and warehousing, there are a significant number of other activities associated with logistics. They are often described as value added logistics (VAL) to distinguish them from mainstream or general logistics services. Value added logistics is a term that is rather loosely applied to a wide range of activities, often referring to any functions performed by a logistics company other than transport or basic warehousing and storage. VAL has been described as a combination of logistical and light industrial activities undertaken by a logistics company to finalize a product (Buck Consultants International, 1997). Preferably, this happens as late as possible in the logistics chain, in a warehouse shortly before sending the product to its final destination. The activities are defined according to the amount of value added to the product or service:

- *Low-end VAL activities* normally add only low value to the product (e.g., labelling, making the product country- or customer-specific, adding manuals and parts, creating new assortments of goods or breaking bulk);

- *High-end VAL activities* normally add high value to the product (e.g., blending/mixing of granular products or liquids, sterilization, final assembly, instruction/training, repairs and recommissioning);
- *Back office activities* include managing the goods and information flow, insurance, customs clearance, order entry or staffing a help-desk. These activities are also known as value added services (VAS). Some of these activities (e.g., customs clearance) have for a very long time been undertaken by various types of logistics intermediaries (e.g., customs brokers, freight forwarders). In fact, they date back to a time when the word "logistics" was not normally used in this context. Therefore, it could be claimed that some of the VAS activities are mainstream logistics activities; and
- *Value added facilities (VAF)* include such services as equipment maintenance, equipment renting and leasing, or cleaning facilities.

Postponement

An important concept associated with value added logistics is postponement. Postponement in the context of logistics means deliberately delaying an activity until the last possible moment, particularly the point at which a general (or generic) product is converted into a customer- or country specific product (e.g., adding a special label or packaging). In other words, it is the point at which stock is committed to a market or customer. Because of the different requirements for products or labelling of different countries, postponement has particular relevance in international logistics.

The point where a product in the supply chain ceases to be forecast-based and becomes a specific customer order (Van Hoek, 1997), or where market "pull" meets upstream "push" is called the decoupling point. Christopher and Towill (2000) suggest that there are two decoupling points: for strategic inventory, maintained in a generic form as far downstream as possible (the principle of postponement); and for demand information, which should move as far upstream as possible. They propose that the proper location of decoupling points for material and information flows can produce a hybrid supply chain that combines a lean and efficient supply upstream and an agile and effective supply downstream (Oloruntoba and Gray, 2006). The concepts of "lean" and "agile" supply chains were introduced earlier in this chapter.

Postponement can be divided into form, time and place postponement. For example, final manufacturing is "time postponed" until the customer order is received; "place postponed" at a central operating location; and "form postponed" for country or customer specification. There are many examples of postponement. Finalizing the product after the order is received results in a lower stock of final products, greater flexibility and a stock of general parts much later in the supply chain. Examples include dyeing clothing after the customer order (a process undertaken by Benetton), or fitting a plug on an electrical appliance for a specific country. Brand packaging is another example of postponement. This is where products of the same type and produced in the same plant (e.g., batteries), are sold under different brand names. Brand packaging will normally take place in a warehouse based on customer orders. Breaking bulk (see above) is another variation of postponement. For example, it is cheaper to transport liquids in bulk over long distances than in consumer-ready packaging. The product is not packed for consumers until it reaches the warehouse, thus not only reducing the volume transported, but also enabling country- or customer-specific labelling to be added.

Postponement activities may even be performed in order to avoid or reduce import taxes, if import taxes for components are lower than for total final products. Many of the above postponement activities are often undertaken in the warehouses of logistics companies.

Reverse logistics

Coyle and others (2003) define reverse logistics as "the process of collecting, moving, and storing used, damaged, or outdated products and/or packaging from end users" (p. 687). The disposal of returned goods under environmentally controlled conditions when buying a replacement (e.g., a refrigerator), may be considered as a value added logistics activity. Another aspect of reverse logistics is the repair of returned damaged products or components. Manufacturers may ask logistics service providers to set up a repair area in their distribution centre and do repair work and the exchange of components, rather than undertake the process themselves.

2.11.2 Location of logistics centres

Bowersox and others (2002) refer to the "local presence paradigm", which states that "a firm must have facilities in local markets to successfully conduct business" (p. 450). They claim that this paradigm has become obsolete (in the United States at least) following rapid improvements in information technology and much greater reliability of transport services. These advances have led to direct next-day delivery from warehouse facilities as far away as 1,000 miles (about 1,600 kilometres). Similar developments have taken place in Western Europe. For example, Gillette determined that they wanted a two-day order-to-delivery time across Western Europe, which could be achieved by eight warehouses instead of thirteen (Christopher, 1997). Energizer, the European wing of Eveready Battery adopted a strategy of reducing an original 60 distribution centres in Western Europe to six, with the ultimate aim of focusing on two European "heartland" warehouses with satellite distribution centres outsourced to third parties (Laurence, 2000).

However, exactly where inventory is located requires careful consideration. Christopher (1992) identifies five factors critical to global supply chains in contrast to national or other more geographically limited supply chains. They are extended supply lead times; lengthy and unreliable transit times; complex consolidation options; complex freight options; and the shipping of intermediate components. If a company has only a few manufacturing sites worldwide, it may have problems of supply to a global market, taking into account the large distances for transport. One solution is to provide intermediate inventory points between manufacturing and the market. However, an increase in the number of inventory points increases the overall level of inventory in the supply chain.

3 Factors governing the decision of enterprises to locate at ports or port-related logistics zones

3.1 Introduction

The objectives of this chapter are to identify the major factors governing the decision of enterprises to locate at ports or port-related logistics zones, and to present examples of best practice in making such decisions. This chapter also develops an outline approach to identify good practice suitable for application to inland ports or logistics centres. The term "practice" is interpreted to include both Government legislation and commercial port development. This is appropriate for the port sector where Government often plays a central role.

Many types of enterprise may wish to locate at a port. In many cases the enterprises are associated with the commercial freight transport moving through the port (e.g., stevedoring companies) or with other aspects of logistics (e.g., storage). However, other industries may also wish to locate at ports to take advantage of the location (e.g., oil refineries). These two categories are the types of organizations that are most relevant to this report. However, many other types of organization may wish to locate at a port, sometimes connected with passenger transport (e.g., cruise companies) or with both freight and passenger transport (e.g., ferry operators). Some enterprises will be interested in other water-based activities (e.g., fishing or boating marinas), and others primarily in the real estate of the port (e.g., commercial office or residential property). Although it is possible to envisage circumstances where all of these types of activity could be associated with inland logistics sites, this report restricts its focus to the transport sector, the wider logistics sector and other industrial sectors with a logistical interest.

3.2 What is a port?

There are many thousands of ports of all sizes throughout the world performing a wide range of functions or, in many cases, not functioning as ports. Responsible bodies such as port authorities, whether public or private, have a varied set of objectives and employ a wide range of means to achieve their goals. Ports vary widely in their assets, roles, functions and institutional organization, and even within a single port the activities or services performed may cover a broad spectrum.

A port can be as small as a single quay for berthing a ship or as large as a centre with many terminals and a cluster of industries and services. Ports need not necessarily be only seaports. For example, for legal purposes in the United States the term "port" may include airports (Newman and Walder, 2003). However, this chapter will restrict discussion mainly to seaports, hereafter simply called ports.

The boundary of a port is typically seen as the area under the control of a port authority or similar body, but many developments or policy decisions have an impact beyond the legally delineated area of the port into the port-city or the port hinterland, or along the coastal zone associated with the port. In contrast, some port developments may cover only a small part of a port authority's property, particularly of very large ports. Decisions to locate at ports raise conflicting demands of spatial, economic and ecological or environmental concerns. Depending on the context, decision makers are faced with different objectives e.g., improved container movement, modernization of old industries, regeneration for recreation or tourism (Hershman, 1999).

In broad terms, policy associated with attracting new customers or users of ports is based on two quite different objectives. First, port authorities seek to improve the commercial efficiency of working ports as locations for the transfer of goods or passengers between sea and land transport (Stevens, 1999). This is often known as "port development". Second, there is policy and development associated with

changing the role of ports away from the transfer of goods and people towards using the port as a location usually in a city and suitable for "waterfront regeneration" (Meyer, 1999). This report is concerned primarily with locational decisions based on the first premise, although there is often an interaction between the two approaches (Hayuth, 1988).

3.2.1 Influences on decisions of enterprises to locate at ports

Major areas of influence are:

- Nature of the port organization and structure;
- Responsibility for financing port development;
- Services offered by ports; and
- Responsibility for assets and associated services.

Examples of current practice are provided for each area where appropriate.

3.2.2 Port organization and structure

There are various influences on port structure, organization and management, all of which are likely to also have an influence on the decisions of enterprises to locate at a port (World Bank, 2001).

- The socio-economic structure of a country (e.g., market economy, open borders);
- Historical developments (e.g., former colonial trading structure);
- Location of the port (e.g., within an urban area, in isolated regions);
- Types of cargos capable of being handled (e.g., liquid and dry bulk, containers);
- Public, private or mixed provision of service;
- Local, regional or global orientation;
- Ownership of infrastructure (including port land);
- Ownership of superstructure and equipment (in particular ship-to-shore handling equipment and warehouses); and
- Status of dock labour and management.

The nature of land use in port areas will depend on the nature of control of the port, which is often by a port authority if transport-related port activities predominate. The main objectives of the port authority will be to meet the demands of the shipping and transport sector and it would normally identify unused or neglected resources as potential areas to attract freight-related business. If there is a move away from transport-related port activities into other uses for the port, a local authority or central Government often takes the initiative, followed by control by private commercial undertakings, sometimes unconnected with traditional transport-related port activities. However, even transport-oriented owners of fully private ports may sell port property for "non-port activities".

3.2.3 Different types of port operators

A number of different types of ownership models are found throughout the world for ports engaged in transport-related activities. The nature of the ownership or port institutional structure will have an influence on how an enterprise will become involved in a port's activities. The types of port can be differentiated according to the different levels of service that the port authority provides (Stevens, 1999). A widely-used categorization of port institutions is:

- Service ports (state-owned or private): provide infrastructure, superstructure and additional services (e.g., administration of transport, cargo, loading and unloading, etc.);

- Tool ports: provide infrastructure and superstructure (e.g., cranes, warehouses but with cargo handling probably undertaken by private firms); and
- Landlord ports: provide infrastructure (e.g., berths, parking and loading zones).

State-owned service and tool ports are supposed to operate mainly in the public interest. Landlord ports often attempt to combine public (port authority) and private (port industry) interests. Fully privatized service ports focus on private (shareholder) interests.[1]

The landlord port with a mixed public-private responsibility is the prevailing form for larger ports such Rotterdam, Antwerp, New York and Singapore. The port authority acts as landlord, leasing infrastructure to the private sector, which undertakes port operations such as cargo handling, or operates industrial facilities such as refineries. The private port operators are responsible for their own superstructure (e.g., offices, sheds, warehouses, container freight stations, workshops) and the equipment in their terminal (e.g., cranes, conveyor belts). However, the private sector may also finance a complete terminal within a port, including infrastructural expenditure such as land reclamation.

The above classification of provision is somewhat simplified and the distinction between port types is not always clear-cut. For example, the autonomous French ports are tool ports, but in newer terminals, equipment such as gantry cranes may be a private investment by private terminal operators. This divided responsibility may create friction between the port authority and terminal operators (Bichou and Gray, 2004). Some tool ports may restrict superstructure assets to cargo handling equipment, while others extend such facilities to warehousing and logistics services. The same applies to the use of manpower in some tool ports where private companies are required to use port authority labour. There is no ideal or standard model of port ownership and institutional structuring, and one can find many different styles of organizational structure throughout the ports of the world. Port organization also changes over time, and a previously desirable model of port ownership can later prove to be outdated and inefficient (Bichou and Gray, 2005).

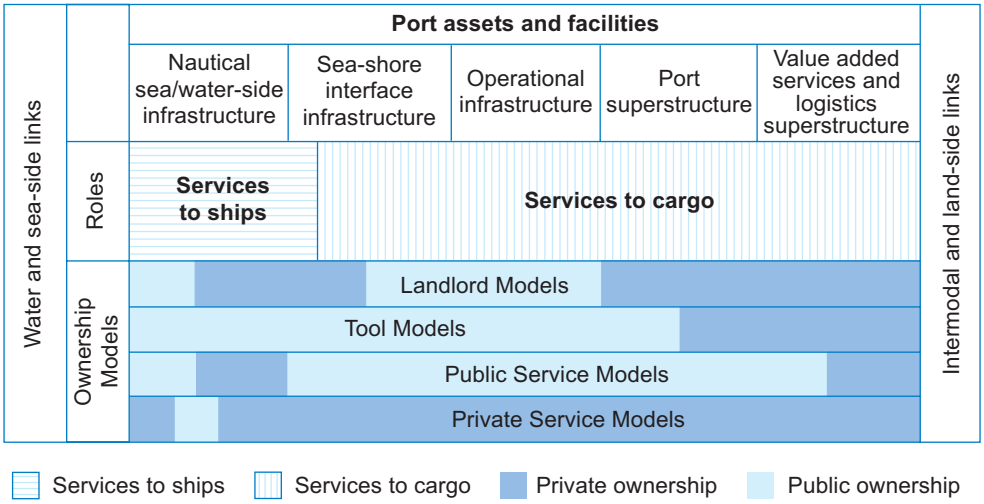
Over the past few decades since the beginning of the modern era of privatization, there has been a debate about the appropriate extent of the public or private status of port ownership and administration, and mainly academic commentators have presented various models or frameworks. These include:

- Ports controlled by the state, ports controlled by local administrations (both municipal and authority ports), and ports controlled by private enterprises (Beth, 1985);
- State ownership, autonomous ownership, municipal ownership, and private ownership (Alderton, 1999); and
- Public port, public/private port with the public sector dominant, private/public port with the private sector dominant and private port (Baird, 1995 and 1997; Cullinane and Song, 2002).

In practice, there are many models of port ownership covering central or state models, decentralized models, partly or fully private models, and some countries retain a wide range of port ownership models (Bichou and Gray, 2005). In general, most ports lie somewhere between central/local and public/private variations, although with no definitive boundary or recognized best practice about what should be controlled by the public entity and what should be managed by the private sector in ports (UNCTAD, 1995). In Figure 3.1 Bichou and Gray (2005) summarize the variations in institutional and organizational management models across major port assets, facilities and services. The divisions between private and public ownership in Figure 3.1 are hypothetical but typical.

[1] See World Bank (2001) and Bichou and Gray (2005) for detailed reviews of developments in worldwide port structure.

Figure 3.1. Variations of functional roles and institutional models across different port services and facilities



Source: Bichou and Gray (2005).

3.3 Responsibility for financing port development

An important factor that will influence the decisions of enterprises to locate in port areas is the financial arrangement for any development in which they will be involved. There are various financing arrangements that may suit both public and private interests (Lloyds Shipping Economist Online (2000):

- BOT (Build, Operate, Transfer);
- BOOT (Build, Own, Operate, Transfer);
- BOO (Build, Own, Operate); and
- BOOST (Build, Own, Operate, Share, Transfer).

Under the basic arrangement (BOT) a special purpose company independent of the port authority undertakes a project to build or develop all or part of a port and then operates it for a specified time period. At the end of the period it is transferred back to the Government or port authority. The other arrangements described above are variations on this process. The arrangement can also be between a private port owner and another private body. Privatization of ports has been commonplace for many years, with the global amount raised through port privatization estimated at well over US$ 1 trillion (Baird & Valentine, 2006).

3.3.1 Financing of operational infrastructure

Distinction should be made between basic port infrastructure and operational port infrastructure, since port authorities may have different approaches to the financing of each category. The World Bank's (2001) Port Reform Toolkit provides useful guidelines in this context. The basic infrastructure under the control of the port authority may be financed externally (because of the large sum involved) under Government guarantee and over a long period.

There are more options for operational infrastructure. For service or tool ports, Governments will usually finance the operational infrastructure, alone or with external finance. In landlord ports with leased terminals, the operational infrastructure in the terminal may be financed by the terminal concessionaire or the leasee under a long-term lease contract (20 to 30 years) with the legal character of a property right. This has four advantages (World Bank, 2001):

- At the end of the contract, the Government or port authority resumes possession of the land;
- Under certain conditions the property rights can be transferred to a third party, possibly subject to approval from the port authority;
- All buildings and equipment may be financed and owned by the operator; and
- The property can be used as security for a bank loan.

Some parts of a port are common areas that are not part of any particular terminal or enterprise, and will need to be financed by the port authority by various types of loan or by using retained earnings.

3.3.2 Public-private partnerships

The private sector uses various criteria to determine whether to undertake port infrastructure or superstructure projects. These include (World Bank, 2001):

- Expected yield;
- Adequate debt/equity financing structure;
- Strong sponsorship;
- Solid legal contracts;
- Transparent legal framework;
- Fair and open bidding procedures; and
- Credible feasibility analyses (technical, institutional, financial, economic and environmental).

Box 3.1. Key Projects

In the Netherlands, central Government has established "key projects" or "exemplary redevelopment schemes". These are model developments with enhanced Government subsidies considered in the national interest. In contrast to previous fragmented approaches to funding, the Dutch Government adopts a coordinated approach with an effective combination of finance from both public and private sources as public-private partnerships. Key projects have been allocated to Maastricht, Amsterdam, Rotterdam, Den Haag and Groningen.

Source: McCarthy (1996).

Private participation in green field or new port projects incurs more risk through uncertainty of future traffic and a greater proportion of capital investment. The longer construction and payback periods may also require a higher proportion of equity contributions (World Bank, 2001). Government clearly has to resolve many conflicting demands on the way in which ports are used, and this will impact on decisions made by enterprises. Some Governments are adopting or investigating new approaches to port or coastal zone projects. In the United Kingdom, the New Approach to Appraisal (NATA) provides criteria for all transport projects, including new port developments (Department of the Environment, Transport and the Regions, 2000). The British Government is consulting the ports industry and other interests about more detailed guidance for appraisal under the five broad headings of environment, safety, economy, accessibility and integration.

3.4 Services offered by modern ports

Depending on actual or potential infrastructure and/or superstructure, port locations are capable of offering a wide range of types of service, and of attracting enterprises seeking to make use of or contribute to such services, classified under a number of broad headings (Department of Transport, Republic of Ireland, 2006):

- Commercial freight transport-related;
- Non-transport logistics;
- Other industrial (e.g., refinery);
- Other commercial (e.g., offices, retailing);
- Passenger transport-related (e.g., cruise ships);
- Water-related leisure (e.g., marina);
- Other leisure services (e.g., heritage trail); and
- Residential.

The scope of this report is restricted to freight, logistics and associated industrial use of ports, and therefore discussion will be restricted to the first three of the above categories.

Box 3.2. Project Appraisal Criteria for the United Kingdom Ports (Example)

A New Approach to Appraisal (NATA) sets out criteria for all transport projects, including new port developments. The Government will consult the ports industry and other interests about developing more detailed guidance specifically for ports. Guidance for all forms of transport covers five over-arching objectives:

- Environment;
- Safety;
- Economy;
- Accessibility; and
- Integration.

Within each of these objectives there are a number of subordinate objectives with their own indicators. Decisions should reflect sustainable development principles. The NATA indicators combine monetary values, physical units and non-quantifiable elements, without priority. There is no single overall indicator which can be used to rank options. Decisions on cases are matters of judgment, not pre-determined weightings. A range of options should be considered using the NATA framework criteria and indicators, making best use of existing infrastructure where possible, and including a base case which covers the current infrastructure and any approved changes. Port developments have to be demonstrably commercially viable, regardless of the status of the port. Operational considerations may also be relevant (e.g., draught, tides, surface access).

The economic impact of port developments should refer to the different users affected – cargo interests, passengers, transport providers, Government, and non-users affected by surface access and wider economic aspects. Because the Government does not have models to estimate changes in cargo and passengers using ports as a result of infrastructure development, proxy measures of economic effects will be needed.

Development can affect the built and natural environment, human health, noise and local air quality, biodiversity of habitats in sensitive areas, and water quality. There is some guidance on measuring these effects. There is a statutory requirement to prepare an environmental impact assessment for projects likely to have a significant effect.

The accessibility of a port development can be described by costs or times for different forms of transport, with the objective to encourage modes other than road, and to encourage public transport.

New transport infrastructure with adverse effects on environmentally sensitive areas must pass special tests. Evidence of substantial public interest may override nationally or internationally designated sensitive sites. The developer could create a replacement habitat within a clear timescale and pay for compensatory measures.

Source: Condensed from Department of the Environment, Transport and the Regions (2000).

3.4.1 Commercial freight transport-related services

As with many industries, worldwide control is becoming concentrated among a limited number of multinational operators. It has been suggested that the global market for port development services is becoming concentrated on four types of operator (World Bank 2001):

- "Global stevedores" operating container terminals worldwide;
- Regional stevedoring groups from United States, Europe and Asia;
- Shipping line investors in terminals; and
- Niche investors looking more specifically at small to medium scale facilities.

A limitation of such classifications is that they tend to focus on container services, as does much academic literature on the subject of ports (Bichou and Gray, 2004). One significant feature has been the widespread privatization of container terminals since 1990. Global terminal operators have sought to increase their competitiveness through mergers and acquisitions, and through joint ventures with local companies, or other global terminal operators or shipping lines. Many terminal operators have been involved in intermodal transport to create links between ports and the inland, by operating rail terminals, setting up road haulage companies or operating their own feeder services (Notteboom, 2004). Such vertical expansion includes the downstream diversification of shipping lines into terminal management, for example by AP Moller (Maersk Sealand) at the Port of Tanjung Pelepas (ESCAP, 2005).

The intense competition between ports to attract shipping lines has made them vulnerable to "hub hopping" where shipping lines move their business to another terminal or port offering better terms. This is the shipping equivalent of the "footloose" multinational corporation moving its production from one country to another chasing the cheapest production costs. Thus, port terminal developments must be carefully planned before engaging in high levels of expenditure, since there have been cases of "white elephants".

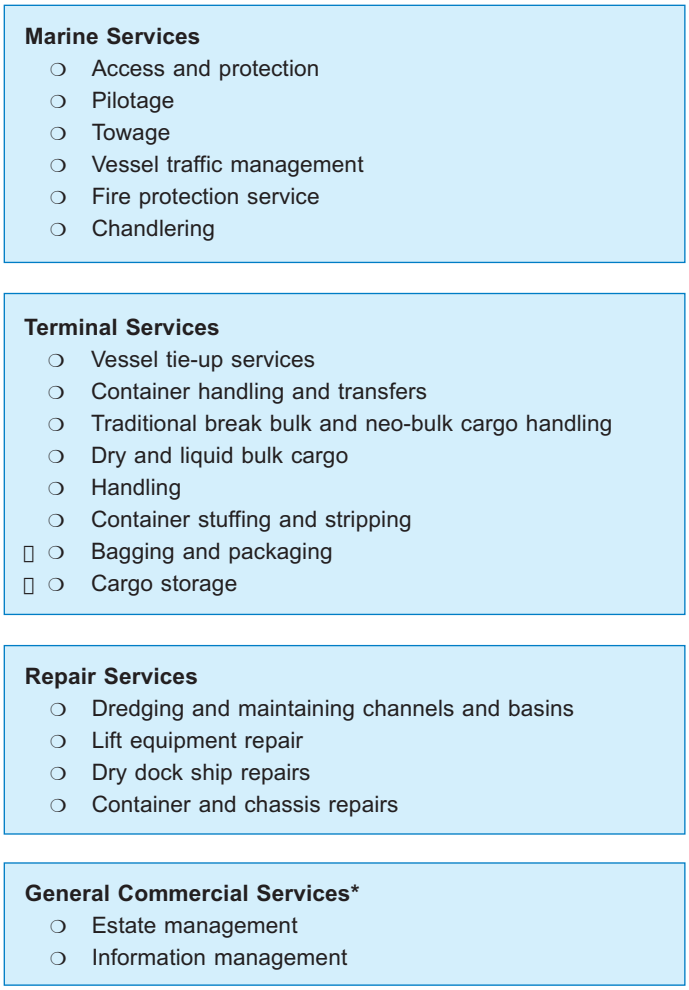
This chapter seeks to identify factors governing the decision of enterprises to locate at ports and related areas. In doing so, account must also be taken of relocation of ports or terminals and the impact on other port-based services. Terminal activities have often relocated to new sites, but this may not be the case for commercial services of shipping lines, agents and others. They may wish to remain in the old waterfront area to keep close to the city services such as banking and insurance. Government agencies such as customs houses may also be slow to relocate (Hayuth, 1988). Goodwin (1999), writing in the context of urban waterfront dereliction, provides a set of reasons why ports have relocated from traditional locations.

- Shrinkage of ports resulting from containerization and load centring (hub ports);
- Abandonment of city central port facilities for new container and other terminals on less developed shorelines;
- Replacement of ocean-going passenger liners by air travel;
- Movement of manufacturing to the suburbs as a result of efficient road freight transport; and
- Urban renewal and demolition close to waterfront sites.

Generally, the commercial freight transport-related services are typically classified according to the criteria in Figure 3.2 below.

Ports are able both to attract shippers and to create competitive advantage by offering services beyond the core port activities. Port authorities can persuade private operators to deliver value added

Figure 3.2. Classification of freight transport-related services



* The private sector may undertake some of the commercial services depending on whether public responsibility or commercial considerations predominate, and on the type of assets required.

Source: The World Bank (2001).

services, possibly through the authority offering franchising, licensing, and incentive leasing. Such services include chandlering, ship repair, container maintenance, marine appraisals and insurance claims inspections (World Bank, 2001).

3.4.2 Non-transport logistics

The organization and management of freight transport is an important activity, but it should be seen as part of a wider set of integrated activities under the general heading of logistics. Logistics is more than just transport, and freight transport should be part of an overall planned system that links various business functions. An integrated logistics system has major objectives such as obtaining the lowest possible inventory levels, the shortest and most reliable lead times, and at the same time maintaining an appropriate level of customer service.

The holding of stock or inventory has traditionally been treated as a buffer or safety measure (the terms buffer stock or safety stock are used), just in case something goes wrong, such as a production breakdown or a late delivery by a supplier. The logistics approach identifies the holding of inventory as a major cost item, which unnecessarily ties up capital. Therefore, systems have been developed which attempt to minimize, or even eliminate the holding of inventory. The old approach is

just-in-case, whereas the logistics approach often advocates just-in-time, meaning that deliveries should arrive just-in-time to be used in production or sold in the market. In this way, unnecessary stock is not held. Important though it is, the transport time is just part of a lead time from when a customer places an order with a supplier to when the goods are delivered to that customer. The logistics approach attempts to compress time in the supply chain so that goods move through it more quickly and reliably. It also provides a higher level of customer service. However, transport or delivery is just one stage in a sequence of activities associated with production, inventory management and order processing.

Such developments have had an impact on the development of ports. The United Nations Conference on Trade and Development (UNCTAD) describes the evolution of three generations of ports. The first generation was an interface for cargo between land and sea transport; the second generation was as a transport, commercial and industrial centre; and the third generation is a dynamic "node" in the international production and distribution network or supply chain.

Box 3.3. Staying at the same location (Example)

The large free zone in Jebel Ali, Dubai enables tenants to import and assemble intermediate products into final products, utilizing a large pool of inexpensive expatriate labour for the assembly process. While many of the value adding activities performed in Jebel Ali can be performed elsewhere, the alternatives may involve significantly higher labour cost and a less friendly Government environment. It may also entail walking away from a high sunk cost. The same applies to Reebok, which has established a large final assembly and distribution centre in the port of Rotterdam to service the European market. While this value adding activity could be shifted to another location, there is a sizable sunk cost associated with the existing facility.

Source: Extracted from World Bank (2001).

However, a rigid application of the "generations" concept cannot always be applied since a single port may show evidence of more than one stage of development at the same time (Bichou and Gray, 2005). Nevertheless, an evolution of this type can occur and port management must change from merely offering facilities and services to playing an active role in the international trade process, such as by promoting trade and providing relevant value added services (Harding and Juhel, 1997). Most of the value added activities described in chapter two can be performed within a port area, and the fact that they are on offer may encourage a port user to stay at a specific port, since it may be impossible or difficult to get a similar level of service elsewhere.

The suitability of different aspects of VAL for a port will often depend on the nature of the traffic. VAL undertaken within a port is most suitable for container traffic or general cargos, whereas roll-on/roll-off traffic has little VAL potential, since it is too costly to delay vehicles with drivers at the port. On the other hand, roll-on/roll-off traffic can make use of aspects of value added facilities (VAF), such as tanking, cleaning, repair, parking, or security. Dry and liquid bulk trades generally have little requirement for either VAL or VAF undertaken by logistics companies. High-end VAL activities such as blending or mixing liquids could be seen as industrial processes which are part of sophisticated activities associated with industries such as oil or chemicals, and which have dedicated port installations.

Such activities are not normally undertaken by logistics companies and are therefore not generally included under the heading of VAL. However, the boundary between logistics and secondary production or processing is indistinct, and perhaps a somewhat flexible definition of VAL should include the words "currently capable of being undertaken by a logistics company" with an eye to potential future opportunities for new activities falling within the VAL gambit. Initially, containerization or intermodal transport may reduce the importance of warehousing in ports. However, as discussed in

Box 3.4. Distripark Maasvlakte (Example)

Rotterdam's latest area for distribution centres, Distripark Maasvlakte, is located right on the North Sea next to the huge Delta container complex. All the world's major container lines use these terminals, often as their first call in Europe. Goods can arrive at the Distripark's warehouses in no time. And from there the entire European market is within easy reach.

Distripark Maasvlakte is designed to centralize large-scale distribution activities. From here you can stock regional satellite facilities throughout the continent. Frequent trains, lorries and barges connect the port with all the continent's important economic centres. Shortsea and feeder shipping make overseas destinations – the United Kingdom, Ireland, Scandinavia, the Baltic and the Mediterranean just as accessible. To service these areas from one location, Distripark Maasvlakte is the ideal location. With the European Union's enlargement to 25 countries, more and more businesses are now opting for this proven distribution concept. Distripark Maasvlakte is divided into standard 3.4-hectare plots – big enough to accommodate a warehouse covering 20,000 square metre plus offices and all ancillary facilities.

Potential customers for Distripark Maasvlakte are mostly:

- Manufacturers wishing to set up their own European Distribution Centres;
- Mega-carriers wishing to further penetrate the logistic chain;
- Mega-distributors that want to set up a maritime hub for their European operations;
- Other (global) logistics service providers and European exporters seeking to create a maritime export hub.

Several world class logistics service providers are already established here, such as:

- Europe origin: Kloosterboer
- United States origin – DHL/Exel, Reebok, Archer Daniel Midlands (ADL), Pro Logis
- Asian origin – Hankook, Canon, Nippon Express, Epson, Nichirei

Source: Port of Rotterdam (2006).

a previous ESCAP publication (ESCAP, 2005), special logistics-oriented zones, including free trade zones, can be created to attract foreign investment, create new employment and secure freight volume. Such developments are sometimes known as distriparks or Trade, Distribution and Marketing Centres (TDMCs). Such developments provide substantial benefits, but need to take into account other problems associated with ports such as congestion (Harding and Juhel, 1997). The following extract on Distripark Maasvlakte is from promotional material issued by the Port of Rotterdam.

3.4.3 Other industrial services

A port area is often used for other industries apart from maritime and other transport-related activities. These industries can be classified into:

- Industrial ports with dedicated port installations (e.g., oil, chemical, cement and grain installations);
- General port industries with no dedicated installations but dependent on the port as a transfer or break bulk point (e.g., tobacco and food);
- Industry associated with the adjacent urban centre because it is a market in its own right (Hilling and Browne, 1998); and
- Marine-related industry unconnected with commercial port transport (e.g., boat building, fishing, and defence).

Not only may the ability of an industry to locate at a port be important, but also its location within the port. This will depend mainly on the type of product and the technology required transferring it from the ship to the quayside. For example, movement of liquid bulk cargoes (e.g., oil) can be moved by pipelines cheaply over long distances, partly because of economies of scale. Marine-related industries such as ship repair or boat building will almost certainly require a waterfront location, and may be in competition with other, probably more prosperous industries (e.g., high-tech companies) able to pay the higher rent for the scarce waterfront property.

The evolution of Maritime Industrial Development Areas (MIDAs) over the past few decades provides a picture of how policy to ports as industrial areas may change. MIDAs are sometimes associated with port relocation because of the increased size of ships requiring deeper water, more specialized port operations, and greater storage needs of modern ports. MIDA development, often a process of separating port and city functions, has evolved in four stages. The first generation from the late 1960s was based on economies of scale using large tankers in deep water ports with large areas of land and well developed land connections. Industrial port sites (e.g., refineries) can become redundant or "lie fallow" through recent deindustrialization (Pinder and Husain, 1988). Following recession in the mid-1970s, the second generation favoured light industry and activities such as warehousing and distribution. This led to the development of distriparks in places such as Rotterdam. A good example of where this type of land use change has occurred is the Distripark Botlek in Rotterdam, which was converted from a large oil storage yard into a distribution centre with a strong emphasis on chemicals (de Bruijn, 1999). Although such new uses are often transport-related, they may not be maritime-related and therefore perceived by the port authority as "non-port activities" or "non-waterfront uses".

The third generation of MIDAs is associated with smaller-scale developments in developing countries. The fourth generation adopted some heavy industry but also industry based on imported goods, including high technology products which are often re-exported (Hilling and Browne, 1998). This is associated with the concept of the "free port", "free trade zone" or "foreign trade zone", which, in its most basic form, is a warehouse operating under customs bond, but may also consist of a number of factories where goods are processed and re-exported without customs duty being paid. ESCAP has recently produced a major report on this topic (ESCAP, 2005). There are many examples of such zones. In the United Kingdom, Liverpool and Southampton have free port zones with product processing, transshipment and distribution. The Foreign Trade Zone (FTZ) programme was instituted in the United States either for a single trade area (Miami for Latin America) or for general purposes (e.g., New York). Variations on these developments are now found throughout the world (Hilling and Browne, 1998).

3.4.4 Industrial clusters in ports

A port authority may seek to attract a few (or even just one) large tenant or a larger number of smaller tenants. There are arguments for and against each approach. The case for having a larger number of tenants is that many businesses of a similar type may congregate in the same area to their mutual benefit. The concept of "clusters" in which businesses support each other is widespread. Industrial clusters are often located at ports, creating areas of high productivity, lower transaction costs, technological innovation, and a general environment to encourage further business development. Larger ports are particularly attractive locations, notably in Rotterdam, Yokohama, Antwerp, Hamburg, Marseilles and Houston. The Boxes 3.5 and 3.6 provide examples of port-related clusters. Clusters are discussed in more detail in Chapter 5.

Box 3.5. Development of port industrial clusters

In the 1970s, the larger European ports targeted refineries and chemical industries for co-location and co-development, with considerable success. Thus, for example, a large cluster of five refineries and many chemical-processing companies were located in the Port of Rotterdam as a direct result of public policies developed in 1950s. A cluster of world class, specialized marine services likewise established themselves in the Port of Rotterdam as a result of the good hinterland connections and the gas and oil finds in the North Sea.

A second example of cluster development is the Port of Colombo. A fashion goods and apparel industry cluster has developed around Colombo, which focuses on reliable, short transit container services to complete just-in-time (JIT) purchase orders. This development was business-driven and not the direct result of explicit public policy. The lesson demonstrated in Colombo is that quasi-public goods in the form of efficient industrial networks can be created and developed through private initiatives.

Source: Extracted from World Bank (2001).

Box 3.6. Port of Antwerp: large petrochemical and industrial cluster (Example)

In addition to transshipment and distribution activities many industrial companies are also situated within the port area. For example, Opel Belgium has one of its largest assembly plants in Antwerp. The chemical and petrochemical industries are particularly well represented, with the port ensuring a continuous and inexpensive supply of raw materials. It is worth noting that Antwerp is home to the largest concentration of chemical and petrochemical activity in Europe. The conglomeration effect provides Antwerp with an important additional comparative advantage. A port with a certain critical mass benefits from all sorts of clustering effects. Because of these effects companies can exploit possible synergies to the full, which in turn results in important gains in efficiency. One aspect of this is the wide range of regular shipping services to all continents (“cargo will attract cargo”). In the shipping sector there are many hundreds of specialized services on both the supply and demand side. Similar effects can be found for the port-related petrochemical industries. Therefore, it goes without saying that there is extensive interaction between the manufacturing and shipping sector in the port of Antwerp.

No less than 10 of the world’s top 20 chemical producers have selected Antwerp as one of their main locations. With four steam cracker installations, the port provides a stable local source for ethylene and other basic chemicals, as well as a surprisingly large diversity of chemical products. Antwerp is the main hub of the Western European pipeline network. Not only does it provide logistical expertise, an excellent infrastructure and a wide supply of service providers, but it also offers the potential for substantial growth. One of the main benefits of establishing a facility in the port is the possibility to integrate the facility into the existing industrial infrastructure and logistics service providers. When it comes to cluster quality, the Port of Antwerp definitely excels. Since more than 300 chemicals are produced locally, opportunities for new companies to participate in the synergies generated by this cluster are considerable. The Port of Antwerp offers a fast growing platform for the safe efficient transportation and distribution of chemicals.

The Port of Antwerp is considered to be one of the pillars of production of basic chemicals in Europe. Antwerp has a capacity of 2.18 million tons of ethylene per annum, or 9.2 per cent of the total European capacity. It also generates 11.8 per cent of the total European propylene output. A comparison of the six major petrochemical commodities, the so called “big six” (ethylene, propylene, butadiene, benzene, toluene and xylene), reveals that Antwerp, with a cumulative output of 4,793 million tons, is Europe’s largest petrochemical commodities centre.

Source: Port of Antwerp (2006).

3.4.5 Other categories of port use

Other categories of ports not considered in detail in this report are:

- Other commercial (e.g., offices, retailing);
- Passenger transport-related (e.g., cruise ships);
- Water-related leisure (e.g., marina);
- Other leisure services (e.g., heritage trail); and
- Residential.

The broad choice between "traditional port functions" and "non-port activities" has already been mentioned. This choice usually only becomes available when there has been a decline in traditional port functions, and a thriving commercial port is rarely converted to non-port activities. Another choice is between waterfront uses where the presence of water is essential and those that could be situated anywhere, including inland and away from water, such as an office development (Department of Transport, Republic of Ireland, 2006). The waterfront is frequently a highly desirable location for residential and commercial developments that have no connection with the port or the sea, but require a pleasant environment. Such developments may have greater sources of finance than have traditional port users, and often there will be lobbying in the face of development proposals to defend waterfront sites for "waterfront uses".

3.5 Responsibility for assets and associated services

A decision to locate at a port may not be entirely dependent on the services offered, but also on the extent of any organization's responsibility for provision of assets, and whether asset restructuring is possible. Key decisions for the port authority or owner are:

- The extent to which it wishes to provide its own assets;
- The extent of competition permitted or encouraged for the provision of specific assets; and
- The combination of assets to be put out to tender and operated by the (usually) private sector.

Issues of combinations of assets and the extent of competition are more relevant to those larger ports where the provision of competing services is more likely to be viable. There are three basic categories of port assets (World Bank, 2001):

- Long-lived, high cost infrastructure (e.g., breakwaters, channels and turning basins) that cannot be precisely assigned to individual port users;
- Long-lived, high cost infrastructure (e.g., quays and terminals) that can be assigned to individual users or service delivery systems; and
- Superstructure and equipment linked to specific users or service delivery systems.

Although the private sector could provide all classes of assets, it may wish to avoid the high risk and long-term returns of the first category. A detailed list of key elements of each asset category is provided in Annex A (World Bank, 2001). A retained public interest oversight is likely to be required, and the nature of the body responsible for this needs to be determined. In this context, different areas of legislation concerning the national institutional framework governing ports, concessions or contracts with private organizations, and operational regulations come into play (World Bank, 2001). Operational regulations may be national (e.g., laws related to environmental improvement or protection) or specific to a port (e.g., laws associated with ship access). In general, port tenants (e.g., producers, carriers, shippers) need to invest prudently in port facilities because of possible high "switching" costs if they move from one port to another. The development of surplus port land is, thus, crucial to attract and retain tenants and customers alike.

Box 3.7. The high costs of switching (Example)

A joint venture of Saudi Arabia and United States interests began operating a rice processing plant in the port of Jeddah in October 1995. It is the largest rice handling facility of its type in the Middle East and the investment in the facility creates an exit barrier should the operator become dissatisfied with the service received from the port. Another example is the container load centre in Salalah, where Maersk Sealand is a major investor in the terminal along with the Government of Oman. It is difficult to pack up and leave this facility if there is unhappiness with port policies. At the same time, sunk costs in facilities do not preclude leaving when things get too bad. ICTSI decided to pull out of the port of Rosario after having invested US$ 27 million in a failed effort to operate the container terminal. ECT left Trieste after a one-and-a-half year effort to operate the Molo VII container terminal. Both contractors decided that future losses would be greater than the cost of pulling out.

A service provider that participates in the financing of an activity is clearly in a better bargaining position than one who does not.

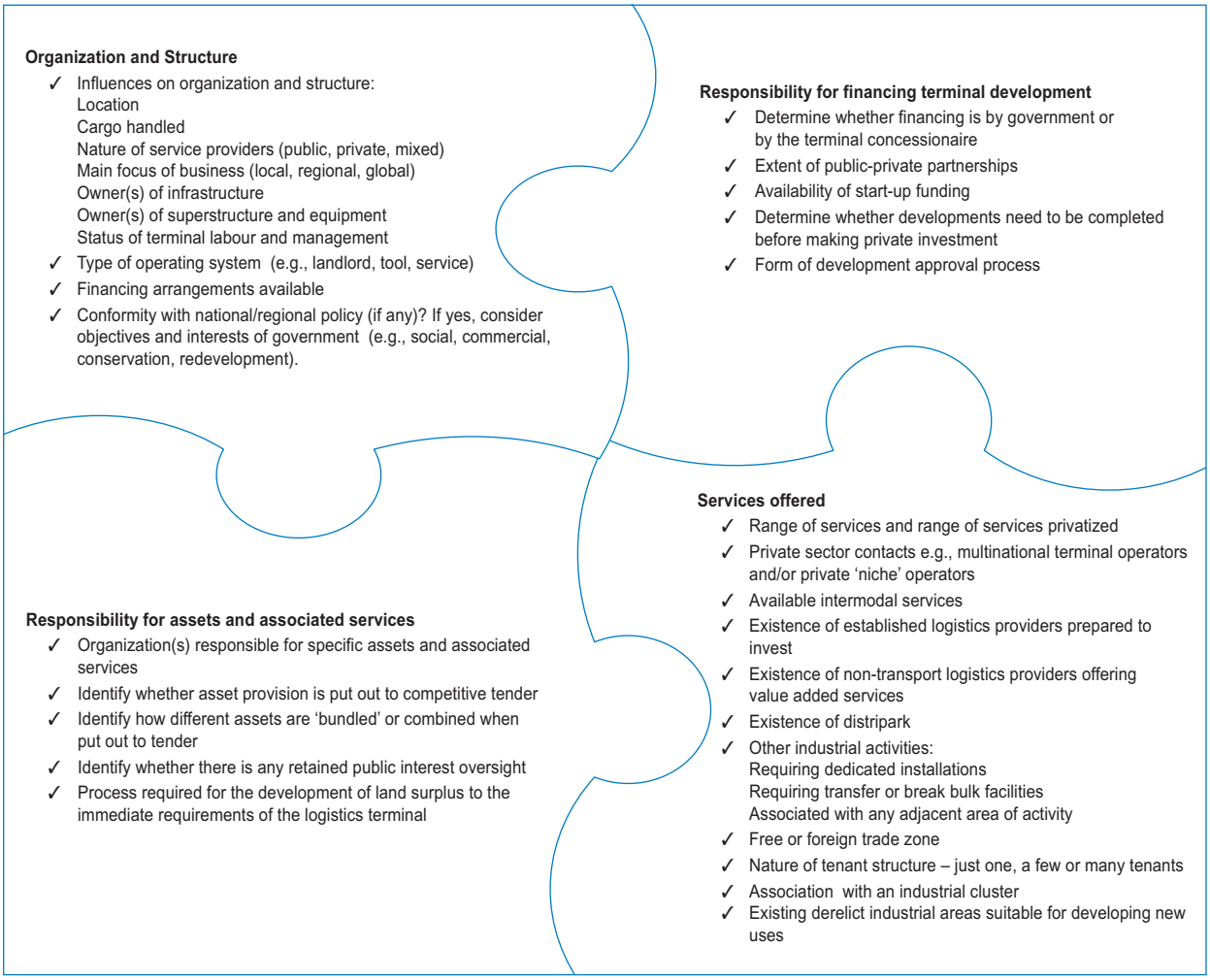
Source: Extracted from World Bank (2001).

Three major approaches have been identified for the development of surplus port land (World Bank, 2001; Department of Transport, Republic of Ireland, 2006): *Firstly,* redevelopment performed by the port authority thus extending its function from that of a port into a property developer, which may require modifications to its statutes. Examples include Barcelona and the Port Authority of New York and New Jersey. In the United Kingdom, Associated British Ports (ABP) has undertaken the same role, but as a private company. *Secondly,* the port land is transferred to a local authority, municipality or local Government for redevelopment. This requires the local Government to have sufficient resources to realize the full value of the land. Successful examples of regeneration of port estates near the city centre are found in Baltimore and Rotterdam. *Lastly,* a development corporation may be created specifically to redevelop dock land that covers a large area, more than one authority and high costs. An example is the London Docklands Development Corporation (LDDC) which was created by the British central Government and resulted from the failure of six waterfront authorities to develop a suitable dockland development plan (World Bank, 2001). A further example of a separate development corporation is the Puerto Madera Corporation in Argentina, a joint venture by the City of Buenos Aires and the Argentine national Government to convert old city docks into mixed commercial, residential and recreational use.

3.6 Intermediate conclusions: Towards a step-by-step action plan for "dry ports" – Part 1

This chapter has sought to identify the major factors governing the decision of enterprises to locate at ports or port-related logistics zones and to develop a framework suitable for application to inland ports ("dry ports") or logistics centres. Not every aspect of port development is applicable to an inland context, but much of the chapter content appears to be relevant. The outcome of this chapter is a four-stage process as a form of checklist for enterprises considering locating at a "dry port". The main topics and their decision elements are summarized in Figure 3.3.

Figure 3.3. Summary of Chapter 3 – Towards a step-by-step action plan for the development of "dry ports" (Part 1)



4 Replicating the Port Concept at Inland Locations

4.1 Introduction

The main objective of this chapter is to explore the idea of replicating the concept of seaports and logistics zones at inland locations. Inland logistics centres in various guises have existed for many years, usually under more traditional names such as “transport depot” or “warehouse” and overwhelmingly concerned with domestic (i.e. not international) logistics. This work restricts itself to considering inland logistics centres with an international role although, at the same time, recalling that any particular centre can play both an international and domestic role. Indeed, practically all international movements of goods ultimately require a domestic or inland component of collection at the point of origin or delivery at the final destination. A specific objective of this report is to examine the extent to which the concept of seaports can be applied inland. Consequently, the focus of this chapter is on inland ports. Since there is not universal agreement about the definition of an inland port, the various definitions and terminology associated with the topic are considered in detail.

In order to overcome the problems of indistinct terminology, this chapter adopts an approach whereby an inland logistics centre is defined by the collection of both functions and institutions associated with it. There is no precise definition of a logistics centre, and any such centre is capable of performing a number of different functions depending on not only market demand, but also convention or tradition, and Government policy, including such wider issues as environmental concern. Therefore, this chapter examines legal, financial and institutional arrangements, providing a number of examples of current practice.

4.2 The definition of inland ports

This chapter examines the concept of an “inland port” and then reviews some other terms applied to inland logistics locations where international trade is processed. Since the concept of an inland port is derived from that of a seaport, let us first return to the definition of the latter, originally considered in Chapter 3. As stated in Chapter 3, much of the literature on ports focuses on the larger container ports, in the context of which a prescriptive definition such as that of the OECD is acceptable. This definition states that,

> “A seaport is a logistic and industrial node in the global transport system with a strong maritime character and in which a functional and spatial clustering of activities takes place, activities that are directly or indirectly linked to seamless transportation and transformation processes within the logistic chains.” (OECD, 2000, p. 9, cited in Roso and Lévêque, 2002)

However, not all ports are necessarily operating efficiently on behalf of logistics chains, as Bichou and Gray (2005, p. 75) state:

> “Seaports are complex and dynamic entities, often dissimilar from each other, where various activities are carried out by and for the account of different actors and organizations. Such a multifaceted situation has led to a variety of operational, organizational and strategic management approaches to port systems.”

There is a frequent assumption that inland ports and intermodal terminals are to all intents and purposes the same. In other words, an inland port is the inland equivalent of a marine container terminal. The latter consists of three key parts: a quay for transfer between sea and shore; storage and processing space for containers; and an entrance gate or area for controlling the inward and outward flow of containers (Tioga Group, 2003). The only difference for an inland intermodal terminal is that the transfer between modes does not require sea access. Using the term “dry port”, (Roso and Lévêque, 2002, p. 50) give an example of a definition that is essentially referring to an intermodal terminal,

> "A dry port is an inland terminal directly connected to seaport(s) with high capacity transport mean(s), where customers can leave/pick up their standardized units as if directly to a seaport."

However, inland ports can be much more than intermodal terminals and may offer a range of functions, often dissimilar from each other. This makes it difficult to give a precise definition of an inland port, although there have been a number of attempts to do so. One class of definition hangs on the concept of the inland port as a location intended to relieve one or more seaports from congestion or other problems of access. For example, the Tioga Group (2003, p. 1) states that,

> "The 'inland port' concept refers to the idea that some seaport facilities could be duplicated or complemented at inland locations, thus reducing the need for scarce space at the seaport."

Another approach is to define inland ports as locations where aspects of international trade are performed. For example,

> "The formal definition of an inland port, used in this work, is a site located away from traditional land, air, and coastal borders containing a set of transportation assets (normally multimodal) and with the ability to allow international trade to be processed and altered by value added services at the site as goods move through the supply chain." (Leitner and Harrison, 2001, p. 43)

Trade Point United States (cited in Walter and Poist, 2003, p. 43) defines an inland port as,

> "A combination of assets which make a region an attractive distribution hub, consolidation point, or destination for imported and exported goods."

The Greater Des Moines Partnership (cited in Walter and Poist, 2003, p. 44) provides the same emphasis in its definition of an inland port as,

> "An inland, intermodal port... that would facilitate international and domestic commerce, as well as provide support for export and import opportunities by consolidating at a single source all services related in trade, licensing, loading, storage, light assembly and bonding."

Walter and Poist (2004) stress the importance of an information-based approach to an inland port by stating,

> "The most-desirable features of a North American inland port appear to be both information and facilities-based... promoters of an inland port would be advised to begin with an information-based model before adding or leasing facilities for handling customs inspections, intermodal transfers and other transportation duties." (p. 593)

Elsewhere they cite La Londe as describing the inland port concept as being based on information,

> "Traditionally, a port is located on navigable waters. Now, it is information, used to coordinate transportation and distribution, instead of water. That allows an inland area to operate as a port." (Walter and Poist, 2003, p. 42)

Inland ports are not a new phenomenon and there are many examples of historic inland ports based on rivers, such as Duisburg in Germany. The primary reason for their creation and development was, of course, the existence of a navigable river or lake. However, in modern times, inland ports have often been developed to overcome congestion in seaports or on their access and established hinterland routes, particularly following the growth of containerization. They have also been established to improve access to new markets for shippers (Roso and others, 2006). Modern inland ports are as likely to be linked to seaports by rail and/or road links as much as by waterways, and are often referred to as "dry ports" or "dryports" (both forms of spelling are used).

A potential area of confusion is whether there is a distinction between the terms inland port and dry port. There appears to be no published discussion of the relative merits or meanings of these two

Box 4.1. Major River Ports in China (Example)

Chongqing Port, Wuhan Port, and Nanjing Port could act as important transshipment places for inland transportation… Chongqing Port is located in the mid-west of China, Chongqing Port is the main inland port which is the biggest one in the upper reach of the Yangtze River. This port is also linked through railways of Chengdu-Yu (Chongqing), Xiang-Yu (Ankang), Yu-Qian (Guizhuo), and Yu-Huai (Huaihua), and the freeways of Cheung-Yu, Yu-Qian, Chongqing to Wuhan, and Chongqing to Changsha. This port offers a large range of management service: loading and discharging cargo in port, embarking passengers and cargos, transferring between waterway and landway, storage agency, logistics distribution, and tourism. Its throughput of cargo reaches 9 million tons a year and the passengers going there nearly 10 million a year. It has 114 berths with covers 350,000 m^2 storing areas. An international container occupation wharf whose total handling ability reaches 100,000 TEU a year, and an automobile roll on-off wharf whose handling ability is 100,000 autos. Chongqing Port has totally freight wharfs and 17 passengers transport wharfs, whose capital is 1.8 billion yuan, and is operated by Chongqing Prot Group Co., Ltd. Second, Wuhan Port is located in the middle reaches of Yangtze River, Wuhan is one of the most important inland river ports along the river. It is also home to the headquarters of organizations and corporations in relation with Yangtze River navigation and shipping. Wuhan Port is an open port ranked as Class 1 of Chinese classification along the Yangtze River.

This port can handle vessels up to 3,000-5,000 tons capacities. Frequent feeder service is available between Wuhan and ports along the Yangtze River to Shanghai and Chongqing. The port handles up to 900,000 tons in general cargo and 25,000 TEU of container traffic a year. The total port area is 122.45 km^2, of which, the land area is 1.75 km^2. There are four cargo loading/unloading areas and one passenger transport area. Since April 2002, the Wuhan Port has been decentralized to Wuhan municipal Government, and Wuhan Port Group is recently established for the port administration. Local Government will have more say in the port infrastructure and daily operation, and it will be more difficult for the port to get financial support from central Government for its infrastructure construction. Third, Nanjing Port is located in the lower reaches of the Yangtze River. Nanjing is open to navigation for 35,000-ton ships all the year. After completion of the dredging project of the estuary and lower-reaches waterway of the Yangtze River, Nanjing Section of the Yangtze River will be navigable to over 50,000 tons. The port is a multifunctional sea-river port for the collection and distribution of cargos along the Yangtze River and in the Yangtze Delta. It provides river/sea transshipment and water/land transshipment with an annual cargo throughput of over 60,000,000 tons. In 2002, its throughput exceeded 300 thousand TEU and in 2003, it will exceed 400 thousand TEU, maintaining its position as the biggest port along the Yangtze River in container transportation. It has eighteen 10,000-dwt wharfs, fifty-two 1,000-dwt wharfs and 16 buoy berths; there are 59,338 m^2 warehouses, 477,878 m^2 storage yards, and an 18 km port railway. This port owns the largest port areas for petrochemical, container, coal and foreign trade along the Yangtze River.

In order to meet the requirements of rapid development of container transportation, the Longtan Port Project, Phase I has been commenced after obtaining approval from the Central Government of the State. The project will lay emphasis on building three 25,000-ton level (with the hydraulic structures satisfying the requirements of 50,000 tonners) container berths and two berths under 10,000-ton level. The designed throughput capacity is 520,000 TEU and the total investment in the project will be 1.1 billion Yuan. It is expected to be put into production at the end of 2003. By that time, as the container businesses at Xinshengwei will be transferred to Longtan Port Area. As a special container port that is the largest in scale and highest in level of modernization among all ports in the Yangtze Valley. Longtan Port will become a gateway for trade and a transit base of Nanjing and areas in the middle and upper reaches of the Yangtze River.

Source: Lim and Ko (2005, pp. 67-69).

terms and, at the risk of appearing pedantic, there is a need for clarification of what is meant by each term, since both are widely used. For some writers the terms appear to be interchangeable. For others, an inland port is a river port/lake port/inland waterway port with access to the ocean, whereas a dry port is an inland terminal connected by “dry” modes (i.e., road or rail) to a seaport. There is no complementary term “wet port”, although “river port” is commonly used. In this interpretation, a dry port is a subcategory of inland port.

Yet another interpretation is that an inland port is truly inland and some distance from a seaport, whereas some dry ports can be very close to a seaport, in effect acting as a container overflow park for the seaport. UNECE/ECMT/EC defines a dry port as an “inland terminal which is directly linked to

a maritime port" (UNECE/ECMT/EC, 2001). This definition is also preferred by OECD, who provides no definition for an inland port (OECD, 2006). However, elsewhere, UNECE states that "dry port" is a synonym of an inland clearance depot (ICD) – see below for further discussion of ICDs.

For Roso and Lévêque (2002) the term dry port should be applied only to inland terminal facilities that conform to three criteria:

- Direct link to a seaport;
- High capacity transport link(s); and
- Availability of services found in a seaport.

Following this definition, an inland location without services normally found at a seaport (e.g., customs clearance) would become a dry port only if such services were introduced. Much of the material on this subject area and in the public domain emanates from the United States either as Government, commercial or academic publications. A search of United States Government websites reveals that the overwhelmingly preferred term is "inland port". Indeed the term "dry port" is barely used and usually refers to developments outside the United States. For example, Leitner and Harrison (2001, p. 15) state that, "Metroport Auckland is New Zealand's first inland port – officially termed dry port – focused on landside container flow". The following quotation from Leitner and Harrison (2001) suggests that the use of the term inland port is not restricted to those with water connection such as river or lake ports:

> "It is recognized that a substantial amount of trade is currently processed at inland sites including airports, intermodal hubs, and dedicated inland ports. A definition of these sites, which will be referred to collectively as inland ports, is important to enhance understanding and operational impacts on the transportation system. Defining the sites will also allow for understanding of how federal and state actions can best support the successful operation of inland ports and how these in turn impact the modal corridors (rail, waterway, and highway) along which they are located. Many terms have been identified to designate locations where international trade is processed. Such facilities are frequently named container freight station, freight hub, freight gateway, international trade processing centre, river port and industrial park, among other terms. However, it is important to note that the names used to describe the sites are secondary to their function and are often chosen by individuals without regard to their technical definitions.
>
> When defining inland ports, recognizing that their function as a location where international trade is processed is important. In addition to international trade processing locations, inland ports can be sites where congested ports are relieved, many services are provided at one location, or local and regional development is promoted." (Leitner and Harrison, 2001, pp. 41-42)

The point made by Leitner and Harrison about names given to locations, without regard to the functions performed, concurs with the findings of the research made for this report. Although there are a number of definitions of both dry ports and inland ports, the overwhelming evidence is that the two terms are synonymous, with the term "inland port" preferred in North America and the term "dry port" in many other parts of the world. Based on the number of mentions of each term in the search engines of Google and of Lloyd's List, the specialist shipping newspaper, inland port appears to be the more common term[2], although important international organizations such as UNECE and OECD prefer to use the term dry port. (Numerous other names exist to describe dry ports and inland ports. A non-exhaustive overview is provided in Annex B.)

[2] A search on both Google and the archives of the specialist shipping newspaper Lloyd's List produced approximately three times as many citations for inland port compared with dry port in both cases. The term 'inland dry port' is also found, although rarely, in Lloyd's List.

With this in mind, a review of the various terms used suggests that the following key attributes are often, although not always found:

- Geographical attributes
  - linked to a sea or airport
  - inland – located away from traditional land, air, and coastal borders
- Transport logistics attributes
  - high capacity transport link(s)
  - more than one transport mode
  - intermodal transfers
- Warehouse logistics attributes
  - temporary storage or warehousing
  - consolidation and deconsolidation
- International port attributes
  - international trade involved
  - customs inspection
  - other services found in an international sea or airport
- Value add logistics services
  - freight forwarding
  - information systems
  - other value added services

The type of facility being investigated in this report should have three key existing or potential features:

- An existing or potential high capacity direct link to an international port;
- The range of facilities offered at international ports (apart from those specifically associated with the sea (e.g., pilotage); and
- A range of logistics services.

4.3 Classification of inland or dry ports

There have been few attempts to classify inland ports into different categories. One classification (using the term “dry port”) is that of Roso and others (2006) based on distance from a seaport, namely:

- Distant dry ports;
- Mid-range dry ports; and
- Close dry ports.

A distant dry port is perceived as the most common type with the longest history. Its advantages are that there are cost savings by making use of rail, rather than road, over longer distances, and that the seaport’s hinterland is extended. A mid-range dry port is likely to make use of road transport from the seaport and act as a consolidation point for rail services, although high capacity flows may make dedicated container rail services viable. A close dry port is situated in the immediate vicinity of a seaport and provides a buffer to the seaport by enabling greater terminal capacity and permitting larger container ships to call at the seaport, possibly through the operation of a rail shuttle service. Two examples below highlight the practical implement of dry ports with air transport being the dominant mode of transportation.

Box 4.2. Rickenbacker International Airport

Rickenbacker International Airport in Columbus, Ohio, was privatized from a military airport in 1980. Since that time there has been a focus on trying to develop Rickenbacker as a distribution centre, capitalizing on the strength of its location, being centrally located near more than half of the United States manufacturing base. "With our geographic asset, the region has been focused on distribution and supply chain activity since 1980," claims David Whitaker, the airport's Vice President of business development and communications. The region has been very active and focused on logistics as a core competency. Just in the Rickenbacker area, there are 30 million square feet of warehousing and DCs under roof, and the Columbus area also boasts other major DCs. The facility enjoys three modes of transportation. It has a first class international airport with two wide runways capable of landing any aircraft in the world and which are open all the time. Rickenbacker has an existing intermodal facility, called Discovery Park, operated by rail company, NS. "This year construction is expected to begin on a new intermodal facility, also to be operated by NS," notes Whitaker. "The theory at the moment is that both the new and existing facilities will be used to provide new intermodal capacity. Discovery Park will probably still be used as an intermodal facility for a few years – it's an NS asset, so they'll make the final decision." Motor carriage is the third mode at the airport. The new Rickenbacker intermodal terminal is a component of the Heartland Corridor Project that will connect the Port of Virginia to Chicago through Virginia, West Virginia and Ohio. Rail Company CSX has mainline track presence in the area though it does not have an intermodal operation at Rickenbacker. "A small percentage of goods are arriving by air," Whitaker notes. "The raw number is so large that the percentage is significant. In 2005 we had our best year in over 15 with more than 100,000 tons transported." Air cargo operations have been upgraded through development of the Rickenbacker Air Cargo Terminal Complex, which is comprised of three air cargo terminal buildings with 164,000 square feet of space and direct airside access. Two more terminals are planned for construction over the next few years. With its designation as FTZ 138, the Air Cargo Terminal Complex offers Rickenbacker global trade services for freight forwarders and shippers. Combined with the airport's Customs clearance facility, Rickenbacker is among the largest ports of entry for textiles in the United States. In addition to rail expansion, another big project for Rickenbacker is its Global Logistics Park. "We have partnered with Duke Realty to develop 1,000 acres of airport land we've identified as not necessary for aviation purposes," explains Whitaker. "It's where we'll offer distribution and light manufacturing. We will be capitalizing on the growth we expect from the new intermodal facility."

Source: Morton (2006).

Box 4.3. Rickenbacker International Airport

The trend toward regional gateway development began with the international freight forwarder Panalpina locating a gateway at Huntsville International Airport in Alabama. The inland Port of Huntsville now combines the airport, an international intermodal centre and an industrial park serving the Tennessee Valley region and, by truck, the entire southeast United States region. The gateway operation has grown to 14 flights a week from one a week in 1990. David Beatson, regional CEO of Panalpina, forecasts doubling that number in three years. At Huntsville, a city of 158,000 people, the Port of Huntsville has increased the runway to 11,600 ft. from 8,000 ft. and has set up a Foreign Trade Zone. The United States Government conducts United States Customs and Agriculture Department inspection services there around the clock.

Source: Ott (2004).

4.4 The development of dry ports

4.4.1 The advantages of dry ports

The list of attributes given in the preceding section suggests that when considering the advantages offered by inland logistics ports, we need to look at both functional and locational advantages. The existence of an inland logistics port provides shippers with a direct interface to international transport and therefore gives them a locational advantage. It also provides them with access to a number of functions that can be undertaken at the inland logistics port, some of which are traditionally restricted to international ports or border-crossing points (e.g., customs clearance). Most of the advantages described below directly relate to shippers. However, if shippers perceive advantages in the existence

of an inland logistics port, then it also provides business opportunities for the logistics sector and for the local economy in general. Typical advantages of inland logistics ports are:

- Inexperienced inland-based shippers have the opportunity to undertake international trade through local facilities;
- International functions such as customs clearance and labelling for export can be undertaken locally (Walter and Poist, 2003);
- Uncertainties of customs clearance can be eliminated through the locational advantage of having all associated functions at one site (e.g., unloading, modal transfer, redistribution) (Leitner and Harrison (2001);
- Smaller shippers can benefit from consolidation of their consignments with others to form full loads;
- Inland-based shippers have direct access to international transport equipment such as containers or roll-on/roll-off vehicles;
- Inland-based domestic-only shippers have access to a wider range of local resources (Walter and Poist, 2003);
- "Transportation-related waste" associated with inefficient supply chains can be eliminated or at least reduced. This is achieved primarily through better linkage between different modes (e.g., intermodal rail facilities) or within modes (e.g., connections between different major road routes) (Leitner and Harrison 2001; Morash, 1999, in Leitner and Harrison); and
- Collaboration is possible between different institutions undertaking such functions as distribution, warehousing, and manufacturing, providing a "shared location for partners" (Robinson, cited in Leitner and Harrison 2001). In other words, this is a benefit of clustering.

A comprehensive analysis of the advantages of dry ports requires a balance check between transport externalities, which can be benefits and costs. Rothengatter (1994) presents a number of external transport benefits (specifically referring to road transport). Those particularly relevant to inland logistics ports include:

- Extension of the consumption pattern and improvement of living standards;
- Introduction of growth and structural effects, and freight logistics to create new approaches to industrial labour division and interaction, setting new quality standards such as "just-in-time" transport;
- Increase in flexibility and innovation, which creates a new quality of service and transport and strengthens the economy for international competition;
- Cost reductions for packing, processing, and logistics; and
- Positive employment effects in peripheral regions.

4.4.2 Constituents of a good dry port

A number of key features contribute to the operation of an effective inland logistics port. They include:

- Location at or near a rail-based intermodal terminal. Many centres have access only for road transport, either because of a strong road-orientation within an industry or economy, or because of mediocre service by rail. With the growth of legislation or taxation against road congestion, the appeal of intermodal centres should increase (Konings, 1996);
- Access to sea and/or airports;

- A high quality transport system, preferably consisting of all three modes – rail, road and airway. Leitner and Harrison (2001) consider that good transportation is the key determining element for a successful inland port. They suggest that such a facility has a "development life cycle" where first transport is introduced, followed by distribution facilities, and finally manufacturing facilities. Examples of good practice include air cargo capacity, intermodal facilities, and easy access to the road system (Walter and Poist, 2003);
- Advanced technology in information-sharing such as EDI. This allows international trade to operate at locations other than the traditional international boundaries enabling seamless movement of goods door-to-door. An information centre with transport and trade publications and statistics can also be offered, perhaps in association with a website (Leitner and Harrison, 2001; Walter and Poist, 2003);
- Ability to meet the needs of a specific marketplace by integrating services with the physical infrastructure (Roso and others, 2006) and with potential users who have existing traffic (Leitner and Harrison, 2001);
- Sufficiently large local population as a market and/or labour pool. A minimum base population of three million people has been estimated to be needed for an inland port (Leitner and Harrison, 2001);
- Sufficiently large area of land for development, estimated at 5,000 to 10,000 acres (approximately 2025 to 4050 hectares) (Leitner and Harrison, 2001);
- A full range of services appropriate to an inland logistics port. These include all modes of transport, transloading (between international and domestic transport), warehousing (included bonded warehouse to offer postponement of tax payment), distribution, consolidation, container services (empty storage, maintenance and repair), customs clearance, other logistics services, and manufacturing. (Leitner and Harrison, 2001; Roso and others, 2006; Tioga Group, 2003);
- A free trade zone to provide a tariff shelter (ESCAP, 2005; Walter and Poist, 2003);
- Security and control using modern information and communication systems (Roso and others, 2006);
- Proximity to substantial manufacturing capacity and production centres or to large shippers;
- Effective cooperation between public and private organizations, possibly through councils formed to address the problems of interested parties such as shippers and logistics providers (Walter and Poist, 2003);
- A multipurpose business centre for offices, conferences, trade shows etc. (Walter and Poist, 2003); and
- An inland logistics port can have a positive impact on the regional or local economy, not only by providing direct processing of international trade, but also by attracting distributors and manufacturers associated with it. This is another advantage of clustering.

4.4.3 Critical issues for the effective development of dry ports

The development of dry ports requires attention to several critical issues that influence the development of dry ports.

- Disagreement between shippers and carriers or other logistics companies about the nature of the facilities (Walter and Poist, 2003).
- Government involvement may not be at the appropriate level. In many countries inland logistics centres or nodes are not public assets under the responsibility of Government,

unlike rail transport systems, road infrastructure and international ports. Often the development of inland logistics centres rests entirely with the private sector. For example, Roso and others (2006) point out how the European Union has established the major links in the Trans-European Network (TEN) for intermodal transport, but offers no guidelines on the location or the functions of the nodes of the network. The focus on links rather than nodes is typical of many Governments and is reflected in the composition of ministries, which are generally associated with specific transport modes (e.g., Air Ministry) rather than with intermodalism or logistics as an integrated service (OECD, 2001).

- Development creates its own congestion through the growth of road transport activity, which in turn may reduce accessibility to the facility (Konings, 1996).

Similarly to the argument about the external benefits of transport in general and dry ports in particular, the external costs need to be evaluated. External transport costs have two major impacts: on the stock of non-renewable natural resources; and through interactions within the transport system.[3] External benefits of transport would, ideally, compensate for the external costs. However, they may also be seen as internal benefits to the transport operator resulting from lower transport costs or greater efficiency. Therefore, it could be argued that they do not compensate for the external costs of transport. The external costs of transport are many and varied and may be considered in both global and local terms. The local aspects of external costs of transport may be divided into the following:

- The environment (pollution and noise);
- The infrastructure (vibration and road wear); and
- Social considerations (safety, congestion, intrusion and community severance).

The discussion of advantages, constituents and critical issues related to dry ports shows that effective development of efficient dry ports has significant legal implications, which will be discussed in the next subchapter.

4.5 Legal implications of dry ports

4.5.1 Background

Government has traditionally played an important role in many areas of transport, although the extent of the role varies both throughout time and from one country to another. Government has also played a role in the governance of seaports in many countries, but much less of a role in policy associated with inland logistics centres. Therefore, any list of Government responsibilities connected with inland logistics ports should be seen in this context. Furthermore, responsibility of different levels of Government within a nation (local, regional, national) or at the supranational level (e.g., the European Union) may also vary.

4.5.2 The roles of Government

Typical roles adopted by Government may include the following, although not necessarily all of them.

- Providing infrastructure (e.g., roads, bridges, port facilities);
- Improving safety;
- Protecting the environment;
- Protecting existing industry sectors;
- Promoting new industry;
- Improving regional/national competitiveness;

[3] An example of the former is the so-called greenhouse effect, and the latter is best typified by road congestion.

- Restricting monopoly power;
- Controlling excessive competition;
- Integrating land use and transport;
- Integrating modes of transport;
- Safeguarding social standards (e.g., employment levels);
- Promoting access of national carriers to external markets or restricting access of foreign carriers to national markets (e.g., cabotage[4] issues); and
- Providing statistics (particularly national transport statistics).

In this report, the treatment of legal aspects is restricted to legislation required to implement major changes in logistics systems on a national or supranational basis, that in particular have an impact on the development of inland logistics ports. This report does not consider the many kinds of legislation throughout the world associated with commercial or industrial premises in general and including logistics centres (e.g., health and safety legislation), however legal, institutional and administrative arrangement of major logistics centres for foreign investment is briefly summarized as follows, which could be a reference to policymakers in charge of dry port development. There appears to be some evidence of enabling legislation associated with dry ports (see Box 4.4), while legislation to assist in the development of intermodal transport exists in the United States and the European Union (see Annex C and D for more detail), which by association can be considered as a form of legislation for inland logistics centres. This report will therefore seek to extract the relevant aspects from the intermodal legislation.

Box 4.4. Enabling legislative environment for foreign investment in major logistics centres and dry ports

Hong Kong, China: Foreign investors can establish companies without approval from authority. No restriction on local labour employment, foreign currency exchange as well as local products procurement. All business areas are open to foreign investment except some public markets (e.g., postal service, water supply service). No discrimination among foreign investors and citizens in administrative treatment and economical activity. Investment Promotion Strategy Group (IPSG) and InvestHK established to promote foreign investment. Several programmes (Investment Promotion Programme, Service Promotion Programme, High-Profile Brand-Building Programme, Helping Business Programme) are promoting foreign investment. The Investment Promotion Programme and the Protection Agreement (IPPA) signed with Australia, Netherlands, and others. Corporate tax rates are at the lowest level compared to other countries in Asia. No customs duties on foreign-invested companies except alcoholic beverage, cigarette, petroleum, methyl alcohol.

Singapore: One-stop service to foreign investment. No discrimination among foreign investors and citizens in administrative treatment and economical activity. Economic Development Board (EDB) established to promote foreign investment. Various incentives provided to foreign-invested headquarters, namely operational headquarters, business headquarters, manufacturing headquarters, global headquarters. Flexible tax incentive rate for foreign investment.

Netherlands: One-stop service to foreign investment. No discrimination among foreign investors and citizens in administrative treatment and economical activity. Provision of specific information and administration service to foreign-invested companies. EDI network established among ports, inland logistics centres and customs. NFIA and HIDC established to promote foreign investment. Provision of logistics consulting service through HIDC. Tax exempt up to 30 per cent of foreign worker's salary.

China: A group of plans concerning logistics development has been established by local or provincial Governments, which refer to the development of inland or coastal logistics centres, the fostering of logistics companies, the strengthening of competitiveness of logistics service, the requirements for administrative arrangements and so on.

[4] Cabotage is the transport of goods between two locations in a single country. It has been an issue within the European Union for various transport modes (e.g., road freight and shipping) when foreign operators have sought the right to transport goods entirely within another member country.

For example, a plan on logistics modernization, established by Zhejiang Province in 2002, aims at network system upgrading of logistics-related facilities, establishment of information systems and market systems for logistics modernization. A development plan for a logistics hub in South-East Asia, established by the landlocked Province of Yunnan in 2002, aims to facilitate administrative and legal arrangement for logistics system modernization regarding the construction of six logistics centres and related transport facilities such as roads and railways. There are about 3,800 special development zones including logistics centres across the country from coastal area to the deep hinterland, where various legal incentives are provided to foreign and domestic investors in order to consolidate/ develop industries and businesses including logistics. Incentives provided at logistics centres can be categorized as land incentive, tax incentive and others such as administrative support.

Japan: Japan has formulated and implemented various logistics-related policies since the 1960s. Those policies cover various items required for efficient and competitive logistics in coastal and inland regions and refer to logistics centres development and upgrading, decrease of logistics cost, logistics modernization, IT development, human resources management, energy and environment issues.

Republic of Korea: ROK started to formulate systematic policies to promote logistics, especially inland logistics in the 1970s and it established a "Five year action plan on logistics modernization" (1970) as well as implemented the "Act on facilitation of logistics modernization" (1970). As a recent example of systematic policies, the ROK formulates the "Basic plan on logistics improvement" annually from 1994 which regulates regional logistics centres development, the establishment of inter-regional transport network, efficient operation of logistics centres, establishment of integrated information system on logistics, administrative and institutional arrangement, and so on. The ROK has also designated some specific inland locations as special zones for foreign investment, where foreign investors can enjoy economic incentives.

Source: ESCAP (2005a), Korea Maritime Institute (2003).

4.6 Administrative/financial arrangements

In many parts of the world the funding of inland logistics centres has been undertaken by the private sector, or by public/private arrangements. Chapter 3 discussed the arrangements for funding for ports to suit both public and private interests. A similar set of arrangements may be suitable for inland logistics ports.

The World Bank is an organization that has significant experience in funding both port and inland terminal developments, and has developed what appears to be a standard framework of assessment, which could be adapted for use by others when developing inland logistics ports. Upon completion of each project in excess of US$ 1 million, called a Global Environment Facility (GEF) operation and administered by the World Bank, the Bank reviews the results, and prepares an assessment called an Implementation Completion Report. This typically consists of the following themes that are all rated for performance along a number of scales (e.g., highly satisfactory to highly unsatisfactory) (World Bank, 2006):

- Assessment of Development Objective and Design, and of Quality at Entry
  - Original Objective
  - Revised Objective
  - Original Components
  - Revised Components
  - Quality at Entry
- Achievement of Objective and Outputs
  - Outcome/achievement of objective
  - Outputs by components
  - Net Present Value/Economic rate of return
  - Financial rate of return
  - Institutional development impact

- Major Factors Affecting Implementation and Outcome
  - Factors outside the control of Government or implementing agency
  - Factors generally subject to Government control
  - Factors generally subject to implementing agency control
  - Costs and financing
- Sustainability
  - Rationale for sustainability rating
  - Transition arrangement to regular operations
- Bank and Borrower Performance
- Bank
  - Lending
  - Supervision
  - Overall bank performance
- Borrower
  - Preparation
  - Government implementation performance
  - Implementing agency
  - Overall borrower performance
- Lessons Learned
  - The categories vary depending on circumstances
- Partner Comments
  - Borrower/implementing agency
  - Co-financiers
  - Other partners (NGOs/private sector)

In addition, various technical measures are included, typically consisting of:

- Key Performance Indicators
- Project Costs and Financing
  - Project Development Objective
  - Project Outcome
  - Project Output
  - Project Cost by Component
  - Project Costs by Procurement Arrangements (Appraisal Estimate)
  - Project Costs by Procurement Arrangements (Actual/Latest Estimate)
  - Project Financing by Component
- Economic Costs and Benefits
  - Economic and Financial Evaluation Summary
  - Economic Analysis (Cost and Benefits)
- Bank Inputs
  - Missions
  - Staff
- Ratings for Achievement of Objectives/Outputs of Components
  - Macro policies
  - Sector policies

- Physical
- Financial
- Institutional development
- Environmental
- Social
  - Poverty Reduction
  - Gender
  - Other

- Ratings of Bank and Borrower Performance
- Bank performance
  - Lending
  - Supervision
  - Overall
- Borrower performance
  - Preparation
  - Government implementation performance
  - Implementation agency performance
  - Overall

The Annex E gives an example of a published Implementation Completion Report for a loan for US$ 71 million to China for a container transport project (World Bank, 2005). The example is not provided to examine the quality of the particular project, but to show the evaluation methodology.

Whether or not to fund a project is a difficult decision for Government or other fund-givers, and the European Commission in its White Paper on European Transport Policy even refers to "the headache of funding" (European Commission, 2001, p. 57) and advocates innovative methods of funding. This refers specifically to transport infrastructure, which has traditionally received public funding. Interestingly, the focus of the White Paper is on connectivity, which is where inland logistics ports can play an important role,

> "To maximize the return on Community aid, therefore, and without waiting for the revision of the guidelines, the aim is not only to tighten up the selection criteria but also to ensure that Community funding is much more conditional upon the implementation of projects guaranteeing interconnection of the infrastructure concerned, their interoperability, their contribution to the development of intermodality, greater safety, and the recovery of the aid where this principle is not met." (European Commission, 2001, p. 57)

The European experience is clouded by the financial problems of the Channel Tunnel between England and France, and Box 4.5 illustrates the change of emphasis from fully private to public/private partnership investment.

Despite a similar approach to project financing, the success story of an effective and efficient dry port located in Duisburg (Germany) contains useful references for policymakers in the ESCAP region, as it investigates the question: How did an inland port over 300 km from the sea attract investment from ocean carriers and seaports? Additional examples from the region, especially China (e.g., Hefei Modern Distripark in Anhui Province and Nanjing Longtan Distripark, Jiangsu Province) underline the growth potential of dry ports.

Box 4.5. Reassuring private investors

When the Channel Tunnel was built, funding was provided by private investors. While this project is an undeniable technical triumph, it has however proved to be a notorious financial failure affecting small savers and major financial groups alike. The main weakness of a financial package of this type lies in the time lag between the capital expenditure and the first returns, which come only when the project becomes operational. These first returns do not necessarily mean profits. The most tangible effect of this failure at the financial level has been the lack of interest on the part of private investors to fund transport infrastructure, especially cross-border infrastructures on which profits, often low, are by no means certain.

In an attempt to remedy this situation, the Commission launched a consultation process in 1995-97 aimed at encouraging the development of public/private partnerships. Some major projects – the Øresund bridge/tunnel for example – have been funded by this partnership mechanism. The guarantees are such that almost the entire risk is borne by the State. In spite of this advance, the public/private partnership formula has still not been able to attract private investors; just as in other cases the inflexibility shown by some States has not encouraged the development of public/private partnerships.

By introducing new procedures for public contracts, the Commission is hoping to achieve greater involvement of private capital in infrastructure funding. The revision of the rules on public contracts already proposed and clarification of the rules applicable to public works concessions should result in the involvement of the private sector at the earliest possible stage in the planning of projects and greater legal certainty in the way in which they are put together. Experience has also shown that setting up a single body responsible for obtaining and utilizing funding is a precondition for the success of projects involving the private sector. Such mechanisms should therefore be encouraged.

Source: European Commission (2001).

Box 4.6. Benelux tie-up pays off for Duisburg

[…] There was little hope for Duisburg throughout much of the 1980s and 1990s as the steel and mining industries that made its original fortune went into decline. Today politicians and city planners can justly proud of taking the right decisions to reverse this decline. Instead of clinging to Duisburg's heavy industry heritage, they set out to transform the place into a service-oriented logistics hub. Years of planning, redevelopment and marketing have led to success. "We have become the top inland port among the world's top 100 container ports," reflected Erich Staake, CEO of port management group Duisburger Hafen (Duisport).

Last year 712,000 TEU were handled by its three large container terminals, DeCeTe, Duss and DIT, which combine barge, rail and road capabilities in a trimodal fashion. […] Hundreds of trimodal services arrive and depart from the German city. Given its favourable location on the Ruhr and Rhine rivers, barge transport to and from Rotterdam was one of the first links. Local steel producers such as the ThyssenKrupp mills led the way by sourcing coal and ore by barge. Now the focus has shifted to containerized goods that require distribution, finishing or on-carriage to consumer markets across Europe. After several years of double-digit growth, unitized cargoes such as standard containers and vehicles account for half of all throughputs in Duisburg with rail services taking a bigger piece of the action. A range of new shuttle services to Antwerp and Zeebrugge have recently been launched. […] Container lines such as CMA CGM and port and terminal managers such as the Port Authority of Bruges-Zeebrugge are involved. Both stakeholders represent important links to overseas container logistics chains that extend deep into inland markets. The overall efficiency of these chains (including repositioning of the equipment) depends to a large extent on well-functioning hub and spoke systems in the hinterland that are centred on linchpins such as Duisburg. […] That is the reason why no carrier or logistics group ambitious to control the entire door-to-door intermodal flow can afford to ignore the hinterland hubs. That is where the containers are transshipped, sorted or stripped and where the products are stored, picked and packed for distribution. […] Ocean gateway ports eager to increase their throughput have meanwhile realized that Duisburg has to be a vital part of their hinterland strategy. Its **strategic location and access to fast, high-density cargo lanes** allow them to reach markets they could not serve otherwise. Take the example of central and Eastern Europe. […], if they all put their Eastern Europe cargoes together in Duisburg they will achieve the critical mass required for an efficient, low-cost rail shuttle on that corridor." Staake explains. […] Duisburg took bold step to develop business by acquiring minority stake in P&O's (now Dubai Ports) Antwerp Gateway, which opened in 2005. It was probably the first time that an inland port – a satellite in the interstellar world of container transport – became a stakeholder in a fully fledged ocean terminal. Terminal congestion in 2004 dealt a tough hand to seaports – which

may now be starting to see the need for inland partner hub. Couldn't the ports be so much faster and more productive if they had more strategic buffers in the hinterland? Scientists […] point out that Duisburg provides terminals at seaports with valuable storage space and it can also take over many "sorting functions".

If ports dispatched discharged containers immediately to Duisburg by train and barge instead of storing them in their yards, they would have more resources to focus on what they do best ship-to-shore operations. It also works the other way around. "If we consolidate homogenous container cargoes for the barges operating into Rotterdam, then barge traffic could be rationalized tremendously" […]. Vessels could then just serve one terminal, whatever their loading patterns, so reducing overall intra-port traffic on a region. Ports like Rotterdam and Antwerp are already engaged in related projects. […]

Source: Hollmann, M. (2007, pp. 20-21).

4.7 Institutional arrangements

4.7.1 Background

When considering institutional arrangements, it is particularly important to understand the difference between functions and institutions. Functions are tasks or activities performed by institutions. Thus, an institution that calls itself a logistics operator may perform various functions within an inland logistics port, including consolidation of small shipments, or transporting containers. Under a Government-regulated system, the functions may be clearly defined and controlled as to who does what, but under a deregulated system constrained solely by the market, a particular institution may perform virtually any combination of functions. Gray and Kim (2001) provide a formal analysis of the functions in a logistics channel, which can be adapted to focus on inland logistics ports. They can be categorized as functions required by the shipper; functions required by the carrier; and intermediary functions between the shipper and the trading partner. Many of these functions could be performed at an inland logistics port.

The four classes of function primarily required by the shipper are:

- Transport services;
- Logistics centre services;
- Information processing services; and
- Professional advice and support.

The three classes of function required by the carrier are:

- Marketing services;
- Asset holding; and
- Assortment and volume convenience.

Logistics channel intermediaries can also act as an intermediary between the shipper and the trading partner. There is nothing new about this; for example, freight forwarders have undertaken customs clearance for many years. However, in recent years there has been a substantial increase in these types of activity, some of which are often called value added logistics. Tasks performed by logistics companies acting as intermediaries between the shipper and the trading partner fall into the broad classes:

- Inventory management of goods;
- Information processing services;
- Product transformation; and
- Delivery.

Figure 4.1. Transport Logistics Attributes

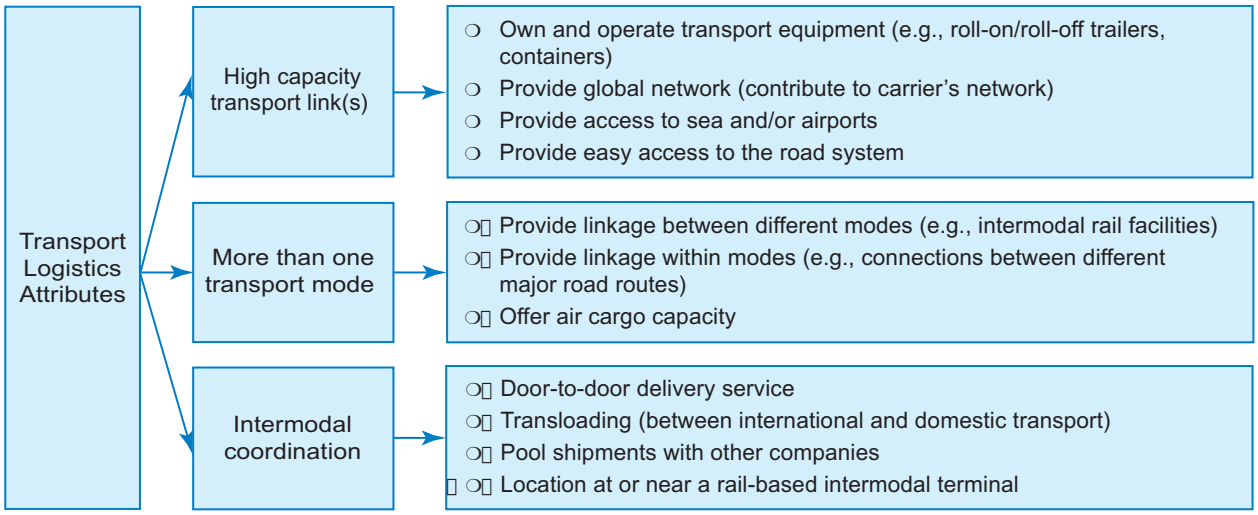


Figure 4.2. Warehouse Logistics Attributes

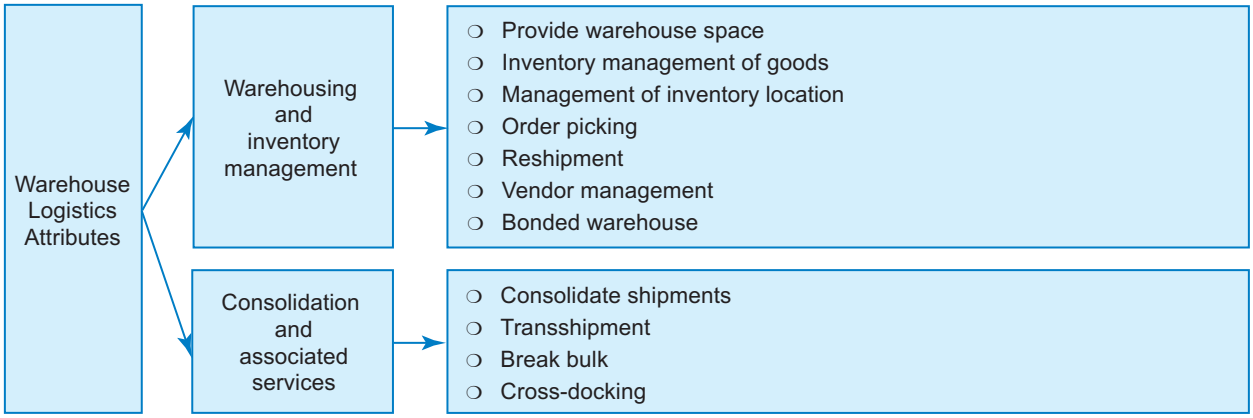


Figure 4.3. International Port Attributes

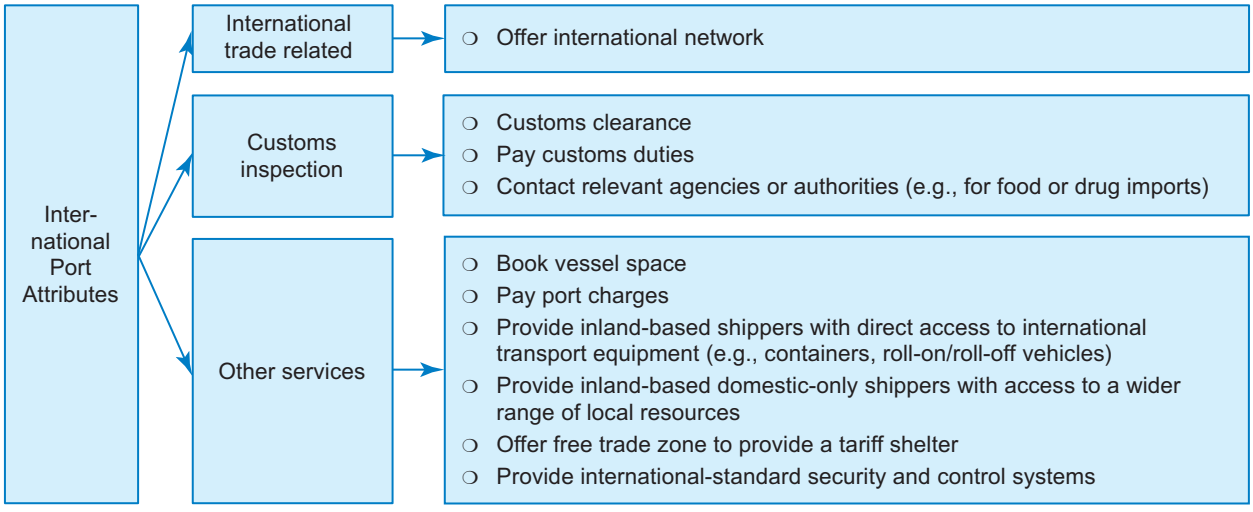
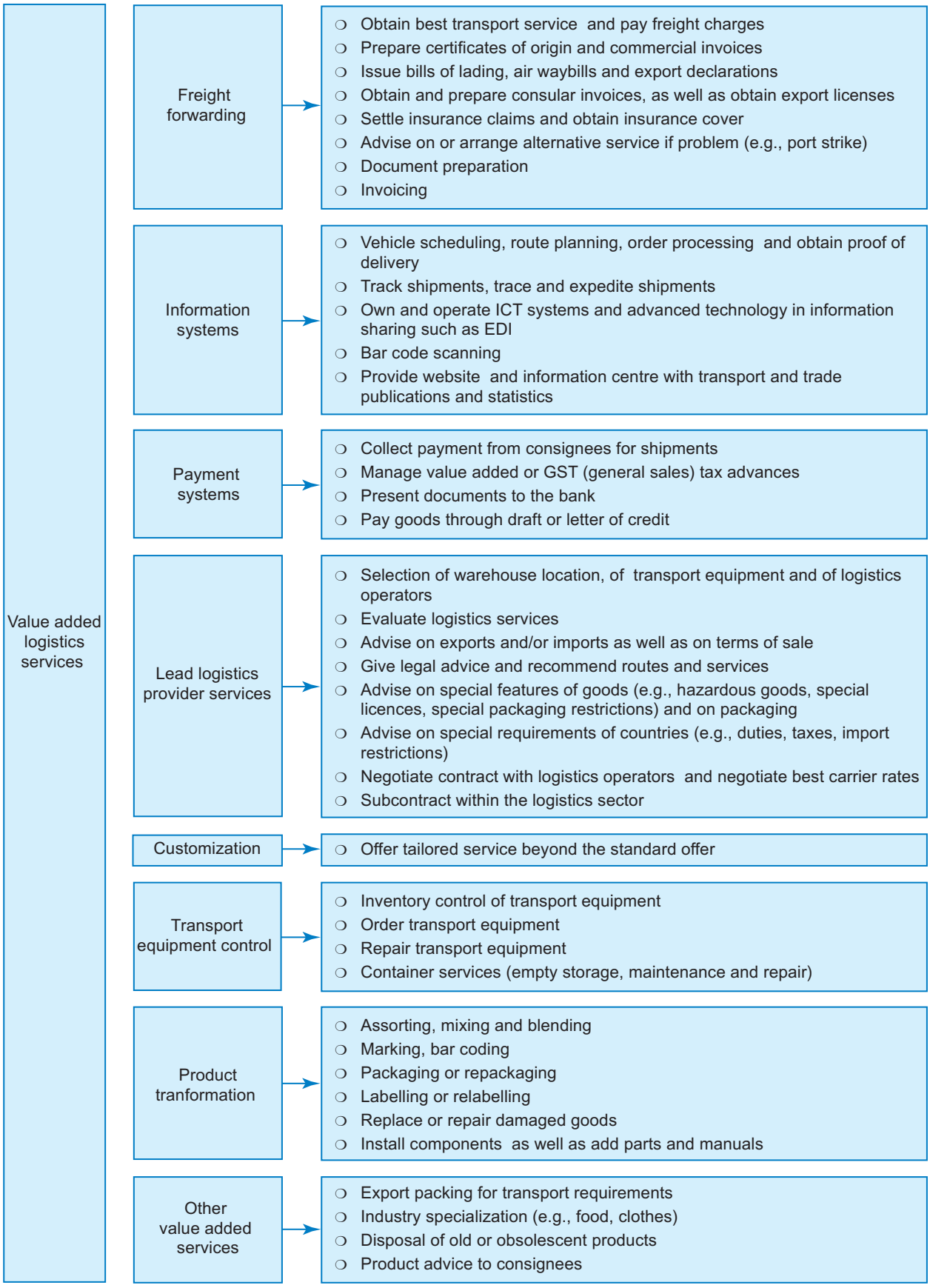


Figure 4.4. Value added logistics services



Gray and Kim (2001) provide a detailed list of many logistics functions under the above headings consolidated from a variety of sources. However, their list was not intended to focus specifically on inland logistics ports, and has therefore been adapted for the purposes of this report, and the summary of attributes is illustrated in the figures below. The revised structure has been derived from the findings of the literature review in this report. Although the list contains many functions, it would be wrong to consider it as exhaustive, as the logistics sector is in a constant state of change and new functions may be introduced, provided there is no legal restriction.

4.7.2 Changing functions

An inland logistics port could perform all of the above functions. The potential for specific functions will change over the years, and, as stated above, logistics companies have proved themselves to be very adaptable, for example in the face of containerization a few decades ago. Two major current challenges are the requirement for greater security measures and the rapid changes in information and communications technology. However, there are certain functions that will continue to exist whichever type of institution performs them. For example, either a freight forwarder or a local road haulage (drayage) company could make the final delivery from an inland port to the importer, or the international carrier may provide a door-to-door service on behalf of the exporter.

However, not all functions are essential or continue forever. For example, provided there are no legal constraints, the function of clearing goods through customs could be undertaken by a licensed import clearance agent or broker or by the exporter's freight forwarder, or even by the importing company itself. If two countries are part of a free trade area, the function of customs clearance for goods moving between those two countries may no longer be necessary and therefore disappear. An example of this happened within the European Union (EU) with the establishment of the Single European Market (SEM) in January 1993.

Functions do disappear, but generally, they persist, and given no legal restriction, various types of institution can perform them. Simply because a company calls itself a forwarder or carrier does not mean that it is necessarily restricted to performing a specific set of functions or activities. Nowadays the less specific but perhaps more appropriate term "logistics provider" is used ever more frequently by companies in the logistics channel. The distinction between freight forwarding functions and lead logistics provider functions in the above list is to some extent arbitrary, and based mainly on the "traditional" functions of freight forwarders.

The European Commission (Directorate G – Maritime Transport and Intermodality) has called for the creation of a new type of logistics company called a "freight integrator" defined as:

> "Freight Integrators are transport service providers who arrange door-to-door transportation by selecting and combining without prejudice the most sustainable and efficient mode of transport" (European Commission, 2003, p. 8)

According to the European Commission (2003, pp. 8-9), freight integrators should possess the following qualities:

"(1) The ability to devise intermodal transport solutions suitable for sophisticated supply chains;
(2) Neutrality in order to advise, build cooperation and mediate in the case of disputes;
(3) Knowledge and experience of all transport modes, as well as the storage and handling of goods;
(4) Long term relationships with shippers and operators;
(5) Access to information about transport services, operators and shipments; and
(6) Access to a broad network of contacts and partners."

This approach has been criticized by sectors of the industry who claim that such a role already exists. Furthermore, it can be argued that under a free market such a role would emerge according to market

demand. From the standpoint of this report, the concept of an integrating organization is sensible, but the focus is oriented too much towards transport with little consideration of the role of inland logistics ports, other than a brief mention of storage and handling of goods. A consortium led by the Zentrum für Logistik und Unternehmensplanung GmbH was commissioned by the European Commission to investigate the concept of freight integrators (Zentrum für Logistik und Unternehmensplanung, 2003). They did not specifically look at logistics centres, although their survey produced the following criticisms of terminals in Europe: lack of capacity; high cost of storage; lack of tri-modal (road, rail, water) terminals; terminals built for political decisions associated with development policies rather than where needed; terminals closing on Sundays; dismantling of rail tracks for the "last mile" to manufacturers.

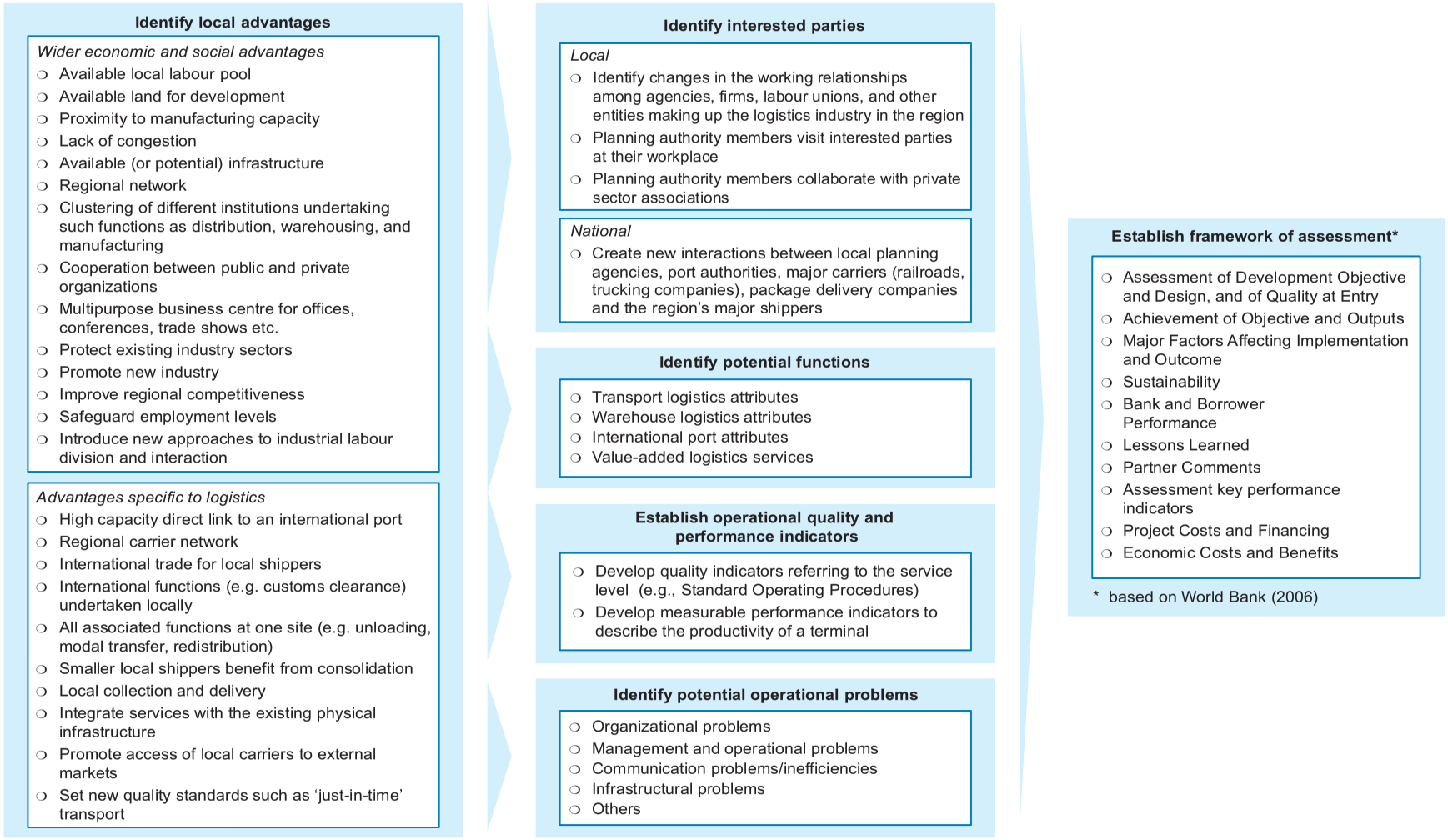
4.8 Intermediate Conclusions: Towards a step-by-step action plan for "dry ports" – Part 2

The literature review associated with this report has brought to light the much greater emphasis, particularly by Government, on logistics as transport (i.e. a link activity) rather than logistics as a node activity (Chapter 2 included a detailed discussion of node-link systems). No doubt this reflects the much greater Government involvement in transport rather than in logistics centres in many parts of the world. Nevertheless, it is possible to develop a step-by-step action plan for countries wishing to apply the concept of inland logistics ports. This chapter has presented a number of frameworks that can contribute to a six-stage process, which is:

- Identify local advantages;
- Identify interested parties;
- Identify potential functions;
- Establish operational quality and performance indicators;
- Identify potential operational problems; and
- Establish framework of assessment.

The chapter summary provided in Figure 4.5 gives a visual overview on the points discussed and serves as a reference for decision makers.

Figure 4.5. Summary of Chapter 4 – Towards a step-by-step action plan for the development of "dry ports" (Part 2)



5 The Concept of Clusters

5.1 Introduction

A cluster is a grouping of similar things. This chapter investigates the basis of grouping when applied to the specific context of industry, and in particular to logistics and ports. There are many characteristics that can form the basis of a cluster – geographical (not just close physical proximity, but also when linked by informational proximity); type of business; horizontal relationships of businesses in competition; horizontal relationships of businesses in collaboration; businesses and support services (Government may or may not be included); and vertical relationships of suppliers and customers. Clusters may also consist of more than one of these characteristics. The delineation of the boundary of any cluster is often imprecise, since clusters do not have natural boundaries and their borders can be somewhat arbitrary (de Langen, 2003).

Clusters can be local, regional, national or even global. There is some debate about the continuing relevance of location in a world of increasing globalization and instant communication where, it is claimed, geography is no longer so important, and some commentators even talk of the "death of geography". Others claim that globalization is making regional economies, as opposed to national economies, the focus for economic activity (Martin and Sunley, 2003).

5.2 Clusters: an examination of definitions

For illustrative purpose, Annex F with numerous definitions of the notion "cluster" provides an indication of the complexity and range of meaning associated

Bergman and Feser (1999) suggest that most studies of clusters tend to be highly idiosyncratic as they are specific to the policy concerns surrounding the cluster under study, or they are constrained by limited data or resources, or are subject to different theoretical underpinning. Theories appropriate to clusters are discussed later in this chapter. Some authors claim that the very ambiguity of the cluster concept has led to its popularity. Martin and Sunley (2003, p. 10) even consider it a "chaotic concept" in the sense of "conflating and equating quite different types, processes and spatial scales of economic localization under a single, all embracing universalistic notion". Nevertheless, it is a widely used concept and has proved of value in many contexts. Bergman and Feser (1999) consider that the key distinction is between clusters in economic space and clusters in geographic space, and Martin and Sunley (2003) see the definitional problem resting mainly with the geographical aspect applied inappropriately, with often little regard to spatial limits or scale. Increasingly, in a world of globalization and modern transport and communications, spatial proximity of cluster members becomes less important and they can be geographically dispersed but remain in a cluster (Bergman and Feser, 1999; Duncan and others, 2005). Bergman and Feser (1999) refer to François Perroux's seminal 1950 work titled "Economic Spaces: Theory and Application". Economic space is where buyers and suppliers communicate, and it need not be associated with physical space. In a global economy, linkages between firms may have a worldwide reach. In recent times, this perspective has become increasingly important with the growth of Internet trading.

There is even ambiguity concerning the concept of "space" in the context of clusters. According to OECD (1999) space (both in terms of distance and proximity) can be influenced by many dimensions apart from actual physical distance, including company size and internal structure, transport, communications and other technology, and cultural influences. All of these factors will have an impact on the process of clustering. It is not easy to measure distance or proximity along most of these dimensions, and various researchers have produced an assortment of different dimensions and means of measuring them. A criticism of this lack of uniformity is that it is difficult for policymakers to compare different reports on cluster developments or to form an objective judgment.

Another area of ambiguity is when attempting to define the difference between a network (also a very popular concept) and a cluster. The OECD distinguishes between the two concepts as follows,

> "The term network refers to a group of firms that cooperate on a joint development project – complementing each other and specializing in order to overcome common problems, achieve collective efficiency and conquer markets beyond their individual reach."
>
> "The term cluster is used to indicate a sectoral and geographical concentration of enterprises which, first, gives rise to external economies (such as the emergence of specialized suppliers of raw materials and components or the growth of a pool of sector specific skills) and, second, favours the rise of specialized services in technical, administrative and financial matters." (OECD, 1999, p. 270)

In the OECD definitions, the two concepts of network and cluster appear very similar, but with a difference of emphasis. The definition of a cluster focuses more on a concentration of firms offering the opportunity (i.e., "favours the rise") of activity, whereas a network is a planned collaboration to achieve something. Thus, the difference is in the intent. The above discussion makes it clear that there is no single ideal definition of an industrial cluster, and that it is possible to delineate clusters along a number of dimensions. Jacobs and de Man (1996) (cited in St. John and Pouder, 2006), identified six dimensions that underlie the structure and activity of geographic clusters of firms.

- Horizontal – competitors in the same or similar industries;
- Vertical – suppliers and customers in the same supply chain;
- Lateral – different types of firms using common resources with an "industry identity" (e.g., tourism or shipping);
- Technological – different types of firms sharing a common technology with a "technology identity" (e.g., Silicon Valley);
- Focal – firms based around a central entity such as a dominant firm or research centre; and
- Network quality – of interfirm cooperation.

Clusters can also be analysed at the different levels associated with economic theory, so that OECD (1999) links the three levels – micro-level, meso-level and macro-level – to clusters. Micro-level analysis deals with linkages between individual firms, meso-level analysis with linkages within and between industries, and macro-level analysis with the broader economic structure of industry groups.

5.3 Economic and management theories associated with the concept of clusters

Although there has been much recent interest in the concept of industry clusters and appropriate policymaking associated with them, formal theory about clusters probably dates back to the economist, Alfred Marshall writing at the end of the 19th century about "industrial districts" (OECD, 1999). More recently, interest in regional industry clusters has been influenced by the work of Michael Porter, and in particular, his book "The Competitive Advantage of Nations", published in 1990. A number of writers, adopting an economic geography viewpoint, have been critical of the approach suggested by Porter. The following sections provide an overview of the different theories associated with clusters.

5.3.1 Porter's concept of clusters

Porter's work must be the most popular cluster-related theory extant, based on the volume of comment both supportive and critical. Porter's work is the benchmark for most state and local cluster initiatives (Duncan and others, 2005), and his theory has become the standard concept in the field of cluster theory (Martin and Sunley, 2003). It is widely applied by policymakers throughout the world, not least because Porter has promoted his concept as a key policy tool and has himself advised many policymakers. Porter sees innovation as critical to the success of firms, and suggests that innovation

and competitive success are often geographically concentrated, giving as examples entertainment in Hollywood, finance on Wall Street, and consumer electronics in Japan (Porter, 1998b).

In Porter's own words:

> "I modelled the effect of the local business environment on competition in terms of four interrelated influences, graphically depicted in a diamond: factor conditions (the cost and quality of inputs); demand conditions (the sophistication of local customers); the context for firm strategy and rivalry (the nature and intensity of local competition); and related and supporting industries (the local extent and sophistication of suppliers and related industries). Diamond theory stresses how these elements combine to produce a dynamic, stimulating and intensely competitive business environment. A cluster is the manifestation of the diamond at work. Proximity – the collocation of companies, customers, and suppliers – amplifies all of the pressures to innovate and upgrade." (Porter, 1998b via Business Source Premier – unpaginated)

Porter's concept of a cluster includes both horizontal relationships (local competition and complementary services) and vertical relationships (suppliers and buyers). It also focuses on geographical proximity. Martin and Sunley (2003) consider that Porter's concept is limited by lack of clear cluster boundaries, an indeterminate level of industrial aggregation, an unspecified range of related industries and activities or degree of economic specialization. For freight transport, particularly the international movement of goods, a limitation of Porter's Diamond is that the strictly local aspect of the cluster excludes the long distance relationships prevalent in transport and logistics. This criticism is even more appropriate in a global economy (Duncan and others, 2005).

A further limitation of Porter's Diamond is that it does not explicitly include Government although it has indirect influence on each of the four factors (corners) of the diamond. However, Porter has included Government elsewhere as in the following definition of a cluster,

> "Clusters are geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialized inputs such as components, machinery, and services, and providers of specialized infrastructure. Clusters also often extend downstream to channels and customers and laterally to manufacturers of complementary products and to companies in industries related by skills, technologies, or common inputs. Finally, many clusters include Governmental and other institutions – such as universities, standards-setting agencies, think tanks, vocational training providers, and trade associations – that provide specialized training, education, information, research, and technical support." (Porter, 1998b via *Business Source Premier – unpaginated*)

Ultimately, Porter's cluster concept is firmly associated with competitiveness – not just of firms, but also industries and nations – which is perceived by policymakers as essential to success in the global economy (Martin and Sunley, 2003).

5.3.2 Other theories on geographical concentration

Bergman and Feser (1999) consider that there have been two basic conceptual approaches to explaining the benefits of geographical concentration. First, industrial location theory which develops the work of Weber (1929) to produce the concept of "agglomeration economies", or the benefits that firms obtain by clustering or increased spatial concentration. Second, external economies of scale (a concept developed by the 19th century economist, Alfred Marshall) are cost savings accruing to a firm through general growth in the industry of which it is part. Thus, external economies of scale occur outside of a firm, but within an industry. They contrast with internal scale economies, which are the source of increasing returns within a firm. Such external economies tend to be spatial and thus include the assumed economic benefits of proximity created by a cluster. Martin and Sunley (2003) describe the more recent advances in theory associated with local industrial specialization, spatial economic agglomeration, and regional development. A number of concepts have been developed including "new industrial spaces", "territorial production complexes", "neo-Marshallian nodes", "regional innovation milieux", "network regions", and "learning regions". The OECD (1999) lists further concepts

and the authors associated with them, including “industrial districts” (Alfred Marshall), “innovation clusters” (Joseph Schumpeter), “development blocks” (Eric Dahmen), “development and growth poles” (François Perroux), and “industrial and high-technology agglomerations” (various economic geographers).

Another concept often associated with industry clusters is that of “cooperative competition”, meaning that even highly competitive firms will cooperate for the general good of the industry, in other words they operate under a form of enlightened self-interest. However, examples of such cooperation seem to be rare in the literature. In fact, geographical concentration may increase interfirm rivalry since firms are competing for not only customers, but also for labour, capital, publicity and political support (Bergman and Feser, 1999). As with the variety of measurements mentioned earlier, the plethora of concepts associated with clusters is likely to add to the confusion of policymakers attempting to form judgements.

5.4 Emergence of clusters

From a Government policy standpoint, the analysis of emergent or potential clusters is often more important than studying existing clusters (Bergman and Feser, 1999). The two key questions to ask in analysis of clusters are why do firms cluster and where do they cluster? (Meijboom and Rongen, 1995). Therefore, it is desirable to investigate theories associated with the emergence or initiation of clusters. The emergence of clusters can be by chance with no apparent precedence in any particular location. Krugman (1993) gives many examples of clusters from the United States, including carpet producers around Dalton, Georgia; jewellery producers around Providence, Rhodes Island; shoes in Massachusetts and rubber in Akron. He gives the striking example of six of the top twenty United States carpet manufacturers being subsequently located in Dalton as a direct consequence of a teenage girl making a bedspread as a wedding gift in 1895, and then discovering in 1900 a new method of tufting carpets. Such an initial development could have happened anywhere, which makes it difficult to predict suitable locations for new clusters (Meijboom and Rongen, 1995). Krugman (1993) distinguishes between influences on the initial emergence of the cluster and its subsequent growth. As the cluster develops, both employers and employees know it as a location for specific skills, and other economies of scale become evident. Therefore, it is advisable to consider initiation and development to be two distinct stages.

A significant feature in the development of clusters is so-called path dependency. Bergman and Feser (1999) define path-dependence as “the general notion that technological choices – even seemingly inefficient, inferior, or suboptimal ones – can assume a dominant lead over alternatives and be self-reinforcing, though not necessarily irreversible given a significant enough shock.” They mention the modern computer keyboard, which is based on a design suitable for a manual typewriter and is not best suited for its modern use, but exists because of the “path” leading to it. Similarly, the existence of a cluster in a specific location is often because of its historical “path”, as in the example of carpet producers in Dalton. Critics of the concept of path dependence claim that it means nothing more than “history matters”. However, supporters of the concept have provided more formal explanations and, as Pierson (2004, p. 67) states,

> “path-dependent processes are marked by critical junctures and long-enduring trajectories. The long-term outcomes of interest depend on the relative timing of important processes, because positive feedback from one may decisively affect the consequences of the other when it occurs later.”

Box 5.1 on the “fresh logistics” of the Dutch fresh horticultural sector shows the complexity of processes and the importance of timing in logistics innovation. OECD (1999) states that successful clusters do not always emerge spontaneously. They suggest that the three main factors to impede this process are:

> "i) the significance of the transaction costs that need to be borne to identify suitable network partners and to forge relationships; ii) the imperfect market functioning for the provision of crucial inputs for networking development such as information and innovation; and iii) the high risk of 'free riding' that is especially faced in contexts where the legal framework to back up joint endeavours is relatively underdeveloped". (p. 270)

In short, they are referring to the high cost of networking, uncertainty of access to information and fear of other participants not paying their full contribution.

Box 5.1. Fresh logistics

The extent and form of logistic innovation depends on various internal and external conditions, related with supply chains – including the competitive requirements of important clients, as well as the location of firms. Supply chains are of direct importance as they communicate requirements for logistics service providers in terms of costs, lead times, reliability, sourcing, distribution locations, etc. The location of firms and their regional context may constrain or enable them to meet these requirements, depending for example, on the availability and quality of physical infrastructure, land use patterns and prices, congestion, the quality of the labour force, public policies (regulation, investment, public-private partnerships), the intensity of local rivalry, static clustering effects (of scale and scope, for various types of logistic costs), dynamic clustering effects (of learning and innovation) or the lack thereof (introducing issues of lock-in and path dependence…). Regional conditions are also likely to play a role in the setting of the third form of logistic innovation, i.e., strategic renewal, which requires non-market interaction between clients and logistic service providers, and which therefore raises issues of power, trust, transaction costs, learning benefits and strategic capabilities. The resolution of these issues determines whether logistic firms may, or may not, reposition in the supply chain. In the case of fresh logistics, we expect that innovations in the first place meet the requirements of large retailers, who are closest to final consumer markets and are thus able to communicate demand information to upstream actors in the supply chain. In the Netherlands, the regional context may also be important as it includes barriers (congestion, land scarcity, advanced regulations, effective implementation of policies) that simply necessitate logistic innovation. Next, we expect operational and tactical improvements to be dominant, as system and market innovation requires time (for learning) and skill (to align the interests of the different actors involved in a learning process) to solve issues of power, transaction costs, trust, lock-in and learning.

Source: Van Klink and Visser (2004).

5.5 Types of clusters

Different types of clusters have been identified, either as theoretical constructs or based on empirical evidence. A major distinction is sometimes made between two generic types of cluster; industry-focused clusters that evolve with the industry life cycle, and technology-based clusters where new technologies enable new products or even industries to develop (St. John and Pouder, 2006).

5.5.1 Industry clusters

Bergman and Feser (1999) define an industry cluster as "a group of business enterprises and non-business organizations for whom membership within the group is an important element of each member firm's individual competitiveness." The group is based on a variety of elements common to the cluster members – e.g., geographic location, shared suppliers and distribution channels, common pools of labour, and common technologies. Various types of industry cluster are found in the literature.

- Regional industry cluster: Bergman and Feser (1999) define a regional industry cluster as "a cluster whose elements share a common regional location, where region is defined as a metropolitan area, labour market, or other functional economic unit".
- Potential industry cluster: As the name implies this is a group of businesses or institutions that requires certain further elements or resources before it obtains the critical mass necessary for a cluster (Bergman and Feser, 1999).
- Value-chain industry cluster: Roelandt and den Hertog (cited in Duncan and others, 2005, p. 21) define the "value-chain" industry cluster as "a cluster consisting of an extended

input-output or buyer-supplier chain comprised of multiple sectors or industries and including final market producers as well as suppliers at all tiers directly or indirectly involved in trade." Later discussion will show that this type of cluster has particular relevance for freight transport and logistics centres.

- Business network: The distinction between a network and a cluster has already been discussed. A cluster focuses more on a concentration of firms offering the opportunity (i.e., "favours the rise") of activity, whereas a network is a planned collaboration. A business network is created by its members for mutual financial gain and is likely to develop more easily within a cluster (Bergman and Feser, 1999).
- Marshallian industrial district: Alfred Marshall proposed the concept of industrial districts as agglomerations of firms operating in one industry sector in a well-defined and relatively small geographic area, based on small, locally owned and specialized firms with a common knowledge base and strong cooperation among competitors (St. John and Pouder, 2006).
- Italianate industrial district: In Italy in the 1970s, there was a rediscovery of the Marshallian industrial district model, with the difference that participants were actively seeking socio-cultural cooperation through shared values (Rosenfeld, 1995 cited in Bergman and Feser, 1999).
- Innovative milieu: In a similar vein to the concept of industrial districts, the innovative milieu is based on socio-cultural proximity of firms in a cluster, in this case as a source of innovation. A "milieu" is defined as a "collective context of competing firms and supporting organizations" (St. John and Pouder, 2006, p. 144), capable of initiating a synergic process (Bergman and Feser, 1999).
- Industry complex: This is a cluster of industries "connected by important flows of goods and services, and showing in addition a significant similarity in their location patterns" (Bergman and Feser, 1999).

5.5.2 Technology clusters

St. John and Pouder (2006) claim that clusters with a "technology identity" such as the original "Silicon Valley" have been the most common examples for economic development initiatives. Often linked to universities or research institutes they may lead to the growth of entirely new industries. They make use of new knowledge bases such as bio-technology, which is not in itself an industry but has influenced industries such as pharmaceuticals and agriculture. They are more closely associated with the early stages of an industry when there is a need for innovation, and are less suitable for mature industries or large scale manufacturing.

- Technology districts: Technology districts focus on flexible social networks of learning associated with production-related technology (St. John and Pouder, 2006).

5.5.3 Logistics clusters

In the past two decades, there has been an increase in logistics clusters in Europe and North America. The specific term "logistics cluster" does not appear to be widely used, although there are about ten locations that refer to themselves explicitly as maritime clusters. Indeed, within the United Nations, various agencies associate the term logistics cluster with humanitarian aid programmes where a number of different clusters have been established, including logistics clusters. For example, there are Logistics Clusters in Ethiopia, Somalia and Kenya, as well as a Regional Logistics Cluster for the Horn of Africa (United Nations World Food Programme, 2006). Clusters of logistics service providers follow the same pattern as other industry clusters in certain ways. Economies of scale are relevant for land rental, for warehousing and for enlarged markets for transport, such as that established through free trade between member countries of the European Union (Meijboom and Rongen, 1995).

Box 5.2. Also Danuber

The Also Danube system is a collaborative, multi-jurisdictional effort in the European community that involves key private industries and stakeholders in the development and application of collaborative public and private transportation decision support technologies.

The Also Danube project was developed by a consortium of:

(1) Shipping Companies (sea and inland transport);
(2) Inland waterway transport operators;
(3) Transport operators – rail and road;
(4) Ports, sea and inland (port authorities and transshipment operators);
(5) Logistic service providers and forwarders;
(6) Industrial companies (consignor/consignee);
(7) RTD [Road Transport Directive] organizations;
(8) Telematic System Providers;
(9) Software and Consulting companies; and
(10) National Authorities (e.g., customs, emigration authorities, public administration organizations for inland waterways, etc.).

The project commenced with the development of a strategic concept to provide a technology based logistics and transportation system for the Danube River. The concept had the objectives:

(1) Promoting the use of inland waterway transportation for value-chains;
(2) Implementing an advanced concept to manage intermodal transportation chains;
(3) Establishing highly integrated logistic networks and operational platforms;
(4) Improving the efficiency of the waterway; and
(5) Demonstrating the functionality of logistic applications for the waterway.

The approach was to develop WEB-based client applications, advanced EDI solutions, and innovative telematic technologies to be integrated, demonstrated, and evaluated in specific supply chains representing different transportation markets. This entailed the development of a common-source logistics database for all transportation and logistics information relating to the waterway, involving all members of the consortium.

Applications and interfaces for specific logistic channels were developed to meet the needs of shippers, carriers, public entities and other channel members. The result is a collaborative, technology-based intelligent transportation network built around a common-source logistics database with interactive links for information provided regarding: supply operations, logistics processing, planning and operation of infrastructure and ports, tracking and processing information from industries and carriers. The characteristic which makes the Also Danube example distinctive is the degree to which it incorporates transportation system information from carriers, industries and public entities in the development of a cohesive system to use transportation technology to support freight efficiency. Because the process began with the identification of key industries and value-chains, and was developed by members of these chains; it is fundamentally different from American-style systems that involve only information flows among public agencies supplying and managing infrastructure. The involvement of value-chain industry groups in the initial concept of Also Danube was critical to its success. The common source logistics database at the heart of Also Danube would have never developed, and would not have users, had key value-chains and their members not been involved early in the conceptual planning. By identifying value-chain industry clusters, and incorporating industry groups into the conceptual planning process for freight ITS in the American setting; more integrated technology solutions can be developed for freight transportation.

Source: Duncan and others (2005, <http://www.alsodanube.at/>).

However, the concept of the industry cluster has yet to be widely applied in transportation planning according to Duncan and others (2005) who investigate the appropriateness of the value-chain industry cluster for ITS (intelligent transport systems) planning. Of course, transport has long been a factor cost in industrial location decisions. With the development of logistics and supply chain concepts, groups of firms have made greater use of information technology linking inventory, transport and distribution decisions, and as Duncan and others (2005, p. 8) point out, it is "not individual firms, or singular industries; but interactive clusters of industries that use the freight transportation system".

Therefore, it could be argued that a logistics cluster (particularly the transport element of logistics) is unlikely to be limited to one location, although a specific location (e.g., a port) could be the focus of the logistics cluster. The role of logistics in value-chain industrial clusters is described in the example of the "Also Danube" project (Box 5.2), which offers a potential framework for the development of other inland logistics ports. In Box 5.3 Duncan and others (2005) provide a further example of the benefits of logistics (specifically ITS planning) in value-chain industry clusters through a collaborative clustering of air cargo forwarders. This extract associates clustering with the concept of consolidation introduced in Chapter 2.

Box 5.3. Consolidating information architecture for improved asset utilization within the cluster

ITS planning can offer benefits at the value-chain industry cluster level by optimizing the utilization of the assets of transportation related technologies and information flows. This goal has been suggested in recent discussion of an integrated approach to information systems international air cargo operations in the Twin Cities Metropolitan Area. An Air Cargo Task Force in the Mpls/St. Paul region has lead a number of studies which have identified more than 50 air cargo freight forwarders.

A significant issue for the region is that international air cargo drayed to Chicago is often interred for several days while a forwarder attempts to "fill" a truck. A study of the issue has proposed the creation of a consolidation centre whereby all participating air cargo forwarders would operate on a "shared" information system and drayage fleet. This would increase the efficiency of not only the information technology, but of the trucks, warehouse facilities and other key transportation resources in the value-chain. By identifying the relevant value-chain clusters to be served by the facility with their relevant strategies and technologies, ascertaining their transportation requirements at the value-chain level, defining the roles and responsibilities of public and private entities and establishing key decision points and decision support requirements as described in the previous section, a cluster-based concept of operations for such a system could offer reduced costs and increased efficiencies for private sector cluster members, and an optimal use of the relevant ports and highways for public sector collaborators.

Source: Duncan and other (2005).

Duncan and others (2005) advocate the use of the "freight village" with intermodal facilities as a shared resource for members of value-chain clusters so that it becomes more than just an intermodal centre, and combines the benefits of both regional proximity and value-chain linkages. As they state (p. 13):

> "Naturally, when co-located shippers are members of the same value-chain clusters, they can significantly leverage their co-location to reduce the transportation times and costs in the value-chain. Incorporating an integrated cluster-based ITS concept of operations and associated architecture in the transportation planning for a Freight Village may increase the viability and effectiveness of the Freight Village concept, by explicitly accounting for the industry cluster linkages when recruiting firms into the Freight Village and enabling the Freight Village to offer members something more than a location with proximity to both an intermodal facility and a major trade centre."

5.5.4 Port clusters

De Langen (2003) provides a detailed analysis of port clusters based on five components: cargo handling, transport, logistics, manufacturing and trade. According to de Langen, Haezendonck (2001) was the first to apply cluster theories to ports, defining a port cluster as (p. 136):

> "The set of interdependent firms engaged in port related activities, located within the same port region and possibly with similar strategies leading to competitive advantage and characterized by a joint competitive position vis-à-vis the environment external to the cluster."

De Langen sees the core of a port cluster as the arrival of goods and ships and all related activities are included in the cluster such as terminal handling and pilotage. Bichou and Gray (2005, p. 80), on the other hand, claim that a wider interpretation is possible, stating,

> "Port functions can be as limited as simple berthing facilities, ship/shore or intermodal interfaces, or extended to trade, logistics and production centres. Operational and management features also vary with the type of cargo or ship operated and the extent of services offered. In a typical port setting, there is an extensive portfolio of operations extending across production, trade and service industries, which renders particularly difficult any attempt to consolidate port roles and functions under the same operational, business or market category. The port of New York/New Jersey is a typical example in this respect. In addition to providing multimodal services through the management and ownership of air- and marine ports, rail, bus terminals, bridges and tunnels, the port owned the former World Trade Centre, several industrial parks and a regional bank for urban and city development."

De Langen (2003, p. 218) also supports a wider interpretation elsewhere in his work, stating,

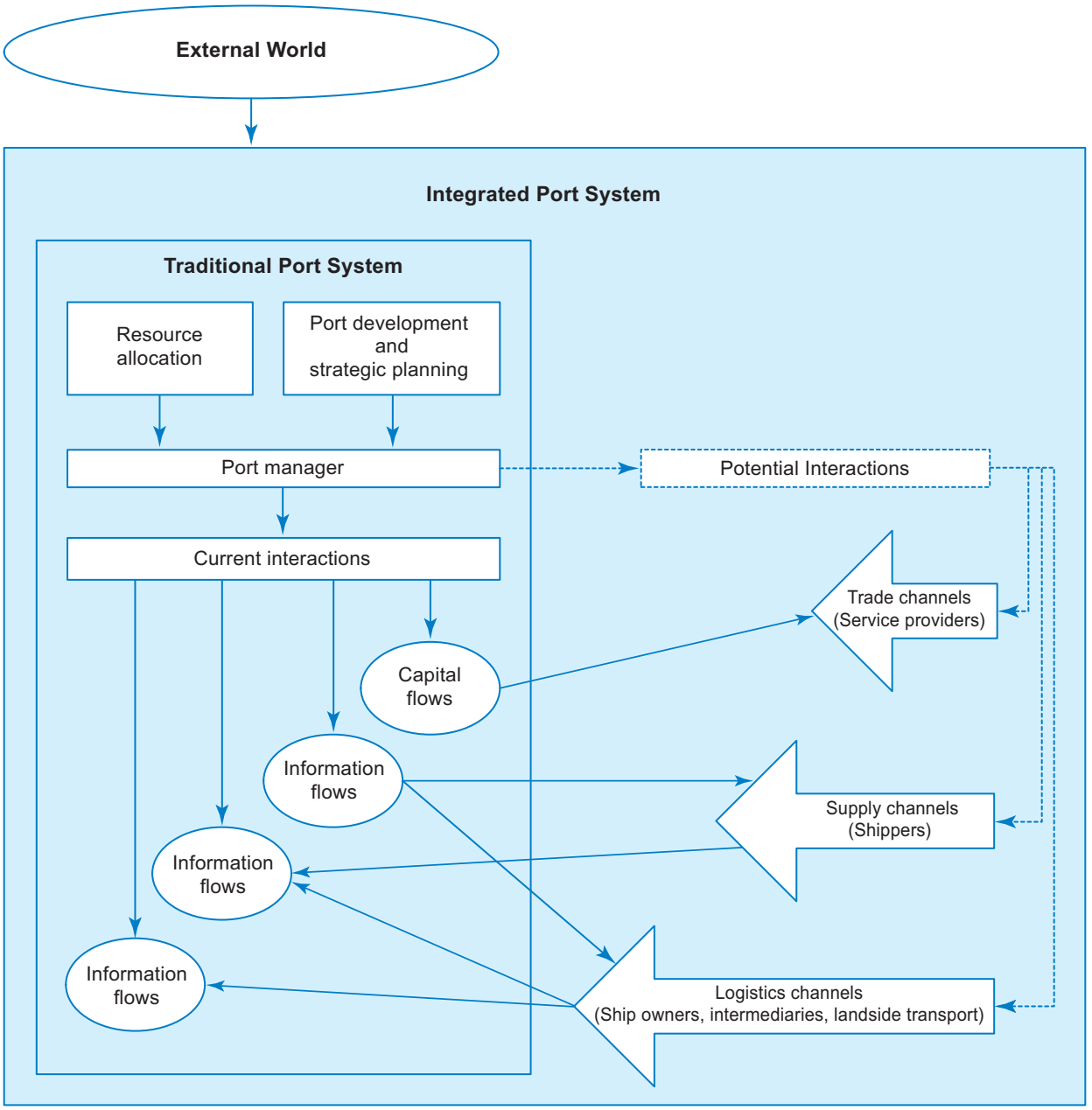
> "Port clusters (like all clusters) need to transform to remain vital. In ports, this transformation is at least partially a shift from a transport node to a location for various kinds of activities, from postponed manufacturing and maritime services to recycling industries. Such a transformation depends to a large extent on the capabilities of actors in the port cluster to initiate and sustain coalitions to attract growth activities."

The concept of postponement (or postponed manufacturing), mentioned in the above quotation was introduced in Chapter 2. Adopting the perspective in the above two quotations, a port is perhaps nothing more than an area of real estate suitable for many uses, including those not necessarily connected with the arrival of goods and ships. The industrial cluster located at a waterfront estate ultimately may be any type of industrial cluster. Therefore, it is preferable to consider the institutions and functions of the cluster as well as the location when defining a port cluster.

Although they are not explicitly writing about clusters, it is clear that Bichou and Gray (2004) are dealing with what are known as "value-chain industrial clusters" (see above). They see ports as complex and multipart organizations in which institutions and functions often intersect at various levels, but within three main interacting channels: the logistics, trade and supply channels. Members of the logistics channel (e.g., shipping lines, freight forwarders) facilitate the efficient progress of cargo through a supply channel. Both the trade channel and supply channel are associated with ownership of goods moving through a system of interacting organizations, the trade channel at the level of the sector or industry (e.g., the oil trade) and the supply channel at the level of the firm. The two levels are the equivalents of the micro-level and meso-level of clusters described by OECD (1999).

This distinction accepts that there are industry-wide conventions based on factors such as the nature of the product or the structure of the industry, but that individual companies have their own corporate culture and methods of operating. Industry-wide conventions are often associated with regulation, enforcing standards, reducing uncertainty, information exchange, supporting mutual interests, or developing a common identity. Traditionally, bulk maritime transport tends to be analysed by trade (crude oil, iron ore, fertilizers, etc.).

Figure 5.1. Interactions of channels in an integrated port management system



Source: Bichou and Gray (2004).

Literature on supply channels or chains generally focuses on the level of the firm (Mentzer and others, 2001), and many definitions refer to the firm. For example, a supply chain is defined as a set of firms that pass materials forward (Lalonde and others, 1994); an alignment of firms that brings goods or services to market (Lambert and others, 1998); or a network of firms that, through upstream and downstream linkages, produce value in delivering products or services to the ultimate consumer (Christopher, 1992). The emphasis on the level of the firm means that the term "supply chain management" is frequently used, although, as discussed in Chapter 2, it is difficult to find a universally agreed definition because it has emerged from a number of disciplines. (Croom and others, 2000; Lummus and Vokurka, 1999). As described in Chapter 2, there are a number of alternative terms to "supply chain", but the literature on clusters tends to prefer the term "value-chain".

Figure 5.1 has been adapted from Bichou and Gray (2004) and shows the interactions of the three classes of channels as part of a port cluster. It assumes the existence of four flows or processes (physical flows of goods and cargo, capital flows, payment flows and information flows) common to all commercial cargo ports. In Figure 5.1, the integrated port management system refers to the aggregate management of the "port community" regardless of the specific details of port ownership and organization. Often, the port authority fits perfectly in this role for service and tool ports. Other external members influence the port system without being an integral part of it, e.g., business associations, public regulators, trade unions and financial institutions. Actors and operators within the port community system (stevedores, multimodal transport operators, logistics providers, etc.) are sub-members of the port management system, and not part of the external world.

De Langen, 2003 introduces the concept of a "cluster manager" for ports. The cluster manager is,

> "A not-for-profit organization that generates income through a 'cluster tax' and re-invests this income to improve the performance of the cluster in the long run. In the perfect setting, the cluster manager can create co-finance arrangements with firms that benefit from the investments." (de Langen, 2003, p. 197)

According to de Langen the port authority is in an ideal position to fill this role which is often lacking in industrial clusters associated with other industries. The table below shows the type of investment that can be seen as cluster management investment in Rotterdam.

Table 5.1. Cluster manager investments in Rotterdam

Role of port authority	Direct cost recovery	Indirect cost recovery
Investments in port cluster (location)	Port consultancy; venture capital provision; office space provision; industrial pipeline infrastructure; hinterland terminals in Middle Europe	Co-funding of university research Co-funding of innovation projects Co-funding of port labour pool Co-funding of training facility Co-funding of education centre
Investments in transport node	"Standard investments" such as dredging, quay construction, and traffic control	Market intelligence Port marketing

Source: De Langen (2003).

As a landlord the port authority may be more concerned with property and estate development than goods transfer or cargo flows management, and therefore, in such cases, can be said to have a role beyond that of cluster manager. Following recent strategies of vertical integration by carriers (e.g., into terminal leasing and ownership), ship-owners are sometimes associated with port management. Shippers may also sometimes act as ship-owners (operating industrial or bareboat shipping) and even as port managers (in dedicated oil or car terminals). In these cases, all such institutional types are part of the cluster management (the integrated port management system in the terms of Bichou and Gray, 2004).

De Langen (2003) stresses that the cluster manager should be distinguished from a leader firm, which can play an important role in improving the performance of port clusters along various paths such as:

- Improving rail accessibility, by setting up a freight rail company;
- Improving the quality of the labour force in the cluster;
- Improving the "data interchange infrastructure" in a port;
- Improving the organizational infrastructure in a port and the cooperation between firms and the port authority;

- Increasing the working standards of suppliers in the port; and
- Encouraging the introduction of internal competition in a cluster.

The point made by de Langen is clear enough, but the issue of conflict between a cluster manager and a leader firm needs to be addressed. For example, a leader firm may press for exclusive use of a terminal against the wishes of the port authority (or cluster manager). Collective action is necessary in some circumstances in a port. It is required when the benefits of investment are for many cluster members and the price cannot be charged to individual members. Areas where collective action is necessary are innovation, training and education, internationalization, marketing and promotion, and hinterland access. Good hinterland access benefits all port cluster members, but usually no single member can develop it (de Langen, 2003).

Much of the recent history of port development can be seen as a process of geographical "de-clustering" where service providers formerly based on ports have moved away from the immediate port vicinity. For example, logistical operations move to inland logistics centres, dry ports, or inland container depots. De Langen (2003), citing Van Klink (1995) refers to the process of decline in port employment as "maritime deconcentration". Whether or not they are located at the port, De Langen (2003) identifies at least six types of intermediary typically associated with a port cluster. They are forwarders (intermediary between shippers and providers of transport services); non-asset based logistics service providers (between shippers and asset-based providers of logistics services); ship brokers (between ship-owners and providers of shipping services); ships' agents (between ship-owners and providers of port services or between ship-owners and shippers); commodity traders mediating between producers of commodities and buyers of those commodities.

Associations are also intermediaries but of a different order, because they aim to promote the interests of their members. However, they should be included in any analysis of intermediaries, since they have "an important mediating role, for instance between different members, between members and the Government and between members and research institutes." (de Langen, 2003, p. 112). Using the terminology introduced earlier, they are operating at the meso-level (OECD, 1999) or in the trade channel (Bichou and Gray, 2004).

5.6 Government policy and clusters

5.6.1 Reasons for Government involvement

Government can play four main roles in facilitating the emergence or strengthening of clusters (OECD, 1999). First, it can create a favourable framework to encourage effective market conditions. Second, it can promote conditions suitable for investment in R&D or knowledge creation. Third, Government itself may be an important participant in parts of the economy. Fourth, it should create an environment conducive to innovation systems. In the context of Government policy decisions, Martin and Sunley (2003) warn against incautious cluster development unsupported by concept, theory or empirical evidence.

5.6.2 Problems of policymaking for clusters

Based on a review of cluster developments in OECD countries, the OECD (1999, p. 328) proposes guidelines for Government to enable them to avoid some of the pitfalls associated with cluster-based industrial policymaking, which are:

"1) The creation of clusters should not be Government-driven but rather should result from market-induced and market-led initiatives;

2) Government policy should not be strongly oriented to directly subsidising industries and firms or to limiting rivalry in the marketplace;

3) Government policy should shift away from direct intervention towards indirect inducement. Public interference in the marketplace only can be justified in the presence of a clear market or systemic failure. Even if clear market and systemic imperfections exist, it cannot necessarily be concluded that government intervention will improve the situation;

4) Government should not try to take the direct lead or ownership in cluster initiatives, but should work as a catalyst and broker, bringing actors together and supplying support structures and incentives to facilitate the clustering and innovation process;

5) Cluster policy should not ignore small and emerging clusters; nor should it focus only on 'classic', existing clusters; and

6) Clusters should not be created from 'scratch'. The cluster notion has sometimes been appropriated by (industrial) policymakers and used as an excuse to continue more or less traditional ways of defensive industrial policymaking."

In short, the OECD suggests that clusters should emerge from the market, and that Government should restrict its role to that of an enabler or facilitator.

5.6.3 The changing role of Government

In many countries Government has moved away from direct intervention towards indirect inducement in the role of a facilitator providing "support structures, such as broker and network agencies and schemes, and … platforms for constructive dialogue and knowledge exchange" (OECD, 1999). A major and continuing difference in policy is between the "bottom-up" and the "top-down" approach. The former approach seeks to create dynamic market conditions with the Government acting as facilitator, whereas in the latter approach the Government sets national priorities and determines the key participants before the clustering process is exposed to the market.

Although it does not advocate a dirigiste role for Government in cluster development, the OECD (1999, pp. 418-419) nevertheless identifies many other roles for Government, which are:

"❑ Establishing a stable and predictable economic and political climate;

❑ Creating favourable framework conditions for the smooth and dynamic functioning of markets (infrastructure, competition policy and regulatory reform, provision of strategic information);

❑ Creating a context that encourages innovation and upgrading by setting a challenging economic vision for the nation or region;

❑ Raising awareness of the benefits of knowledge exchange and networking;

❑ Providing support and appropriate incentive schemes for collaboration and initiating network brokers and intermediaries to bring actors together;

❑ Acting as a facilitator and moderator of networking and knowledge exchange;

❑ Acting as a demanding and launching customer when addressing needs;

❑ Facilitating the informal and formal exchange of knowledge;

❑ Setting up competitive programmes and projects for collaborative research and development;

❑ Providing strategic information (technology foresight studies, strategic cluster studies);

❑ Ensuring that (public) institutions (especially schools, universities, research institutes) cultivate industry ties;

❑ Ensuring that rules and regulations maximize flexible adaptation to changed market conditions and stimulate innovation and upgrading processes;

- Stimulating interactions and knowledge exchange between the various actors in systems of innovation;
- Removing informational failures by providing strategic information;
- Removing institutional mismatches and organizational failures in systems of innovation, i.e., mismatches between the (public) knowledge infrastructure and private needs in the market or a missing demanding customer in the value chain; and
- Removing Government failures and Government regulations that hinder the clustering and innovation process."

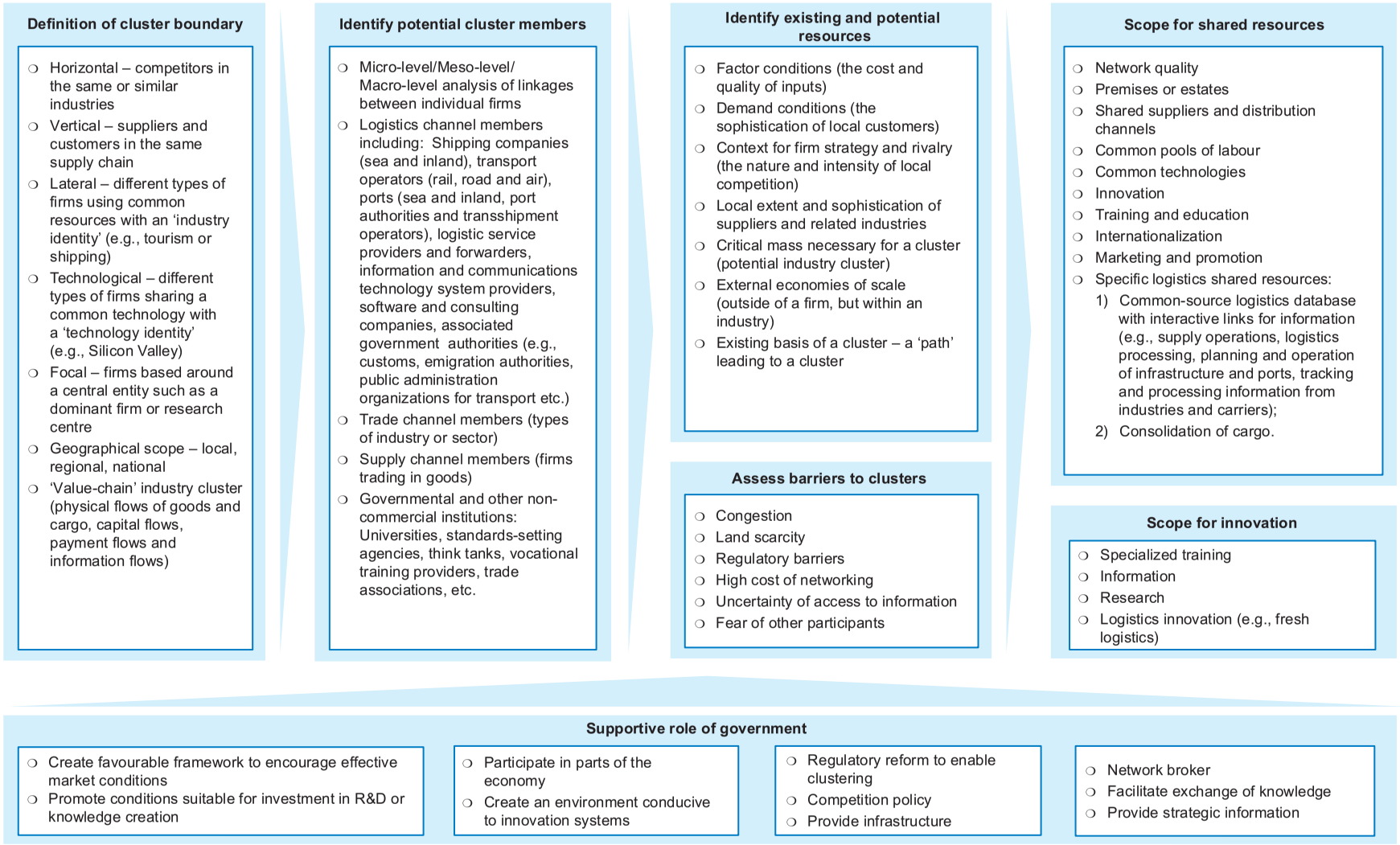
5.7 Intermediate Conclusions: Towards a step-by-step action plan for "dry ports" – Part 3

The present chapter has discussed a number of frameworks that can contribute to a seven-stage process for cluster initiation and development. For effective cluster development, policymakers and decision makers will have to assess the following:

- Define cluster boundary;
- Identify existing and potential resources;
- Identify potential cluster members;
- Determine supportive role of Government;
- Identify scope for shared resources;
- Identify scope for innovation; and
- Identify barriers to clusters.

Figure 5.2 summarizes the discussion of Chapter 5 and represents another building block for the step-by-step action plan for the development of "dry ports".

Figure 5.2. Summary of Chapter 5 – Towards a step-by-step action plan for the development of "dry ports" (Part 3)



6 Application of the Model – Factors Governing Corporate Decisions

6.1 Introduction

The previous three chapters have developed a three-part model based on a general literature review. This chapter and the following two chapters investigate inland logistics port development in the ESCAP countries based on published material, and attempt to establish the extent to which the model matches the themes mentioned in the published material. This analysis identifies which areas are already covered in the published material, but also which areas are not covered or treated only in a limited way. The approach is subjective as it is inevitably based on interpretation and the availability of published material. However, it forms a good starting point for the development of a final model suitable for empirical enquiry within the ESCAP region to be undertaken at a later stage.

6.2 Model Part 1: Factors governing decision of enterprises to locate

This part of the model has been derived from the contents of Chapter 3 (Factors governing decision of enterprises to locate) and has four main components – organization and structure; services offered; responsibility for assets and associated services; responsibility for financing terminal development. Each component has a number of subcomponents as shown in Figure 6.1.

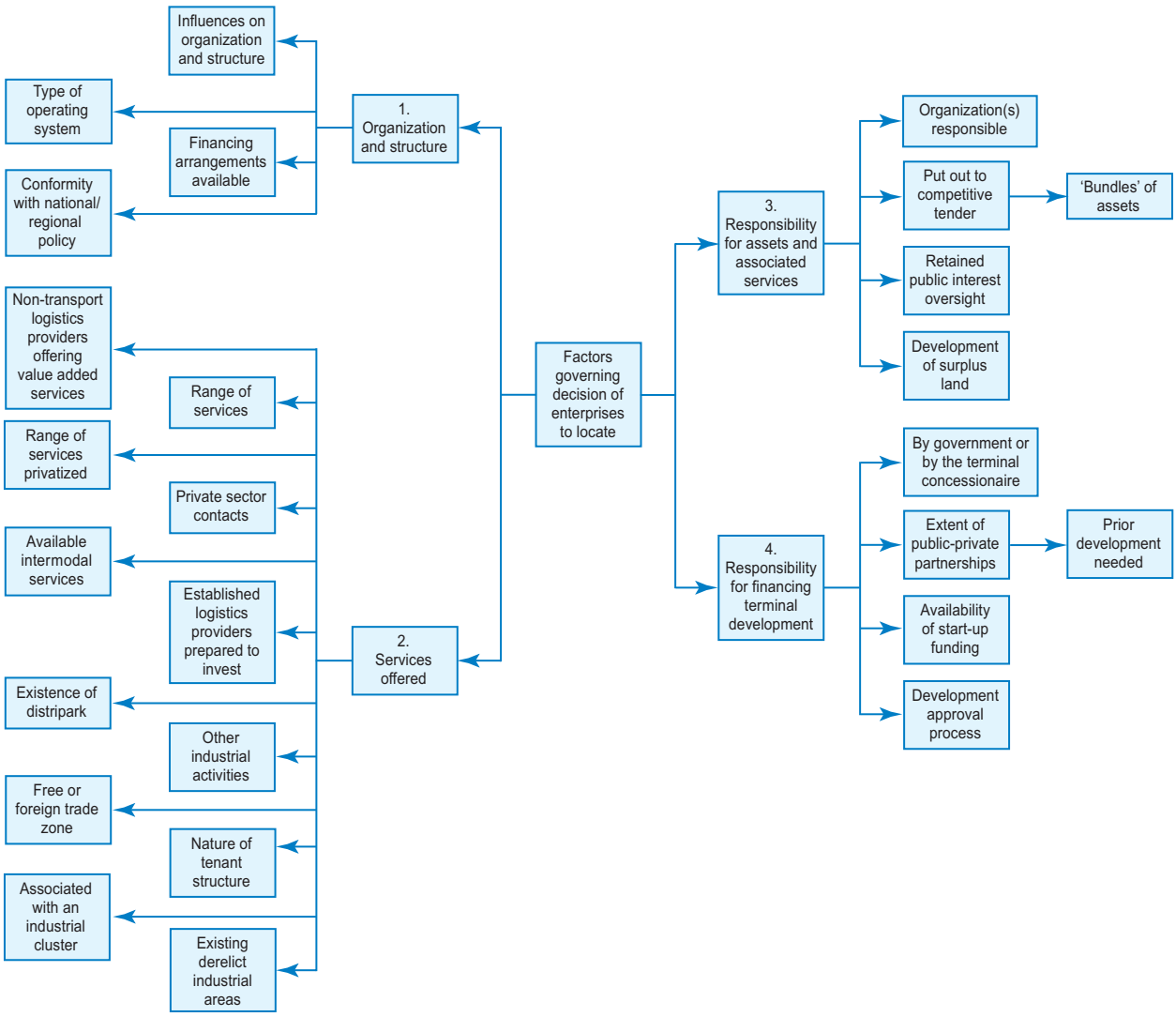
6.2.1 Organization and structure

This part of the model is concerned with the influences on organization and structure of existing inland logistics ports. Such influences include impact of the current location, cargo handled, types of service providers, main focus of business (local, regional etc.), owners of infrastructure, superstructure and equipment, and status of labour and management. The conventional port terminology for operating systems (landlord etc.) and financing arrangements can be applied here, as well as Government policy, if any towards inland logistics ports. It proved difficult to find any published information about the organization and structure of inland logistics ports in terms of the above categories, although there is a fairly large volume of published commentary on seaports and logistics centres associated with coastal areas. Countries in the ESCAP region have a number of Government departments each responsible for a single mode of transport. Therefore, vested interests in single modes are most likely to gain funding to the detriment of intermodal interests, and consequently to the development of inland logistics ports. This is a feature of Governments that is found in many parts of the world. To overcome existing power structures, restructuring of modal groups rather than forming new intermodal groups is recommended by ESCAP (2006a).

6.2.2 Services offered

This part of the model is intended to determine not only the range of available services, but also those that are privatized, as well as private sector contacts. It seeks to identify available intermodal services, as well as established logistics providers and non-transport logistics providers offering value added services, and the nature of the tenant structure. It looks at land use – e.g., other industrial activities, derelict land, distriparks and free or foreign trade zones – and whether the inland logistic port is associated with an industrial cluster. It did not prove possible to find any published formal review of the types or range of services offered by inland logistics ports in the region, although there is reasonably extensive literature on available and potential intermodal services.

Figure 6.1. Factors governing corporate decisions



Established logistics providers prepared to invest

An area that is covered in some detail in the literature is the extent to which existing logistics providers are prepared to invest in inland services, although the focus is mainly on transport rather than the actual inland logistics port. For example, the following extract from ESCAP (2006a) discusses the importance of railways in China and the issues associated with taking containers far inland. The following extract from ESCAP (2006a) outlines how partnerships have been formed to assist in intermodal development in India. According to ESCAP (2002a) little attention has been paid to "soft factors" in logistics development, particularly the development of professional and manpower skills. If international logistics providers are to expand inland they need skilled personnel to cope with the "new and uncontrollable economic environment, laws and systems, social and cultural values and behavioural standards, the structure of the market, as well as desired service levels and the quality of usable information" (ESCAP, 2002a, p. 74). Such skills have contributed to logistics success in developed economies.

Box 6.1. Intermodal Investment in China

There are signs also that the importance of railways is being recognized in China. A recent article published in a Containerization International supplement on the Kowloon and Canton Railway Company notes that "putting more of Hong Kong, China's containerized freight traffic on the railways is a strategic objective of the Kowloon and Canton Railway Company". The rail service network is also being expanded. Over recent years, the Kowloon and Canton Railway Company has extended the scope of its container shuttles, in conjunction with the Chinese Ministry of Railways, and now operates to twenty-three locations in mainland China from Hong Kong, China. In addition, the Company is offering a new international rail container service to the Russian Federation and the Commonwealth of Independent States, providing fifteen day transit times between Hong Kong, China/South China and Ulaanbaatar, twenty days for Almaty, twenty-eight days for Moscow and thirty days for Kiev.

While the company has made important strides towards developing the intermodal side of the business, one of the factors constraining the growth of its container traffic is the reluctance on the part of ocean carriers to allow their containers to go deep into mainland China on the rail system. This can involve lengthy delays, periods of unproductive idle time for their container assets or misplacement of containers, which the lines are understandably keen to avoid. As part of the Government's tenth five-year plan, these issues are being addressed, but progress is very slow.

Part of the progress in China has included significant investment in the planned development of a nationwide network of distribution hubs by the Chinese Government. Complementing this development is the establishment of agreements between the China Railway Container Transport Centre (CRCTC) – the Ministry of Railway's wholly owned company that has responsibility for intermodal container transport – and a small number of ocean carriers including OOCL, Maersk Sealand, Cosco and China Shipping Container Lines (CSCL) to "run dedicated block-train services between ports and selected cities".

Over the last two or three years all of these carriers have introduced new intermodal services, including those for reefers that link inland cities such as Chengdu, Harbin Xi'an and Kunming with the international ports of Dalian, Yantian and Shanghai. Also, third party logistics operators, such as APL Logistics, have established joint ventures with road and rail transport specialists in an attempt to win a share of the domestic logistics market as a means of improving door-to-door service for their international freight.

Source: ESCAP (2006a).

In China there is an increasing tendency to outsource the movement of cargo to third or fourth party logistics companies, and there is also a demand for increasingly sophisticated intermodal services. In other Asian countries the demand for third party logistics comes from overseas customers. Some countries are already efficient in logistics – Japan, Singapore, Republic of Korea, Hong Kong, China and Taiwan Province of China. Other countries such as Indonesia, Viet Nam, Cambodia, and Thailand have yet to reach this standard (ESCAP, 2006a). There is a demand for a pool of labour skilled in logistics.

As ESCAP (2006a, pp. 103-104) states:

> "One of the key organizational limitations on the development of intermodal logistics networks capable of facilitating growth of trade and extending the hinterland markets of ports is a lack of awareness of the competitive importance of logistics, and, as a consequence of this, the low priority given to logistics in executive decision-making. This problem can extend beyond predominantly Government managed ports, railways or road authorities to private companies and their executives. Many of the third party logistics specialists that operate in Asia are from Europe or North America. They still tend to rely on their own staff for senior management roles or have their local staff educated in foreign universities. Hence there is a lack of a locally educated Asian talent pool."

Free or foreign trade zones

This topic is covered extensively in a recent ESCAP publication (ESCAP, 2005a). It describes how the worldwide advance of ICT and transport technologies has led to a significant increase in demand

for SCM from multinational companies and provision of space for logistics activities, including logistics-oriented FTZs. For example, the Republic of Korea has introduced FTZs in port hinterland areas such as Busan, Gwangyang, Incheon and Incheon airport with total areas of 16.5 square kilometres. They undertake international transshipment, distribution, procurement and entrepot trade. Hong Kong, China is developing Lantau logistic park covering 72 hectares.

Box 6.2. Intermodal Investment in India

There are signs also that the importance of railways is being recognized in China. A recent article published in India, where intermodal operations are mainly in the hands of the Container Corporation of India Ltd., (Concor), the practice of ports having access to intermodal networks to reach hinterland markets is well established. Since 1989 Concor has developed thirty-one export/import terminals and nine domestic terminals handling over 900,000 TEU. At these ICDs, containers are stuffed and sent via a combination of road and rail to the port of exit, including those at Chennai, Kandla, Haldia (Calcutta), Visakhapatnam and Shalimar (Kolkata)….

Part of Concor's development of these intermodal links has been through partnerships with shipping companies such as Maersk India, with whom it is soon to open one of Asia's largest inland container depots at Dadri near New Delhi. When fully developed, the depot will operate as an intermodal logistics hub that will be serviced by six railway lines. With the Dadri operation, Concor is taking a landlord position and providing space to other logistics firms, container freight station (CFS) operators and shipping lines to set up their own facilities within the premises. Concor and Maersk have already formed a 49 per cent/51 per cent joint venture firm called Star Track Terminals with an equity of Rs. 160 billion to set up an independent CFS on the premises. The Dadri development is part of Concor's plans to establish container handling terminals also at Dhappar, Mirzapur, Kota, Agra, Ankleshwar, Gandhidham, Tirupur, Raipur and Bhopal.

Source: ESCAP (2006a, pp. 58-59).

It will be completed by 2009 and offer value added services. FTZs have developed differently in various Asian countries, possibly because of differences in political, economic and social situations. The whole of Singapore can be seen as a FTZ, whereas other countries, such as the Republic of Korea and Malaysia, have very specific and small areas as FTZs. China has introduced many kinds of special zones of various sizes and its economic activities are operated through them.

6.2.3 Responsibility for assets and associated services

This covers the organizations responsible for providing specific assets and associated services, the extent to which assets are put out to competitive tender, in what combination and whether a public interest oversight is retained. It also covers issues of land use including the treatment of land surplus to the immediate requirements of a logistics terminal.

There is little information on developments specific to inland logistics ports. The only traceable information refers to the development of city ports in the ESCAP region where there have been difficulties in creating logistics centres because of insufficient land space. These comments could also be applied to inland locations. According to ESCAP (2002a) priority should be given to preventing land next to ports being used for random development or without regard to port-related functions, and that legislative controls should be introduced. ESCAP (2002a, p. 66) proposes that land use management policies must aim at:

"❑ retaining operational land in operational use;
❑ retaining maritime industrial land at an appropriate level of industrial use;
❑ ensuring that full economic use is made of occupied areas;
❑ making it possible to recover land from obsolescent and obsolete uses for redevelopment; and
❑ phasing contracts as closely as possible to the life of the activity."

6.2.4 Responsibility for financing terminal development

This part of the model is intended to determine whether financing is by Government or by the terminal concessionaire, and the extent of public-private partnership. It identifies the availability of start-up funding, whether developments need to be completed before making private investment, and the form of development approval process. The financing of infrastructure, including logistics centres, is an issue within the ESCAP region, and often central and local Governments have insufficient funds for such developments. According to ESCAP (2002a, p. 68) "ports should provide a variety of incentives, such as pioneer status, preferential taxation, loan guarantees, credit insurance, low-interest financing and bonded services in the development of logistics centres." Examples of tax incentives are shown in Table 6.1. ESCAP expert group meetings took place in 2004 and 2005 to identify investment needs and priorities for the development of the Asian Highway network and associated intermodal connections. They identified major expenditure requirements as:

> "a shortfall of almost US$ 18 billion to upgrade and improve about 26,000 kilometres of the Asian Highway in 26 member countries, for which financing from multilateral or bilateral donors and other sources would be required. Furthermore, to close the 13 'missing links' of the Trans-Asian Railway would require about US$ 13.5 billion to build single track lines …In order to upgrade high priority parts of the Trans-Asian Railway to double-track would cost tens of billions of dollars more. Finally, as inland sites in Asia are increasingly developed through ICDs and efficient intermodal connections, a similar level of investment as for container ports today might be required for the construction of ICDs in the future." (ESCAP, 2006b, p. 39)

Table 6.1. Tax favours and incentives for logistics centres close to ports

Country	Description
China	15 per cent of tax on judicial persons levied. If a firm operates D.C. more than 10 years, tax on juridical persons will be exempted for a specified period of time. When the specified period expires, 50 per cent of tax will be exempted.
Hong Kong, China	16 per cent of tax on juridical persons and 15 per cent of property tax levied. No tax on interest income, dividend income, etc.
Taiwan Province of China	In export Processing Areas, import tax, commodity tax and trade tax will be exempted. In Science Industrial Areas, tax on juridical persons will be exempted for 4 years when a firm increases its facilities.
Japan	35 per cent of tax on juridical persons and total tax on permanent asset will be exempted for firms that employ more than 20 workers for 5 years
Singapore	Economic Development Board and Trade Development Board provide various incentives. 10 per cent of tax on juridical persons levied. Over depreciation system adopted.

Source: ESCAP (2002a).

A Government financing agency offering low interest loans for logistics developments could be set in place, as is the case in Japan (see Table 6.2).

Public-private partnerships

Public-private partnerships are growing in the ESCAP region, although restricted to certain countries. According to ESCAP (2006a, p. 92).

> "Although developed economies have experienced a dramatic growth in private investment in transport infrastructure, only 16 Asian developing countries in the ESCAP region have some sort of private sector involvement in transport infrastructure projects, and seven Asian developing countries – China, Malaysia, Republic of Korea, Philippines, Indonesia, India and Thailand – accounted for 95 per cent of all private sector investments, and 97 per cent of transport sector investments in Asian developing countries. Among this group of six countries, China, Malaysia and the Republic of Korea accounted for more than 78 per cent of investment commitments in the transport sector."

Table 6.2. Government financing agency with low interest loans

Agency Name	System	Eligible Businesses
Development Bank of Japan	"Financing Programme for Import Facilities Enhancement"	Prepare equipment for foreign companies to establish a sales office in Japan or for Japanese companies to expand their import products. (Expenses such as rental fees and damage insurance premiums are also applicable for new foreign businesses).
	Low Interest Loan	Direct construction expense of specified facilities by civil law. (Maximum 50 per cent)
Small Business Finance Cooperation	"Loans to Facilitate Import Sales"	Necessary equipment capital and operation capital to expand import product sales for small to mid-size retail and wholesale companies. The amount available for low interest loans will be increased for import wholesalers and retail business based in or conducting business in the FAZ.

Source: Port of Kobe, ESCAP (2002a).

There are clearly pitfalls and institutional, regulatory and administrative barriers to private participation. ESCAP (2002a, p. 73) describes some of these:

> "[…] to overcome the chronic shortage of facilities, new approaches to financing infrastructure have to be adopted. The most significant may be the strengthening of private sector participation in the development of logistics centres. Already, the range of private sector participation is very wide, from straight-forward BOT (build-operate-transfer) to the extreme case of complete privatization with no Government involvement. History shows that the private participation in the development of logistics centres has led to greater efficiency and reduced lead times for development. However, in many cases including the Republic of Korea, protracted negotiations over the terms of BOT developments have actually delayed the development of the logistics centres and related infrastructure. In order to induce private capital for the development of logistics centres, ports in the region will have to provide more favourable institutional, regulatory and administrative environments in a timely manner, and share the risks in the approach."

The Box 6.2 shows examples of effective developments in public-private partnerships in the ESCAP region. Whereas Box 6.3 provides an African example of public-private cooperation that stresses the need for simultaneous development of infrastructure, institutional and regulatory reform and private-sector management and marketing, and also refers to major areas of concern within the ESCAP region – landlocked countries and transit corridors.

Box 6.3. Supporting effective public-private sector investment partnerships

A small number of Asian country Governments are leading the way by supporting effective public-private sector investment partnerships. These are the Republic of Korea, the Philippines, Bangladesh and India (at a provincial level) where private sector participation in infrastructure development has concentrated. The Governments of these countries have developed special units that have been successful in playing a "catalytic" role in promoting and implementing private projects. In an attempt to promote private sector investment in the country's infrastructure development, the Government of Bangladesh has undertaken the Private Sector Infrastructure Development Project, which consists of two components, project financing and transaction development. Through the Ministry of Finance, two facilitative bodies have been established to implement these two components. The first of these, the Infrastructure Development Company was established in 1997 with the assistance of the International Development Agency. A non-banking financial institution, in which its share capital is full subscribed by the Government, one of the main functions of this company is to provide loans for private infrastructure projects or refinancing for small projects implemented by NGOs and other private entities, but so far it has not supported any transport sector projects.

To attract private investors to fund infrastructure projects at both the national and the provincial Government levels, the Republic of Korea introduced the Private Participation in Infrastructure (PPI) Act 1999. The intention of the Act is to promote, facilitate and guide private sector participation for both solicited and unsolicited projects. By September 2002, regulations had been developed to frame the establishment of two separate bodies that will implement the intentions of the Act: a policymaking body called the Private Investment Project Committee which will be led by the Minister for Planning and Finance; and the Private Infrastructure Investment Centre of Korea (PICKO), the role of which is to provide a one-stop-shop service based on uniform criteria for evaluation and negotiation.

Source: ESCAP (2006a).

Box 6.4. Example of public-private cooperation on a transit corridor

That funds can also be raised from the private sector is illustrated by […] Namibia's Walvis Bay corridor. Independent Namibia in the 1990s was economically weak, had a limited market potential, was isolated from its neighbours and had no relevant eastern and northern links. However, the country had a large potential to serve as a gateway for its landlocked neighbours. In a public-private partnership and pursuant to the SADC protocol on Transport, Communication and Meteorology, which recommends both corridor development and corridor management institutions, it was decided to develop the Walvis Bay corridor, an extensive network of integrated transport and facilitation services. The pooling of private resources and expertise to run the project, i.e., the transport operators in cooperation with the public authorities and Governmental institutions (as the transport regulators) has resulted in a partnership which benefits Namibia and the surrounding landlocked countries. The one issue that deserves particular attention in this case is the simultaneous development of infrastructure, institutional and regulatory reform and private-sector management and marketing. This was done to address and solve deficiencies and shortcomings such as the lack of intermodal operations, border and customs procedures and transport regulations.

To private operators, the key concerns are not only the total costs, but also transit time and reliability of service. Successful transit corridors are the result of joint efforts by public and private operators as well as all other Government agencies. Transit can be described as a chain, which includes all the physical, organizational and administrative operations needed to move goods from their place of origin to their final destination. This chain covers the actual transport and also documentation, customs, insurance and all other handling procedures. Therefore, aspects which deserve particular attention are: closely knit cooperation and coordination between the public and private sectors, willingness to implement necessary reforms to reduce delays and administrative hurdles, construction of roads, railway links and port facilities, their efficient management, marketing and long-term maintenance and the repositioning of a transit and landlocked country to a more commercial and businesslike approach to transport, trade and infrastructure problems. There is definitely something to be gained from opening up, from developing a port or a transit corridor.

Source: United Nations Economic Commission for Europe (2002).

According to Lim and Ko (2005, p. 20) finance of inland terminals in the Republic of Korea is being made on a Build-Own-Operate (BOO) or Build-Own-Transfer (BOT) basis:

> "Large-scale integrated cargo terminals and inland container depots are being [developed] in the capital region, Busan region, Honam region, Central region, and Youngnam region for reduced logistics cost via improved cargo distribution system. These projects are being implemented in the forms of Build-Own-Operate (BOO) or Build-Own-Transfer (BOT) as private investment projects with supports from the Government which include construction of roads, railroads, water pipes, and major facilities as well as loans for land purchasing and/or project costs."

Table 6.3 summarizes the status and investment arrangement for various projects in the Republic of Korea.

China has adopted a policy of creating Special Economic Zones (SEZ) where foreign investment is actively encouraged. The example in Box 6.5 by Lim and Ko (2005) provides a summary of developments with direct relevance to the setting up of industrial parks and inland logistics ports. Lim and Ko (2005, pp. 33-34) mention the specific issue of inland logistics facilities (they refer to warehousing and logistics parks) and the possibility of an oversupply:

> "Up to this moment, Chinese warehousing has generally been of a very poor standard, with inadequate IT systems and poor connecting transport infrastructure. This has led to high discrepancy rates, damaged goods and very little visibility of stock. This had resulted in manufacturers building their own warehousing. However, recently the Chinese Government has taken a more pro-active role. The huge demand for warehousing and distribution has led to the development of a large number of officially sanctioned and encouraged logistics parks across China.
>
> However the large-scale construction could result in an over supply according to some analysts. According to the National Bureau of Statistics, about six per cent of China's logistics parks were empty in 2003, a figure which is continuing to rise. Another of the major problems is the lack of skilled logistics professionals able to work in distribution facilities. Chinese Government will govern market admission, land, taxation, financing, standardization, investment and Sino-foreign cooperation policies related to the logistics park development."

Table 6.3. Status and investment arrangement for ICD's in the Republic of Korea

Region and Project		Location	Size	Period	Type
Capital Region	Kunpo Integrated Cargo Terminal	Kunpo, Kyunggi-do	35,640 sqm.	1992-1998 (in operation)	BOT
	Euiwang ICD	Euiwang, Kyunggi-do	74,520 sqm.	1992-1996 (in operation)	BOT
Busan Region	Yangsan International Cargo Terminal	Yangsan, Kyungsanam-do	32,400 sqm.	1992-2000 (in operation)	BOT
	Yangsan ICD	Yangsan, Kyungsanam-do	93,960 sqm.	1992-2000 (in operation)	BOT
Honam Region Integrated Cargo Terminal ICD		Jangsung, Chollanam-do	103,680 sqm.	1998-2010	BOO
Central Region Integrated Cargo Terminal		Cheongwon/Yeonki, Chungchungbuk-do	68,040 sqm.	2000-2010	BOO
Youngsan Region Cargo Terminal and ICD		Undecided	n.a.	2001-2010	BOO

Source: Korean Ministry of Construction and Transportation, Lim and Ko (2005).

Box 6.5. Foreign Investment in China

Currently, the Chinese Government has actively encouraged foreign investment over the last 25 years. At the same time authorities hoped that they would be able to control the development of foreign companies by establishing specific regions in which they could operate. Since then the range and type of these economic zones has grown as authorities have gradually liberalized the market environment. Since 1980 a number of "special economic zones (SEZ)" have been created in Shenzhen, Zhuhai and Shantou in Guangdong Province and Xiamen in Fujian Province. The whole of Hainan Province was also designated a special economic zone.

In 1984, China opened a further 14 coastal cities to overseas investment: Dalian, Qinhuangdao, Tianjin, Yantai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Wenzhou, Fuzhou, Guangzhou, Zhangjiang and Beihai. Since 1988, China has expanded the areas open to foreign investment to include zones of the Yangtze River Delta, Pearl River Delta, Xiamen-Zhangzhou-Quanzhou Triangle in south Fujian, Shandong Peninsula, Liaodong Peninsula (Liaoning Province), Hebei and Guangxi. In addition, 15 free trade zones, 32 state-level economic and technological development zones, and 53 new- and high-tech industrial development zones have been established in large and medium-sized cities.

The main attractions for investing within these zones are the advantageous tax and infrastructure environments. Shanghai has some of the best known SEZs such as Waigaoqiao Free Trade Zone (FTZ) and Zhangjiang Hi-tech Industrial Development Zone (HIDZ). In the Yangtze River Delta this has meant greater focus on Shanghai's neighbouring provinces of Jiangsu, Zhejiang and Anhui. The cost advantages of investing outside of SEZs are evident in the Yangtze River Delta. Labour costs can be up to 20 per cent lower, due partly to lower overall salaries as well as fewer labour regulations and social benefits. In many cases new industrial parks have been set up without Government approval as local authorities compete for FDI. Although they cannot offer tax incentives, they can subsidise new companies, and land prices are usually much lower. For instance Xishan Municipal Development Zone with a land price of 7.25 USD/m^2 is more than 16 times cheaper than Waigaoqiao FTZ.

Source: Lim and Ko (2005).

According to a survey by Jones Lang LaSalle and the China Supply Chain Council (2006) of 136 companies involved in logistics in China, there is little interest in designing and building, or even owning a warehouse. 80 per cent of respondents prefer leasing to ownership of warehousing facilities.

Development approval process

There have been promising developments associated with some ports in the ESCAP region to stimulate employment and establish logistics centres at ports through logistics-related laws and national strategies (ESCAP, 2002a). Such measures could be applied to inland logistics ports where appropriate. Examples of logistics-related legislation within the region are shown in the extract below.

Box 6.6. Logistics-related legislation

Singapore already launched the *Logistics Enhancement and Applications Programme*, as well as the Logistics Master Plan, which was drafted by a steering committee comprised of thirteen agencies and headed by the Trade Development Board. Both of these aim to position Singapore at the forefront of logistics services in the region by creating new logistics capabilities and enhancing competitiveness. In support of the development of ports of Taiwan Province of China into regional logistics centres, Taiwan Province of China introduced the International Logistics Centre Operation Act in 1999 under the Asia-Pacific Regional Operation Centre (APROC) plan. The APROC plan was launched in January 1995 in an effort to encourage global firms to set up regional operation centres in Taiwan Province of China as their base for business and logistics in South-East Asia and mainland China. For effective implementation of the plan, most of the legal revisions were embodied in one comprehensive piece of legislation for speedy enactment as a package. *The International Logistics Centre Operation Act* is also focusing on amending laws and regulations that are outdated and no longer suitable for newly emerging business practice.

Recently, the Republic of Korean Government also enacted *The Act on Designation and Management of Customs-Free Zones for Fostering International Logistics Centres*, and Busan and Gwangyang Ports have been designated as customs-free zones. However, this act raises two major problems due to its inflexibility and the overly rigid regulations regarding FTZ and logistics centres. The first is its minimum physical requirement to be designated as a customs-free zone. If logistics facilities are to become international logistics centres, such a method of prioritizing certain seaports only by physical size will not be successful. Instead, it will be necessary to develop major trading ports, as well as adjacent areas, into customs-free zones. It is both rational and internationally accepted to prioritize certain areas as customs-free zones based on their potential economic impact rather than on physical conditions. This is because, only by this method can global firms invest in areas that can operate at their full capacity based on functional characteristics and the amount of land required to build VAL service complexes in each region.

There is also a problem because within customs-free zones, production functions such as processing, manufacturing and assembly are excluded, and the only type of processing activity included is simple processing. However, in most free trade zones, it is normal to include functions such as manufacturing, assembly and processing, in addition to VAL services. Only in this way can synergy be achieved. Therefore, it is essential to integrate logistics and manufacturing functions into customs-free zones, then the logistics promotional function and the value added logistics function can be greatly enhanced.

Source: ESCAP (2002a).

7 Application of the Model – Replicating Port Concepts at Inland Locations

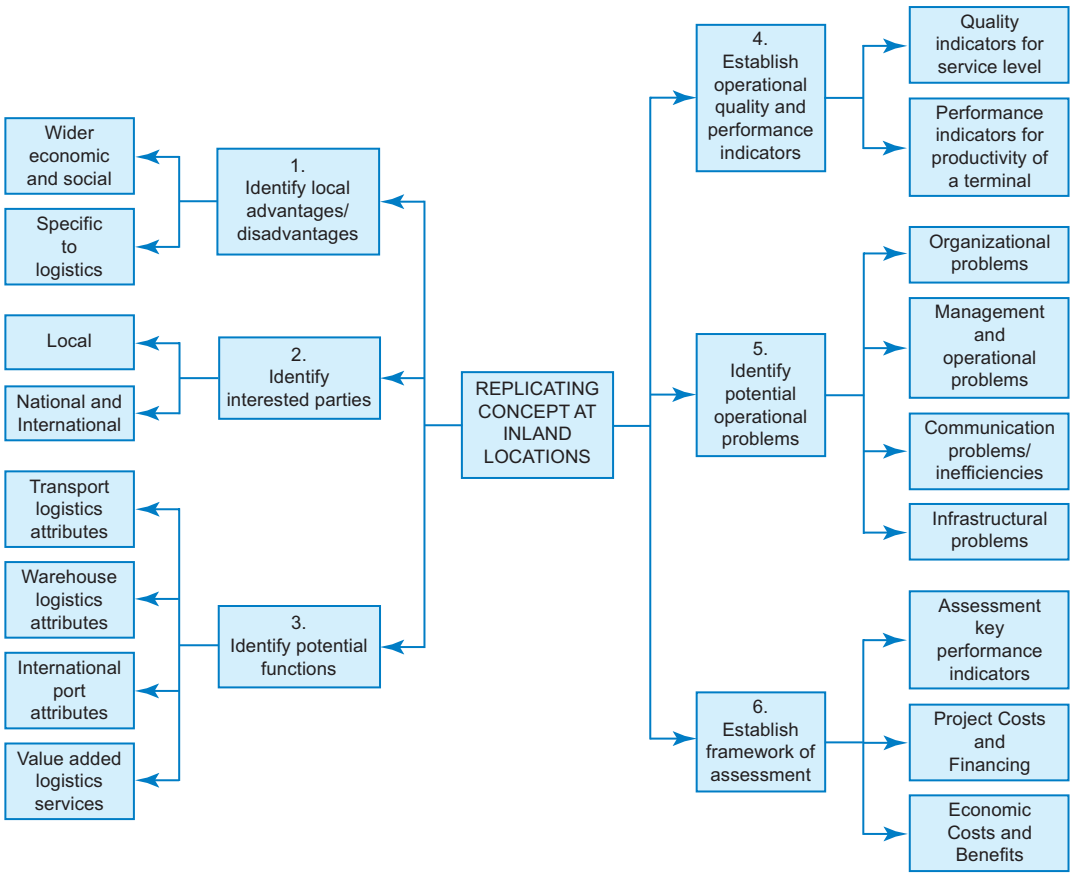
7.1 Introduction

This chapter continues the analysis of the previous chapter by investigating inland logistics port development in the ESCAP countries based on published material, and attempt to establish the extent to which the model matches the themes mentioned in the published material.

7.2 Model Part 2: Replicating port concepts at inland locations

This part of the model has been derived from the contents of Chapter 4 (Replicating port concepts at inland locations) and has six main components – identify local advantages/disadvantages; identify interested parties; identify potential functions; establish operational quality and performance indicators; identify potential operational problems; establish framework of assessment. Each component has a number of subcomponents as shown in Figure 7.1.

Figure 7.1. Replicating port concepts at inland locations



7.3 Identify local advantages/disadvantages

This part of the model seeks to identify local advantages and disadvantages both in wider economic and social terms, and in terms specific to logistics. The former covers labour, land, infrastructure, and various aspects of industry. The latter covers issues of capacity, network, trade and delivery. Because

landlocked countries are so prominent in the region under review, they are considered below in some detail in terms of their locational advantages and disadvantages.

7.3.1 Landlocked countries

The model derives from examples drawn from developed countries, and therefore the specific issues and problems of landlocked countries do not feature in the model. In developed regions such as Western Europe there do not appear to be major logistical problems for landlocked countries such as Switzerland. ESCAP (2003a) provides a comprehensive review of the trade and logistics problems for landlocked countries, pointing out that 12 of the world's 30 landlocked countries are in the ESCAP region, of which Afghanistan, Bhutan, Lao People's Democratic Republic and Nepal are least developed countries, while Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan and Uzbekistan are economies in transition. The International Ministerial Conference of Landlocked and Transit Developing Countries and Donor Countries and International Financial and Development Institutions on Transit Transport Cooperation took place at Almaty, Kazakhstan, in August 2003 (United Nations, 2003). The conference outlined a plan of action addressing the "Special Needs of Landlocked Developing Countries within a New Global Framework for Transit Transport Cooperation for Landlocked and Transit Developing Countries" (United Nations, 2003, Annex 1).

Lack of access to the sea and remoteness from world markets inflates transport costs and reduces effectiveness in international trade, most notably for transport-intensive activities. Since these countries are predominantly commodity exporters, transport costs are a significant component of total costs. Furthermore, the transit neighbouring countries of landlocked countries also tend to be developing countries lacking in the transport and logistics resources for effective transit.

The International Ministerial Conference proposes "genuine partnerships between landlocked and transit developing countries and their development partners at the national, bilateral, subregional, regional and global levels and through partnership between public and private sectors" (p. 11). This requires an "enabling administrative, legal, and macroeconomic environment" in both landlocked and transit developing countries and appropriate cooperative arrangements.

The Almaty Programme of Action (APA) seeks to:

> "(a) secure access to and from the sea by all means of transport according to applicable rules of international law; (b) reduce costs and improve services so as to increase the competitiveness of their exports; (c) reduce the delivered costs of imports; (d) address problems of delays and uncertainties in trade routes; (e) develop adequate national networks; (f) reduce loss, damage and deterioration en route; (g) open the way for export expansion; (h) improve safety of road transport and security of people along the corridors." (United Nations, 2003, pp. 12-13)

It establishes priorities under the following five headings:

- Priority 1 Fundamental transit policy issues;
- Priority 2 Infrastructure development and maintenance;
- Priority 3 International trade and trade facilitation;
- Priority 4 International support measures; and
- Priority 5 Implementation and review.

The specific actions proposed under the first four priority headings (the fifth is beyond the scope of this report) are summarized in Annex F. All of the areas specific to transport or logistics covered by the Almaty Conference appear to be included in the model developed in this study. The Almaty Programme of Action gives more emphasis to Government at various levels – national, bilateral, subregional, regional and global – and on international organizations, whereas the model in this study envisages an active private sector. The APA do however emphasise a need for more private-public

collaboration, and for a more competitive environment. Another related difference is that the APA suggests a variety of forms of funding, including that from donor countries and international financial and development institutions. It is not easy for landlocked countries to set up a corridor on purely commercial terms. Funding from agencies such as the World Bank, the EBRD, bilateral or other multilateral donor agencies are typically directed at infrastructure development. These factors may need to be taken into account if the model is applied in the ESCAP region.

The specifications proposed in the APA do not cover the level of detail specific to logistics in the three-part model developed in this study. Accordingly only major divergences need to be discussed here. Areas that are not prominent in the APA, but are considered important in the model in this study, include a need to focus on local advantages; a need for performance indicators; determination of responsibility for assets and associated services; value added logistics; and the potential for clustering (although the scope for shared resources is covered).

7.3.2 Solutions for landlocked countries

Modern transport and information technology developments reduce the advantages of coastal over landlocked countries, but international shipping maintains an advantage for the former. Landlocked countries can seek the following solutions (United Nations Economic Commission for Europe, 2002):

- Focus on transit corridors;
- Regional integration;
- Legal and regulatory reforms;
- Institutional and administrative improvements; and
- International protection measures.

There are different degrees of “landlockedness” related to closeness to markets and the nature of exports. Landlocked countries with high value exports such as Switzerland experience little or no disadvantage. Where there is transit through another country, the international legal issue of sovereignty arises including political, military and transport concerns. Landlocked countries may also be faced with transit charges over which they have no control.

For comparison purpose, Annex G outlines the local advantage of China as a non-landlocked country.

With the coming into force of the Intergovernmental Agreement on the Asian Highway Network and the adoption of the Intergovernmental Agreement on Trans-Asian Railway Network, both of which are major constituents of international integrated transport system, Asia has made substantial progress in creating new opportunities to bring landlocked countries closer to the sea and world market, and further to expand the benefits of globalization to landlocked locations. As one of various significant attempts to enhance performance of AH and TAR, ESCAP secretariat currently seeks to improve facilities of intermodal interfaces or dry ports along AH and TAR as well as to strengthen logistics activities of those facilities, which definitely seems to be in line with the Almaty Programme of Action and to facilitate replicating port concepts at inland locations or landlocked countries.

7.4 Identify interested parties

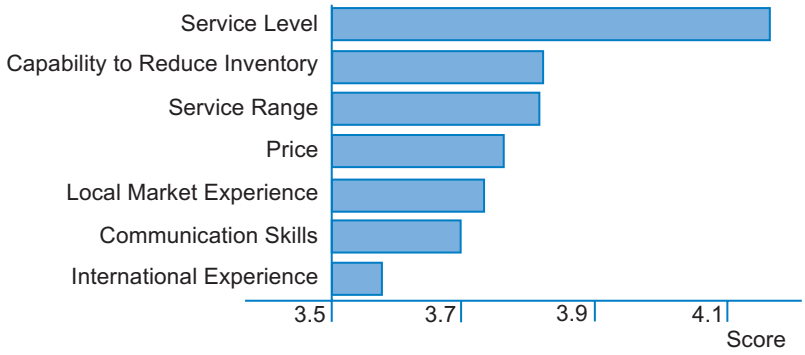
This part of the model examines the interested parties and in particular the scope for interaction between them. It includes the potential for creating new interactions between local planning agencies, port authorities, major carriers (railroads, trucking companies), package delivery companies and the region’s major shippers. Effective transit requires an integrated regional approach including harmonized laws and regulations to cope with goods moving from one legal system to another. Inland logistics centres are not always constructed for logistics efficiency but to overcome legal complications. As the United Nations Economic Commission for Europe (2002, p. 19) states:

> "In many border areas, distribution and transit centres have been built not because they have a particular economic relevance in the logistics process but simply because they mark the furthest point a truck can legally travel and where new legal conditions have to be complied with. Borders are the natural limit of the validity of legal documents such as bills of lading or insurance policies. Legal systems on the two sides of the border can so diverge that they create a "legal wall". That can hinder the smooth transit of goods. Especially if legal tradition and historical or socio-economic legacies have different roots and have taken different directions, the nature of these legal systems can be incompatible. Regional approaches are, therefore, the only logical way to tackle these problems."

7.5 Identify potential functions

The functions can be placed under four major headings – transport logistics attributes, warehouse logistics attributes, international port attributes, and value added logistics services. Traditional functions at warehouses or logistics centres still appear to predominate in China according to a survey by Jones Lang LaSalle and the China Supply Chain Council (2006). According to the survey, storage is currently the most significant current use of warehousing (25.0 per cent); followed by transshipment (20.0 per cent), value added services (20.0 per cent), and consolidation (18.0 per cent), although strong growth is foreseen in value added services with a move away from storage to higher value activities. (The criteria for selecting are shown in Figure 7.2.)

Figure 7.2. Factors governing corporate decisions to locate



Source: Jones Lang LaSalle and the China Supply Chain Council (2006, p. 3).

The results suggest that international experience is not yet the important factor it should be if the more remote regions are to develop fast high capacity links with the international markets. Nevertheless, Table 7.1 below shows that a wide range of logistics functions are undertaken at logistics centres in the more developed and coastal parts of the ESCAP region.

7.6 Establish operational quality and performance indicators

Quality indicators refer to the service level and performance indicators describe the productivity of a terminal. There is evidence of moves towards international quality standards in logistics. For example, the following is a quotation from website of Tianjin DTW group, the agency linked with FedEx in China:

> "January 1st, 2005 is a memorable day for the DTW Group. On this day, DTW Group headquarter passed the ISO9001:2000 Quality Management System Audit and obtained certification issued by BSI. This marks [that] DTW Group has realized normalization and standardization in management, and integrated with international logistics practice in terms of quality management." (Tianjin DTW, 2006)

Previous work by ESCAP suggests that performance indicators should not just consider the terminal in isolation, but should relate it to the total transit. This is particularly relevant for landlocked countries. The following example is based on findings given in ESCAP (2003a). Table 7.2 below (Table VII.2 in ESCAP, 2003a) shows the cost for various stages required to move garments from Vientiane to Bangkok Port.

Table 7.1. Comparison of activities at logistics centres in the ESCAP region

Economies		Major functions	
Singapore		Storage, processing, assembly, classifications, consolidation, transshipment, labelling, packaging, inspection, etc. Manufacturing is partially allowed.	
China	China	Manufacturing, storage, processing, assembly, consolidation, labelling, packaging, exhibition, sampling. Export and import, intermediate trade, finance and logistics.	
	Hong Kong, China	As a free port, all functions are allowed, including manufacturing, storage, processing, assembly, classifications, exhibition, sampling and transshipment.	
	Taiwan Province of China	Export Processing Area	Manufacturing, processing, assembly, labelling, packaging.
		Science Industrial Area	Research and development, manufacturing support, and education for high-tech products.
		Special Area	Trade, warehousing, and transport for building international logistics centre in Asia-Pacific region.
Japan		Foreign Access Zone	Storage, classification, inspection, testing, processing, assembly, labelling, packaging, and exhibition of imported goods.
		Free Trade Zone	Manufacturing, assembly, processing, storage, inspection, testing, transformation, packaging, labelling, export, and exhibition.
Republic of Korea		Material handling, storage, exhibition, distribution, processing, repair, and other international logistics activities.	

Source: ESCAP (2002a).

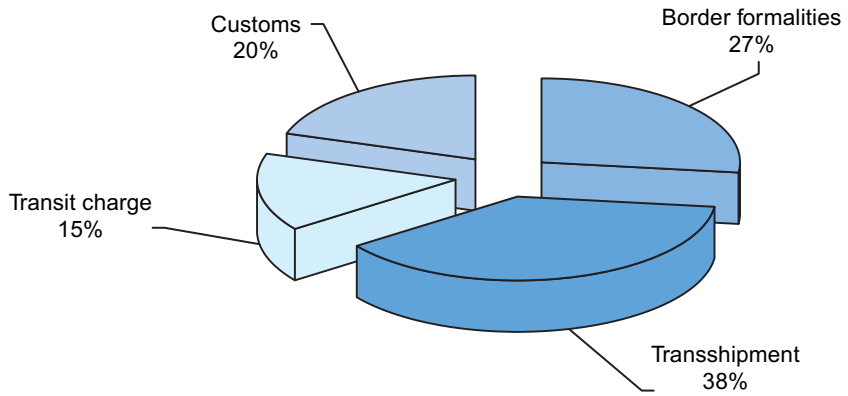
Table 7.2. Estimated time and cost required for garment export by road from Vientiane (Lao PDR) to Bangkok (Thailand)

Stage	Distance (km)	Minimum time (in hrs)	Maximum time (in hrs)	Cost per TEU (USD)	Per cent (%)
Transport Vientiane-Thanaleng and Thanaleng-Nong Khai	15	0.67	1.25	116	16.6
Border formalities	5	2.0	4.0	35	5.0
Transshipment in Nong Khai		3.0	6.0	50	7.1
Transit charge				20	2.9
Customs – Lao People's Democratic Republic				13	1.9
Customs – Thailand				13	1.9
Transport Nong Khai-Bangkok Port	650	12.0	20.0	306	43.7
Container stevedorage Bangkok Port				21	3.0
Container wharfage Bangkok Port				22	3.1
Lift on/off charges Bangkok Port				17	2.4
Terminal handling charges Bangkok Port				68	9.7
Bill of lading charges				13	1.9
Customs – Bangkok Port				6	0.9
Total	670	17.67	31.25	700	100.0

Source: ESCAP (2003a).

The conversion of costs at each stage into per cent ration of overall cost shows that “pure” transport (italics) accounts for only 60.3 per cent of the total costs. Inland border, transshipment and clearance costs account for 18.8 per cent. These costs, which are equivalent to around one-third of the transport costs in this example, appear high and should be considered in the context of any inland logistics port development. Further analysis can be made of the “inland non-transport related costs”, as has been undertaken in ESCAP (2003a) (see Figure 7.3). The high transshipment costs are attributed to the lack of dedicated container-handling facilities.

Figure 7.3. Breakdown of non-transport-related costs at the Thanaleng-Nong Khai border crossing



Source: ESCAP (2003a).

7.7 Identify potential operational problems

Operational problems can be categorized under organizational, management and operational, communication and infrastructural problems.

7.7.1 Organizational problems

This section refers to issues of terminal organization, failure to relate terminal design to modal systems such as rail services, and a general lack of coordination among the different actors of the intermodal transport chain etc. Multinational logistics companies are more reluctant to invest in logistics centres if Government agencies of ESCAP countries are too bureaucratic or require administrative practices that are too complex (ESCAP, 2002a).

Extensive investment in infrastructure and institutional reform are needed if port capacity is to be supported by intermodal links. Network links are incomplete in some areas either through natural geographical boundaries, for political reasons, or because a link has simply never existed, as between China and Myanmar. Another problem is break-of-gauge where neighbouring countries have different rail track gauges, for example between China and Mongolia, and between the Russian Federation and the Democratic People’s Republic of Korea. Break-of-gauge also occurs within one country such as India or Bangladesh (ESCAP, 2006a). Table 7.3 below shows the breaks-of-gauge on the Trans-Asian Railway (TAR) and Table 7.4 summarizes the missing links along the TAR.

A lack of coordination in logistics systems may relate not only to technical aspects such as breaks-of-gauge, but also to information systems, particularly documentation.

Table 7.3. Break-of-gauge on the Trans-Asian Railway

Between….	… and	Gauge transition
China	Viet Nam	1 435 mm ⇔ 1 000 mm
China	Russian Federation	1 435 mm ⇔ 1 520 mm
China	Kazakhstan	1 435 mm ⇔ 1 520 mm
China	Mongolia	1 435 mm ⇔ 1 520 mm
Russian Federation	Democratic People's Republic of Korea	1 520 mm ⇔ 1 435 mm
Turkmenistan	Islamic Republic of Iran	1 520 mm ⇔ 1 435 mm
Azerbaijan	Islamic Republic of Iran	1 520 mm ⇔ 1 435 mm
Armenia	Turkey	1 520 mm ⇔ 1 435 mm

Source: ESCAP (2006a, p. 84).

Table 7.4. Missing links on the Trans-Asian Railway

Between….	… and	Status
Democratic People's Republic of Korea	Republic of Korea	Under construction
Thailand	Cambodia	Under construction (within framework of Singapore-Kunming Rail Link Project)
Thailand	Myanmar	
Cambodia	Viet Nam	
China	Myanmar	Under consideration (within framework of Singapore-Kunming Rail Link Project)
China	Lao PDR	Under consideration (within framework of Singapore-Kunming Rail Link Project)
Myanmar	Bangladesh	
Myanmar	India	
Islamic Republic of Iran	Pakistan	Under construction

Source: ESCAP (2006a, p. 83).

7.7.2 Management and operational problems

This section refers to inefficiencies, bureaucratic shortcomings and restrictive work practices at inland logistics ports. Within the ESCAP region, bureaucratic procedures and restrictive work practices in functions such as ship berthing, loading, unloading and storage of cargo, and customs processing work against introducing a competitive environment (ESCAP, 2006), as shown in the extract below. The consequences of failing to adapt in seaports is equally relevant to inland locations.

7.7.3 Communications problems/inefficiencies

Many ports within the ESCAP region have been slow to adopt IT platforms for conducting business including scheduling information and links to inland transport companies. Singapore is a world-class exception to this deficiency. The same lack of advanced communications applies to the failure to achieve Customs harmonization at ports (ESCAP, 2002a). This limitation is also relevant to inland Customs facilities and of particular concern to landlocked countries. As ESCAP (2002a, pp. 77-78) states,

> "For most countries in the ESCAP region, existing information systems have been developed individually for each sector, resulting in a lack of balance, coordination and standardization between different systems and

> transport modes. Thus, the main issue for the development of logistics information systems in the future will be how to build balanced, coordinated and standardized information systems without interfering with the continuous development of existing systems."

There are also communications problems in the existing 3PL sector in the ESCAP region, which will lessen the impact of attempts to introduce value added services. In particular there is scope for improving IT skills required by multinational logistics companies and essential in international logistics (ESCAP, 2002a).

7.7.4 Infrastructural problems

Issues related to break-of-gauge for rail services mentioned above are both an organizational and an infrastructural problem. ESCAP (2002a) stresses the importance of not only developing new infrastructure, but also the need to replace infrastructure that is several decades old and unable to meet future minimum requirements. Competition for financing of resources in the future will require better utilization of existing facilities as much as introducing new capacity.

7.7.5 Establish framework of assessment

It is proposed that the model used by World Bank (2006) and described in detail in Chapter 4 could be applied at this stage. In essence, the model is divided into assessment of key performance indicators, project costs and financing, and economic costs and benefits. The reader is referred to Chapter 4 where an example is outlined concerning inland container depots (ICDs) in Baoding, Cangzhou, Handan, Tangshan and Qinhuangdao in Hebei Province; Baotou in the Autonomous Region of Inner Mongolia; and Hangzhou, Huzhou and Xiaoshan in Zhejiang Province.

8 Application of the Model – Implementing the Cluster Concept

8.1 Introduction

This chapter continues the analysis of the previous two chapters by investigating inland logistics port development in the ESCAP countries based on published material, and attempt to establish the extent to which the model matches the themes mentioned in the published material.

8.2 Model Part 3: Replicating port concepts at inland locations

This part of the model has been derived from the contents of Chapter 5 (The concept of clusters) and has seven main components – define cluster boundary; identify existing and potential resources; identify potential cluster members; determine supportive role of Government; identify scope for shared resources; identify scope for innovation; and identify barriers to clusters. (Each component has a number of subcomponents as shown in Figure 8.1).

8.2.1 Define cluster boundary

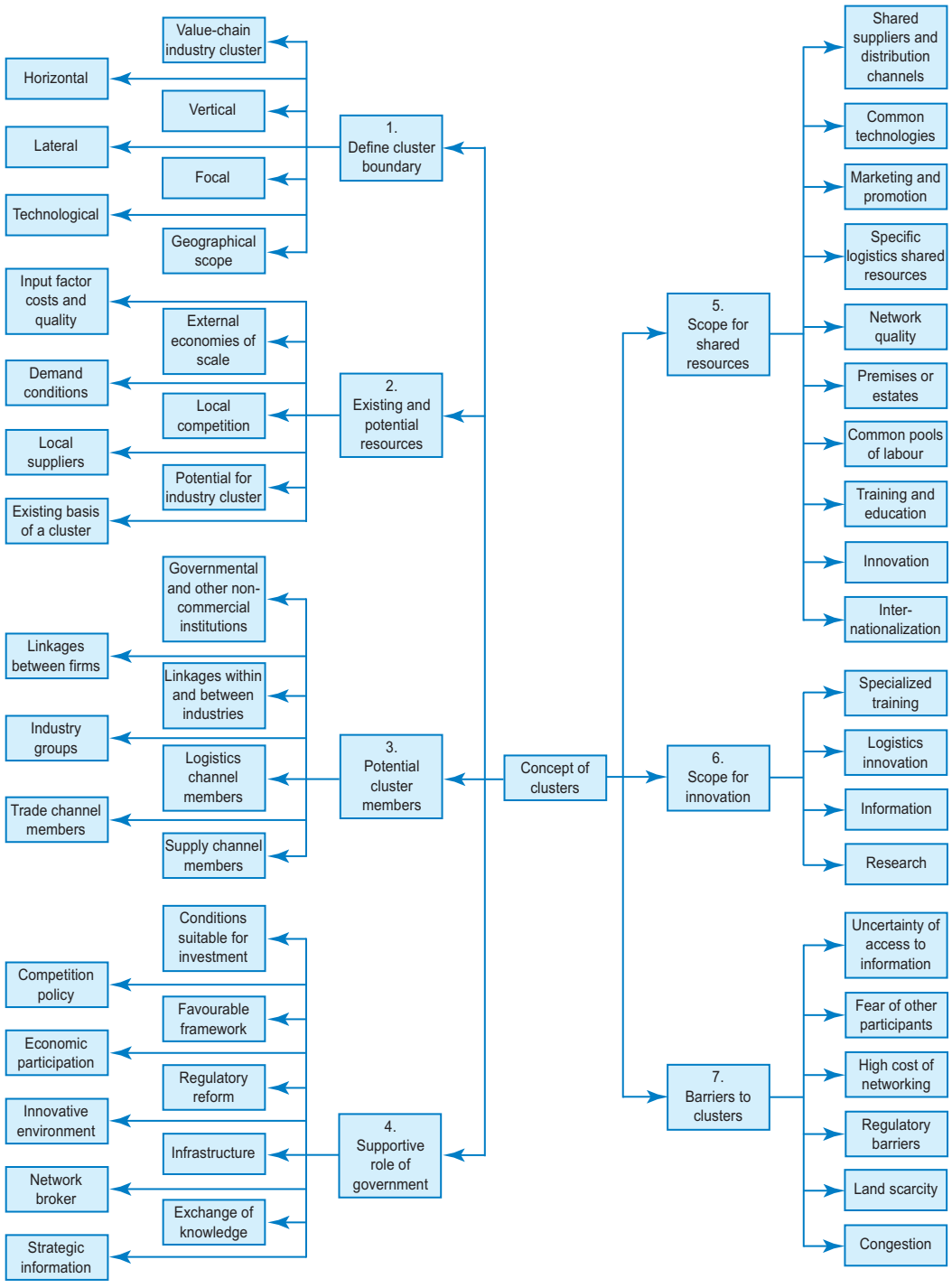
Cluster boundaries can be established along six dimensions. They are horizontal (competitors in the same or similar industries); vertical (suppliers and customers in the same supply chain); lateral (different types of firms using common resources with an "industry identity"); technological (different types of firms sharing a common technology with a "technology identity"); focal (firms based around a central entity); geographical scope (local, regional, national); "value-chain" industry cluster (physical flows of goods and cargo, capital flows, payment flows and information flows). Let us consider how clusters are defined in the following extract by the Hong Kong, China Trade Development Council (2004).

The example in Box 8.1 suggests that the key features of the six leading components (logistics parks) of the overall cluster are:

- Yantian Logistics Park – international cargo hub;
- Qianhai Bay Logistics Park – integrated logistics centre where priority is given to port development;
- The Airport Logistics Park – base for domestic freight;
- Pinghu Logistics Park – integrated logistics park for transshipment over land;
- Sungang-Qingshui River Logistics Park intra-city delivery services; and
- Longhua Logistics Park – to serve customs checkpoints.

The cluster appears to be defined as a "value-chain" cluster restricted to physical flows of goods and cargo and information flows. Discussion is restricted to members of the logistics channel (see later discussion), and there is no mention of supply or trade channels apart from the specialized market products (e.g., house ware, drugs) to be transported, and therefore no apparent value added logistics beyond transport and directly associated functions (e.g., transshipment) relevant to such channels. There is also no explicit mention of horizontal competition among logistics providers.

Figure 8.1. Implementing the concept of clusters



Box 8.1. Investment in Shenzhen

Shenzhen plans to invest Y 31.6 billion to build logistics infrastructure facilities during the Tenth Five-year Plan period. The output value of Shenzhen's logistics sector is projected to reach Y 80 billion by 2005, accounting for 20 per cent of the city's GDP. Under Shenzhen's modern logistics development plan for 2015, the city aims to establish a regional logistics hub based on the integration, complementarity and cooperation among Shenzhen, Hong Kong, China, Pearl River Delta (PRD) and the whole of southern China. Efforts will be made to expedite the building of a modern, comprehensive transportation network (including roads and railways) and a logistics information network. The development of modern, professional logistics services will be accelerated and large-scale logistics distribution centres will be constructed. The target is to achieve the full integration of rail transport, road transport, as well as warehousing, wholesale and distribution services between Shenzhen and Hong Kong, China. Shenzhen is slated to become a modern integrated logistics hub offering multiple levels of service, with international logistics services as the core, regional logistics as the foundation, and intra-city distribution as the back-up. Eight large-scale logistics parks will be constructed, namely in the western port, Yantian Port, Sungang-Qingshui River, the airport, Pinghu, Longhua, Nanshan and Longgang.

The functions of the six leading logistics parks to be built are as follows:

Yantian Logistics Park will be an international cargo hub specialized in international container in transit, warehousing, loading and unloading, processing, and logistics information services.

Qianhai Bay Logistics Park will be an integrated logistics centre where priority is given to port development. It will specialize in bulk cargo dispatch over land, containers in transit, processing, transshipment and delivery services, as well as logistics-related services such as shipping transactions, information, management, insurance and financial services.

The Airport Logistics Park will primarily serve as a base for domestic freight while also targeting international cargoes. It will leverage on an information platform to develop multimodal supply chain services. Construction of an air cargo centre will soon be launched to pave way for a comprehensive platform featuring physical facilities as well as information and other services.

Pinghu Logistics Park will be an integrated logistics park for transshipment over land. Development priority will be focused on three target markets, namely containers in transit, warehousing and delivery, and specialized wholesaling.

Sungang-Qingshui River Logistics Park will be specialised in intra-city delivery services. It will provide a logistics transaction platform based on specialized wholesale markets. Development priority will be given to seven major types of specialized markets, such as houseware, auto parts and accessories, light industrial goods, drugs, frozen food delivery, and culture and communication. Also, 3PL and virtual logistics will be promoted, an e-commerce enabled logistics platform will be built, and dedicated export logistics zones will be established. Longhua Logistics Park will be positioned to serve customs checkpoints. Development priority will be given to container feeder service for entry-exit container cargoes, logistics centres, import-export freight forwarding, container return point, information management and other supporting systems and services.

Source: Hong Kong Trade Development Council (2004).

8.2.2 Existing and potential resources

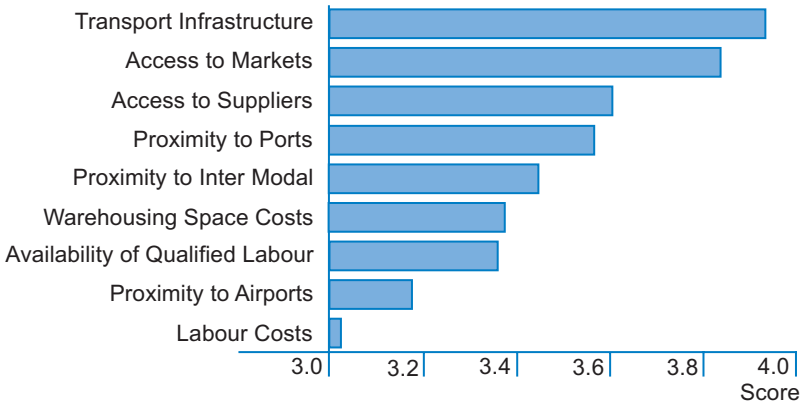
This part of the model seeks to identify the factor inputs to a cluster, the nature of demand, the nature of competition, the local supply chain, the extent to which there is a critical mass for a cluster, external economies of scale, and whether there is an existing basis for a cluster. Jones Lang LaSalle and the China Supply Chain Council undertook a survey in July 2006 of 138 domestic and foreign companies involved in logistics to identify the potential of the logistics market in China. They found that there was an overwhelming concentration of logistics activity in three main regional clusters. Their main findings were,

"❑ The overwhelming majority of respondents warehousing facilities (85.0 per cent) are located in one of the three main regional clusters, Yangtze River Delta (YRD), Pearl River Delta (PRD) and Greater Bohai Bay (GBB);

- The largest concentration is in the YRD region (43.0 per cent), with the focus on Shanghai (32.0 per cent);
- Both the PRD and GBB regions (at 21.0 per cent each) currently have lower representation than the YRD. In the PRD, the focus is on Guangzhou (11.0 per cent) and Shenzhen (9.0 per cent), and in the GBB, on Beijing (13.0 per cent) and to a lesser extent, Tianjin (4.0 per cent); and
- Outside the three main regions, Chengdu has the most noteworthy representation (5.0 per cent). Otherwise, only Xiamen and Shenyang were mentioned by more than 1.0 per cent of respondents." (Jones Lang LaSalle and the China Supply Chain Council, 2006, p. 2)

There appears to be little intention to move away from the three main regional clusters in the near future, given the poor infrastructure and lack of other key factors away from these clusters. The same survey found that the key factors for selecting a warehouse location were as shown in the following Figure 8.2. The results suggest that transport links to suppliers and markets are more important than local factor costs such as real estate and labour.

Figure 8.2. Key factors for choosing a warehouse location in China



Source: Jones Lang LaSalle and the China Supply Chain Council (2006, p. 3).

8.2.3 Potential cluster members

This part of the model proposes three levels of analysis – micro-level of the firm, meso-level of the industry and macro-level of the economy. Cluster members are broadly divided into three commercial channels – logistics channel, trade channel and supply channel members, as well as Governmental and other non-commercial institutions. This level of formal analysis appears to be unavailable in the published literature although useful advice is provided in ESCAP (2006a), which states that ports need to integrate their operations both upstream and downstream within the supply chain and understand their position more fully in the total chain of events.

The earlier example of the development of a logistics cluster in Shenzhen described by the Hong Kong Trade Development Council (2004) appears to restrict membership to logistics channel members, and does not include members from other sectors.

8.2.4 Supportive role of Government

Government can play a number of roles, particularly in the provision of transport and associated infrastructure. Generally, in Western economies Government has become a facilitator creating a favourable environment for market conditions, knowledge creation and exchange, innovation, and a network broker. It may also introduce regulatory reform enabling clustering. This is a part of the model where there is an existing body of literature concerning the ESCAP region. ESCAP (2006a)

proposes the following key roles for Government in developing intermodal services inland which accord with the facilitating role described above, although without explicit mention of clustering.

> "1) Work in the international sphere to reduce the costs of political fragmentation by reducing impediments to international trade and exchange;
>
> 2) Establish policies which foster market conditions that encourage competition and efficiency;
>
> 3) Establish policies that actively and specifically encourage the development of intermodal facilities and services; and
>
> 4) Facilitate the development of new industry and work practices by direct and indirect support of education and training, and research and development initiatives." (ESCAP, 2006a, p. 62)

The Government of China has been aware of the need to create a favourable climate for attracting the best foreign logistics operators and overcoming problems of infrastructure and bureaucracy, but nevertheless has generally required joint ventures with majority ownership by Government-owned enterprises. This position has been relaxed with China's entry in the WTO and an "influx of foreign company involvement, investment and competition" is anticipated (ESCAP, 2006a).

The development of modern logistics in the Pan-PRD (Pearl River Delta) region is being supported by logistics infrastructure construction, which is a key role of government. It is not clear whether this includes the construction of inland logistics ports since discussion is restricted to transport modes and a "network of transportation". Sichuan undertook a survey of 500 manufacturing, commercial and logistics enterprises in the province. It is interesting to compare the "most wanted service" of each category of business. For manufacturing enterprises it was trunk line transport, for commercial enterprises it was logistics system design, and for logistics enterprises it was warehousing and storage. Without seeing details of the survey, it is difficult to make a firm judgement, but it suggests that there is a clear need for logistics centres as perceived by the companies most skilled in logistics (i.e., the logistics enterprises). It may also reflect the lack of large or integrated logistics service providers and the "logistics enterprises" may be predominantly road freight operators. In the words of the Hong Kong, China, Trade Development Council, when it comes to logistics both in concept and practice "the mainland is still a toddler and there is a scarcity of experienced professionals" (Hong Kong, China, Trade Development Council, 2005).

China's commitments to the World Trade Organization (WTO), which it joined in November 2001, did not extend to integrated logistics services, although provision for logistics was included on an individual industry basis. In June 2002 a pilot scheme enabled foreign companies to operate joint-venture integrated logistics services in Guangdong, Jiangsu, Zhejiang, Shenzhen, Beijing, Tianjin and Shanghai, with minimum registered equity of US$ 5 million and maximum foreign equity of 50 per cent. The Closer Economic Partnership Arrangement between Hong Kong, China and the Mainland (CEPA), signed in September 2003, enables Hong Kong, China logistics companies; including Hong Kong, China, based foreign logistics companies, to enter the mainland market. Furthermore, under the Pan-PRD Regional Cooperation Framework Agreement, Hong Kong, China, Macao, China, and nine mainland provinces/autonomous regions (known as "9+2"), will cooperate more extensively and closely in various areas including logistics (Hong Kong, China, Trade Development Council, 2005).

Competition policy

Competition policy differs among countries in the ESCAP region, and some countries do not have a formal policy or any anti-trust legislation. Countries that do have a policy differ in their approach to practices such as mergers and acquisitions, and abuse of dominant power in the market (ESCAP, 2006a).

Regulatory reform

Licensing of logistics operators is essential for safety and environmental reasons, or to maintain service standards. However, licensing can be applied in an inappropriate manner and lead to inefficiencies, as shown in the extract below.

Box 8.2. State and local policies for developing logistics

The development of the modern logistics industry has been put on the agenda of the central Government and the Governments of various Pan-PRD provinces. China's Tenth Five-Year Plan proposes "focusing on the development of trade and commerce, communications and transportation, urban services, chain operation, logistics, distribution, intermodal transportation and online marketing". The action plan for trade and commerce makes it clear that the logistics sector has been identified by the Government as an industry to be encouraged and developed with priority. The List of Key Industries for Encouraged Development also names the development of logistics centres as a key area to be encouraged.

On 5 August 2004, the National Development and Reform Commission, Ministry of Commerce and seven other ministries and commissions jointly issued the Opinions on Promoting the Development of Modern Logistics in China, clearly suggesting that great efforts should be made to promote the opening of the logistics market to foreign investment. Honouring its WTO commitments, China will further open its logistics sector to foreign investment, encourage large foreign logistics companies to set up logistics enterprises on the mainland in accordance with relevant laws and regulations of China, and encourage the use of foreign capital, equipment and technology in the establishment or operation of logistics facilities on the mainland.

Different provinces have also introduced local policies and plans for the development of their logistics sector.

Guangdong will proactively promote logistics cooperation in the Pan-PRD region. Bringing into play the system of the Guangdong-Hong Kong and Guangdong-Macao Cooperation Joint Conference, efforts will be made to further promote diverse forms of cooperation between Hong Kong, China and Macao logistics enterprises and industrial and commercial enterprises in Guangdong, and to raise the level of modern logistics cooperation in Pan-PRD on the basis of making the Guangdong-Hong Kong Logistics Cooperation Forum a success.

Hunan issued the Circular on Suggestions for Accelerating the Promotion of the Development of Modern Logistics in 2002 and planned to build regional logistics centres in Huaihua, Hengyang and Yueyang.

Jiangxi revised Several Suggestions for Accelerating the Development of Modern Logistics in Jiangxi Province in 2003 and encouraged investors of different ownership systems and foreign-invested enterprises to take part in the construction of logistics bases. The Government offers preferential policies on land, capital and taxation for the construction of logistics infrastructure facilities serving the community.

In its Development Outline for Modern Logistics During the Tenth Five-Year Plan and Up to 2010, Sichuan encourages the introduction and utilization of foreign capital to accelerate the construction of facilities relating to its logistics industry and has started to build an information platform for "regional e-commerce and modern logistics service system" in an effort to bring about the formation of a regional network of logistics enterprises and information sharing between enterprises via the Internet.

Yunnan also encourages the development of collective and private logistics enterprises and attracts foreign and multinational logistics companies to the province. It has also started to build the Kunming International Logistics Centre to serve the South-East Asian market.

Guangxi has mapped out a five-year development blueprint for the development of its logistics sector. It will gradually establish a system of logistics distribution centres that mainly serves central cities, transportation hubs, commodity distribution centres and entry-exit ports, increase the number of chain-operated stores in the region to over 4,000 by 2005, build modern logistics parks in Nanning, Liuzhou and Fangchenggang, as well as foster three logistics distribution centres with annual turnover of Y 1 billion each.

Source: Hong Kong Trade Development Council (2005).

8.2.5 Scope for shared resources

An important benefit of clusters is that various types of resources can be shared. Such resources include networks, real estate, supply channels, labour pools, technologies, innovations, training and education, marketing and promotion, and internationalization processes. There can also be specific logistics shared resources, such as information systems and cargo consolidation facilities. The available literature on topics associated with inland logistics ports tends to focus on training and education, the quality of the transport network, and, in particular, on internationalization processes.

Box 8.3. The potential impact of inefficient and inconsistent licensing arrangements

The potential impact of inefficient or inconsistent licensing arrangements can be severe. The Chinese Government is planning to spend at least US$ 120 billion on improving existing roads, and building more than 200,000 km of new roads, especially in the western provinces, by the end of 2006 because the road transport mode has proved itself to be far more flexible and reliable than other modes in terms of door-to-door delivery options and freight pricing. While this investment in the road system will contribute to enhancing the country's distribution networks between China's major provinces, a high level of bureaucratic regulation in the form of provincial licensing and toll systems still restricts the free movement of trucks and significantly impacts on the cost of moving cargo between ports and their hinterland.

The difficulty of navigating the licensing system effectively is reported to have deterred many companies from participation in the market, and some that have made the investment are finding it difficult to deal with the regulations. According to APL Logistics, regulatory restrictions are the biggest constraint on third party logistics specialists wishing to move into China. Licenses are required for many activities that a North American or European based company would take for granted. For example, licenses are needed for the right for trucks to travel in certain provinces or for foreign companies to acquire Chinese transportation and logistics services providers, an issue that is exacerbated by the fact that there is no single pan-Chinese authority that issues those permits and licenses; rather it is done on a regional province and city-by-city basis.

Until recently, about half the 13,000 container trucks that cross the Hong Kong, China – Shenzhen border daily are empty because mainland regulations have prohibited them from taking cargo back out of China. Hutchison Port Holdings (HPH) operates an inland container depot at Guanlan in the Baoan district of China, about 32 kilometres north-west of Yantian International Container Terminals. The Guanlan Inland Container Depot is strategically located in the middle of Shenzhen's major cargo gateways, Yantian Port, Huanggang border crossing, Shekou and Huangtian Airports. The inland container depot is also near a number of large industrial areas, allowing consolidators and freight forwarders to provide supply chain services, including quality inspection and customs clearance to their customers. Its position also provides empty container storage services for shipping lines. To take further advantage of the depot, in September 2003 Hutchison Whampoa subsidiary Logistics Network Enterprise (LINE) negotiated a license with Guandong and Hong Kong, China authorities that allows Guanlan Inland Container Depot to provide trucks with full export containers in return for empties.

Source: ESCAP (2006a, pp. 73-74).

Training and education

Consistency in training logistics professionals in supply chain management and IT skills is largely lacking in ESCAP countries (Singapore is an exception). Any such programmes require institutional support and Governments should encourage the development of formal programmes in logistics education and training (ESCAP, 2002a).

Network quality

A lack of inland infrastructure in many ESCAP countries prevents an efficient service to and from ports leading to a lack of investor confidence and industrial development. Few Governments have an integrated transport policy, and this leads to inefficient use of resources. Although there are signs of recognition of the value of a logistics approach there is still little effective long-term planning (ESCAP,

2006a). In particular, both China and India need to develop inland road, rail and waterway networks to satisfy their growing international trade. An example of developments in India and China are shown in the two excerpts below (Boxes 8.4 and 8.5).

Box 8.4. Intermodal developments in India

The potential impact of inefficient or inconsistent licensing arrangements can be severe. The Chinese Concor is embarking on an ambitious investment programme of more than 14 billion rupees over the next five years. The programme includes: the acquisition of new, larger and faster wagons; improving existing inland container depots while building 14 more over the next five years, each with modern warehousing and distribution facilities; upgrading railway lines, particularly those on the Chennai/Delhi corridor, to accommodate fast shuttle train services to and from Delhi and its main gateway ports on both the east and west coasts. While this investment will go some way to meeting the country's intermodal needs, liner operators believe that significantly higher levels of Government funding are still required and that there is a need to relax the Multimodal Transport Act 1997 to encourage private sector investment in the country's rail business.

Source: ESCAP (2006a).

Box 8.5. China: The Pearl River – a case study

Pearl River Delta, situated in the province of Guangdong, and forming a triangle with the cities of Hong Kong, China, Macao, China and Guangzhou, is critical to the industrial development of China. It is at the centre of three special economic zones (SEZ) – Shenzhen, Zhuhai and Shantou – which have experienced double digit export growth over the last four years and account for about 40 per cent of the value of China's exports. Hence the ports of the Pearl River Delta are crucial southern gateways to the country's hinterland, especially given the fact that big manufacturers including Proctor and Gamble, Nestle, Coca-Cola, Mitsubishi, Honda, PepsiCo and Colgate Palmolive have their production bases here. To meet the massively growing demand for integrated transport services in the Guangdong Province, the Chinese Government is investing in new roads, bridges, terminals and information technology networks.

While the growth in infrastructure has been enormous, it has not been without its critics. Regional planners have criticized a lack of overall planning, fed by rivalry among cities and regions, which has led to construction of too many roads, airports and ports. This in turn has meant that these facilities are working below capacity.

Source: ESCAP (2006a).

Emphasizing the importance of the network concept within and between different transport modes, ESCAP (2006b) reports that in Commission resolution 60/1 of 28 April 2004 (Shanghai Declaration), members and associate members declared that "in the area of managing globalization, we will strive to develop an integrated intermodal transport network in Asia and the Pacific as well as Asia-Europe transport corridors." Closer focus needs to be on:

> "(a) upgrading modal infrastructure links and nodes (including substandard and capacity constrained sections, border crossings and break-of-gauge points); (b) promoting the re-emergence of railways in the intermodal system; (c) addressing infrastructure connectivity issues at modal interchange points (including seaports and dryports); and (d) promoting the improvement of infrastructure asset management and maintenance (in particular, the creation of earmarked road funds for maintenance)." (ESCAP, 2006b, p. 51)

Internationalization

The following extract describes a form of internationalization through a joint landbridge project between Malaysia and Thailand. Such internationalization efforts between countries can broaden the scope of clusters, not only geographically, but also in terms of vertical integration of cluster members and enhancement of the value-chain.

Box 8.6. Scope for shared resources

In 1999, Malaysia's national rail operator KTM Berhad and the State Railway of Thailand (SRT) launched their joint landbridge project. Designed to promote import and export traffic moving between the two countries, the landbridging arrangement has extended Port Klang's hinterland beyond Malaysia's border into Thailand and South-East Asia. Under the terms of the 1999 agreement, the two parties utilize compatible rail networks to make Bangkok a land hub and Port Klang a sea hub. Using more than thirty weekly routes, other landbridge services operate between Singapore and Bangkok (via Malaysia) and between Singapore and Port Klang.

Cargo crosses the border stations between Malaysia and Thailand every day in Padang Besar, Perlis and Rantau Pahjang, Kelantan without having to be unloaded and with only a brief pause for customs clearance due to the cooperation of customs and immigration officials of both countries. Freight services are provided by the State Railway of Thailand and KTM Berhad.

Source: ESCAP (2006a, p. 59).

Harmonization of documentation is as important as technological integration. One way this can be achieved is through the reduction of the overall number of documents associated with freight movements. ESCAP (2006, p. 66) suggests that improvements can be made by,

> "Harmonizing export and import documents, or using commercial documents already used for export purposes for import clearance as well;
>
> Adopting a single format for documents in line with the United Nations Layout Key for Trade Documents and other UN standards, including UN/EDIFACT;
>
> Replacing the compulsory presentation of some documents for low risk consignments at borders with post clearance audits and self-assessment for some trusted traders;
>
> Adopting standardized wording on compulsory labelling and using the languages of both the importing and the exporting countries; and
>
> Introducing electronic systems for filing, processing and communication of data and payment of fees related to border crossing."

Expanding trade within ESCAP has been hampered by rules and regulations specific to individual countries. For example, there may be restrictions on the operations of foreign firms or failure to comply with international standards and protocols. There has also been a rise in the use of security measures worldwide, such as the two-level security protocol introduced by the United States for inbound traffic, to the detriment of non-Western countries (ESCAP, 2006a). Evidence of increasing harmonization within the ESCAP region is given in Box 8.7. There is a lack of overall required standards for the multimodal transport industry within ESCAP, where there is a complex mix of "emerging subregional standards, nationally enforced standards and no standards at all. This may prevent the emergence of innovative clusters. Several countries, including India, the Philippines, the Republic of Korea and Viet Nam have standards imposed by Government. National associations established in the majority of ESCAP member countries play an important role in the self-regulation of the sector" (ESCAP, 2006a, p. 69). Positive steps are being taken with a draft ASEAN framework agreement on multimodal transport to impose minimum qualifications and certification of operators for asset requirements, skills and liability cover. Relevant industry associations such as freight forwarders and multimodal operators will be registered.

Box 8.7. Scope for shared resources

As a means of facilitating national and international land transportation in the ESCAP region, twenty-eight of its member countries adopted resolution 48/11 at the 48th Commission of ESCAP. The resolution recommended that the countries accede to seven international conventions in the area of national and international road and rail transportation facilitation. Progress is gradually being made towards the achievement of the goal of complete accession to the targeted conventions. A number of subregional framework agreements focused on improving the movement of goods, people and vehicles across borders are also being developed by countries in the ESCAP region. These agreements include:

- the ASEAN Framework Agreement on the Facilitation of Goods in Transit;
- the Greater Mekong subregion Agreement for Facilitation of Cross border Transport of Goods and People;
- the Basic Multilateral Agreement on International Transport for Development of the Europe-the Caucasus-Asia Corridor (TRACECA); and
- the Economic Cooperation Organization (ECO) Transit Transport Framework Agreement.

Source: ESCAP (2006a, p. 57).

An example of international collaboration is the international agreement associated with the Greater Mekong River System shown in the extract below. International (both regional and subregional) transport-related agreements and programmes have grown in importance with a trend towards overlapping organizations and programmes of different types, where some countries have benefited more than others. As ESCAP (2006b) states:

> "Countries at the hub of an emerging "hub-and-spoke" system of transport-related agreements have reaped particular benefits, partly due to their geographical location and in part because of their active "transport diplomacy." The proliferation of bilateral and subregional agreements in the transport sector raises concerns over their consistency with regional and global conventions. ESCAP has promoted openness of agreements and adherence to regional and global standards in order to ensure the efficient operation of the intra- and interregional transport system. One example is in the area of cross-border transport facilitation, where ESCAP in its resolution 48/11 of 23 April 1992 recommended that countries in the region consider acceding to a list of key international conventions." (ESCAP, 2006b, pp. 42-43)

Box 8.8. The Greater Mekong River System

The Greater Mekong River System, one of the world's great navigable waterways, has long been underutilized because of the lack of adequate infrastructure, navigational aids and lack of consistency in rules and regulations. An agreement on commercial navigation on the Lancang-Mekong River among the four Greater Mekong Subregion countries – China, the Lao People's Democratic Republic, Myanmar and Thailand – that was signed in 2000 is expected to promote substantial investment and river traffic growth.

- As part of the Lancang-Mekong Navigation Cooperation Agreement, the four contracting parties have constructed a number of ports to support the emerging river traffic:
- The Republic of China has upgraded three ports – Simao, Jinghong, and Guanlei – that will serve both passengers and freight traffic.
- The Lao People's Democratic Republic set up a new economic development zone near the Golden Triangle area, which consists of construction of the Ban Mom Port, new urban area development and bank protection. The port infrastructure was completed in 2001 and others will be completed in 2008 and 2010 respectively.
- Myanmar has designated two ports for international traffic on the upper Mekong River, Wan Seng and Wan Pong. In addition, a port at Soploi has been built on the same scale as the Jinghong Port and opened for operation in 2002.
- The Government of Thailand is building two ports in Chiang Saen, both of which are expected to be completed in the near future. The private sector of Thailand has also built some terminals along the upper Mekong River in the Chiang Rai Province.

Source: ESCAP (2006a, p. 89).

The largest number of agreements and organizations are found in two categories of country. They are landlocked countries, such as Tajikistan, Kyrgyzstan, Azerbaijan, Kazakhstan and Uzbekistan, and geopolitically important countries, such as the Russian Federation, China, India, Thailand and Turkey. However, there have been various moves towards wider regional cooperation in the improvement of transport infrastructure (see Annex H).

8.2.6 Scope for innovation

Innovative clusters, one of the most famous of which is Silicon Valley in California, require specialized training, sophisticated information systems and an environment that encourages research. As mentioned earlier, ESCAP (2006a, p. 62) has encouraged measures by Government to "facilitate the development of new industry and work practices by direct and indirect support of education and training, and research and development initiatives." If this takes place, it is likely to lead to innovative clustering, but the literature provides no evidence of specific inland achievements in this direction.

8.2.7 Barriers to clusters

There are several causes of barriers to the development of clusters including poor transport systems, land scarcity, regulatory barriers, and limited access to information. All these themes have been considered in this chapter under different headings. The following extract outlines the problems of China's "Go West" policy to encourage business activity in its western provinces or regions. Despite low costs and a well educated workforce, the poor transport infrastructure is preventing development.

Box 8.9. The Greater Mekong River System

If you build it, they will come – except perhaps to China's vast, untapped western frontier.

Nearly seven years after Beijing launched its "Go West" campaign to lift incomes, ease social tension and bring prosperity to an impoverished region, foreign firms have saddled up mostly only for minor investments, while domestic firms feel left in the dust.

Multinationals from Microsoft Corp. to Nokia, Motorola and Siemens have set up research centres in big cities. But the list of players that have invested the big sums that Beijing hoped for remains small and stagnant.

BNP Paribas's Chief China Economist, Chen Xingdong, summed things up with a Chinese proverb: "The Government thought once the phoenix tree was planted, the phoenix would come. But it didn't."

The much-touted campaign, kicked off at the turn of the century, aimed to revive the fortunes of the country's 12 poorest provinces or regions, which are home to a quarter of China's people but account for just 15 per cent of gross domestic product. Beijing had hoped to narrow income disparities with the thriving east, assuaging simmering ethnic tensions. Some manufacturers have answered the call, seeking relief from rising labour and living costs along an increasingly affluent eastern seaboard, while retailers battling for consumers' dollars have discovered unsated pockets of demand. So the likes of Intel Corp. and Ford Motor Co. have set up plants in the two biggest cities – Chengdu, the capital of Sichuan Province, and Chongqing. Carrefour S.A. and IKEA have set up shop and plan more outlets. Chongqing, a city of 30 million, boasts investment from more than 30 of the top 500 corporations in the world. "Multinationals move westwards, building research and development centres in cities like Chengdu, because of low-cost but well-educated talent," said William Kusters, Chief of the China Mission of the Asian Development Assistance Board.

TOO REMOTE

But overall, foreign direct investment in the west, spanning two-thirds of the sprawling country, has amounted to less than US$ 2 billion a year between 2000 and 2005 – less than half the total that Shanghai alone has attracted.

"The main challenge for the west remains infrastructure, and there are not enough items that attract foreign investment," said Kusters. "The west is like an economic island in the middle of nowhere. There is not much

interaction with the rest of China." For some firms, western China's isolation is a boon. Lafarge, the world's top cement firm, runs operations in Chongqing, Chengdu, Guizhou and Yunnan, hoping to cash in on the Government's push to develop new infrastructure. "All these provinces are mountainous areas that are naturally protected from imports," said Cyrille Ragoucy, Chief Executive of Lafarge Shui On, a joint venture with Shui On Construction and Materials Ltd.

For others, though, remoteness is a bane. "It's still difficult to lay out a sales network in western rural areas because of the poor infrastructure," said Frederick Leung, Finance Director of TV maker Skyworth Digital Holdings Ltd. Regions such as mountainous Xinjiang or Tibet remain transport nightmares; Sichuan – known for pandas and spicy cuisine – is thousands of kilometres from Shanghai; central provinces such as Henan or Hubei are closer, but shipping goods to the coast is still costly and time-consuming. That's why western China's trade, which came to US$ 164 billion in 2000-2005, made up just 5 per cent of the nation's total.

Beijing has been trying to realize more of the west's potential by providing tax breaks and incentives for energy, information industry, telecommunications, biomedicines and space technology.

LONG MARCH

The central Government has also directed about 70 per cent of all multinational aid and 70 per cent of all tax revenues toward projects in western China over the past six years, according to a cabinet-backed website devoted to all things west (http://www.chinawest.gov.cn/web/index.asp). In one sense, the policy is working. Economic growth in the west averaged 10.6 per cent a year from 2000 to 2005, outstripping the national rate of 9.4 per cent. But western China is starting with so much a disadvantage that the faster growth it is now enjoying risks going unnoticed. "What worries people in the west is that the gap between east and west is actually widening, no matter in absolute or relative terms," said Wei Wei, Director of the Western China Economic Development Research Centre in Xi'an. Xiang Wenbo, Executive President of machinery maker Sany Corp., reckons the Government must do more. "Capital only follows profit. Current policies are not flexible enough," he said. "The government should provide more incentives, such as more favourable tax rates and land policies". "Even then, it may take another decade before Chengdu and Chongqing catch up with their coastal city cousins. For other places, it will be a marathon, not a sprint. It is a Long March, requiring several generations' efforts," Kusters said.

Source: China Supply Chain Council (2006).

9 Preliminary Conclusions

Research carried out in this study shows that the concept of replicating seaports and logistics zones at inland locations is feasible. Information about seaports tends to be reasonably well-documented because seaports are usually in the international spotlight and are often competing in an international market. Furthermore, they are often Government-owned or controlled (at various levels of Government) and are within the public information domain in many countries. Apart from a few exceptions such as some distriparks, readily available and reliable statistics do not exist for inland logistics centres, and public information about them is often restricted to web-based material, which is for promotional purposes with the consequent risk of bias.

Although there is some criticism of existing categorizations of seaports, nevertheless as proposed in Chapter 3 they are widely understood by interested participants and observers. A widely agreed classification does not exist for the various types of inland logistics centres, and Chapter 4 describes the range of conflicting and duplicated terminology (e.g., it discusses whether or not there is a difference between inland ports and dry ports). Furthermore, some of the terminology appears to be created for publicity or promotional purposes (e.g., logistics campus), and this has been a sustained phenomenon that is unlikely to disappear in the near future. This study proposes that the term “inland logistics port” or “dry ports” most adequately describes the concept that is the focus of this study, covering the three key areas of:

- An existing or potential high capacity direct link to an international port;
- Availability of the range of facilities offered at international ports; and
- Availability of a range of logistics services.

At the same time, unnecessary creation of new terminology in an already cluttered nomenclature needs to be avoided. To the best knowledge of the authors, there has been no attempt to address this issue of terminology, which is not one of pedantry but of being able to provide a suitable framework to enable policymakers, both public and private, to understand clearly the potential for the development of inland logistic ports. Therefore, this study places great emphasis on identifying the functions associated with inland logistics ports/dry ports.

This study also undertook a detailed analysis of industrial clusters, and in particular, the special nature of logistics clusters. The term “logistics cluster” is not widely used, although there are many locations, both inland and coastal, where more than one logistics company are clustered together. These are known by various names such as distripark, freight village, logistics campus, logistics city, freight gateway etc. (see Chapter 4). In some cases there are differences of emphasis between categories, but they are all defined primarily by their local geographical position. However, this study makes the point that the most appropriate type of cluster for logistics is not necessarily one bounded by local geography.

The review of different types of industrial clusters in Chapter 5 shows that a geographical point is not the only definition of a cluster boundary. It may also be defined by competitors in the same or similar industries; suppliers and customers in the same supply chain; different types of firms using common resources with an “industry identity”; a common technology; a central entity such as a dominant firm or research centre; and by the network quality of interfirm cooperation. Each of these parameters may have relevance to a logistics cluster, although Chapter 5 suggests that the value-chain industry cluster is probably the most pertinent, being a cluster in which a buyer-supplier chain at all tiers is directly or indirectly involved in trade. In this sense a logistics cluster can extend along freight or trade corridors throughout a country, or even internationally. This conforms to the emphasis placed on supply chain management in this report and discussed at length in Chapter 2. Where the boundary of the logistics

cluster is drawn will depend on practical or empirical considerations; however, not only local geography (although important) should be taken into account.

The final part of this study (Chapters 6 to 8) attempts to apply the concept of traditional seaport-based logistics clusters to inland locations in the ESCAP region, based on a prototype step-by-step action plan for countries to implement. Although there is little detailed information readily available about inland logistics ports/dry ports in the ESCAP region, the prototype action plan appears suitable in providing a framework of analysis for policymakers to formulate country- or region-wide strategies, and for setting parameters for making more detailed strategic decisions. However, the model (step-by-step action plan) needs to be developed by empirical field testing if it is to become a valid decision model within the ESCAP region, since such a model is contingent upon the context in which the inland logistics ports/dry ports are intended to operate. Towards this end, an appropriate research methodology (the Delphi approach) for empirical enquiry was also developed although it does not form part of the study report. At present, the action plan provides a useful aid to identifying areas of priority or concern when developing inland logistics ports/dry ports.

Annexes

Annex A: Key elements of port asset categories

Basic Port Infrastructure

10 Maritime access channels
11 Port entrance
12 Protective works including breakwaters, shore protection
13 Sea locks
14 Access to the port for inland transport (roads, tunnels, etc.)
15 Rail connection between the hinterland and the port
16 Inland waterways within the port area.

Operational Port Infrastructure

17 Inner port channels, turning and port basins
18 Revetments (retaining walls) and slopes
19 Roads, tunnels, bridges, locks in the port area
20 Quay walls, jetties and finger piers
21 Aids to navigation, buoys and beacons
22 Hydro/meteorological systems
23 Specific mooring buoys
24 Vessel traffic management system (VTMS)
25 Patrol/fire fighting vessels
26 Docks
27 Port land (excluding superstructure and paving)
28 Access roads to general road infrastructure
29 Rail connection to general rail infrastructure, marshalling yards
30 Dry-docks for ship repair.

Port superstructure

31 Paving, surfacing
32 Terminal lighting
33 Parking areas
34 Sheds, warehouses and stacking areas
35 Tank farms and silos
36 Offices
37 Repair shops
38 Other buildings required for terminal operations.

Port equipment

39 Tugs
40 Line handling vessels
41 Dredging equipment
42 Ship/shore handling equipment
43 Cargo handling equipment (apron and terminal).

Annex B: Non-exhaustive overview of interchangeable names for dry ports

Inland clearance depot

The following full definition of an inland clearance depot is by the Working Party on Facilitation of International Trade Procedures (1996),

> "A common user facility, other than a port or an airport, approved by a competent body, equipped with fixed installations and offering services for handling and temporary storage of any kind of goods (including containers) carried under Customs transit by any applicable mode of transport, placed under Customs control and with Customs and other agencies competent to clear goods for home use, warehousing, temporary admission, re-export, temporary storage for onward transit and outright export." (Working Party on Facilitation of International Trade Procedures, 1996)

Freight gateway

Freight gateways serve smaller areas by offering international and domestic freight-related services to shippers: "They bring together in one location all the modes of transportation, along with warehousing, freight forwarding and customs brokers, and logistics-management services" (Gooley, cited in Walter and Poist, 2004, p. 581). According to Walter and Poist, freight gateways and inland ports are synonymous.

Air cargo port

Air cargo ports often connect to passenger airports, but to be inland ports, they should have dedicated cargo facilities. An interesting development in the United States is to convert decommissioned air force bases into privatized air cargo ports (Leitner and Harrison, 2001), as shown in the following example which combines three modes of transport, as well as international facilities such as customs clearance.

Maritime Feeder Inland Port

This is a specific type of inland port that offers consolidation or deconsolidation, typically 50 to 250 miles from a congested sea port. (Harrington, cited in Leitner and Harrison, 2001).

Trade and Transportation Centre Inland Port

This is a type of inland port that adds value to the goods moving through it (Leitner and Harrison, 2001).

Container Freight Station

A Container Freight Station (CFS) provides short-term storage and transfers shipments between marine containers and domestic vehicles. It was traditionally located within a marine container terminal (Tioga Group, 2003).

Intermodal terminal

There is no single definition of an intermodal terminal. It is often seen as a location where only modal transfer takes place, as in the following definition:

> "A railroad facility designed for the loading and unloading of containers and trailers to and from flat cars for movement on the railroad and subsequent movement on the street or highway." (Intermodal Association of North America, 2006)

According to UNECE/ECMT/EC (2001, p. 58) an intermodal terminal is:

> "A place equipped for the transshipment and storage of ITUs." (An ITU is an Intermodal Transport Unit)

The terms intermodal, multimodal and combined transport are often assumed to be the same and interchangeable. At other times, they have specific different meanings. There has been some debate in the European Union about the lack of precision of definitions. For example, UNECE/Eurostat/ECMT (2003) gives the following definitions,

> "Multimodal transport: the carriage of goods by at least two different modes of transport (p. 84).
>
> Intermodal transport: Movement of goods (in one and the same loading unit or a vehicle) by successive modes of transport without handling of the goods themselves when changing modes (p. 84).
>
> Combined transport: For transport policy purposes the ECMT restricts the term combined transport to cover: Intermodal transport where the major part of the European journey is by rail, inland waterways or sea and any initial and/or final leg carried out by road are as short as possible (p. 85)."

There is a prescriptive element in the concept of combined transport, in that the European Union wishes to move goods from road to other modes to reduce road congestion, and combined transport is seen as a way of achieving that objective. Roso and others (2006), commenting on Swedish inland terminals, describe a number of types of intermodal terminals:

- Conventional intermodal terminals (infrastructure and superstructure to handle large flows of ITUs);
- Light-combi terminals (train operator carries equipment such as forklift trucks for loading and unloading);
- Wagon-load terminals (with a platform for loading rail wagons); and
- Freeloading sites (used for low-value cargo such as timber and without any special equipment for ITUs.

According to Roso and Lévêque (2002), a range of different operations can take place at an intermodal terminal involving a variety of different actors. In this respect, an intermodal terminal can be equivalent to an inland port.

Inland intermodal hub

An intermodal hub is similar to an intermodal terminal, but the concept of a hub implies that it is part of a wider network. An intermodal hub is also perceived as an inland port, as shown in the following quotation:

> "The location of the Dallas hub would position it to take advantage of cargo entering the United States via rail, having been unloaded at west coast Mexican ports being developed to catch the overflow from southern California. The Dallas facility is just one of many being developed around the United States. But given its size, it will be a barometer to measure the success of large-scale inland port developments." (Tirschwell, 2006, p. 46)

Land-based load centre (LLC)

A land-based load centre is so called to distinguish it from a container port. It is an inland hub-and-spoke configuration where:

> "each load centre (hub) serves a regional market using truck pickup and delivery (spokes), and is linked by dedicated rail services to the other hubs" (Slack, 1990, p. 75)

Distripark

A distripark is defined as:

> "[A] 'state-of-the-art' logistics service having distribution functions designed for operational efficiency with on-site logistics management and good international links. The term 'distripark' connotes the emphasis on a park-like environment and a green image. A distripark offers not only temporary storage space, but also cargo consolidation, deconsolidation, redistribution, sampling, bar coding, inventory management and product customization…. Distripark operators are also involved in intermodal transportation, customs documentation and clearance for freight forwarding." (Zhu and others, 2002, pp. 92-93)

Distriparks are often associated with ports (e.g., Rotterdam, Singapore) but since location may be outside the existing port area, issues of inland transport are relevant. Detailed examples of distriparks associated with Rotterdam appeared in Chapter 3.

Freight village

A freight village is defined as:

> "A defined area within which all activities relating to transport, logistics and the distribution of goods, both for national and international transit, are carried out by various operators. These operators can either be owners or tenants of buildings and facilities (warehouses, break-bulk centres, storage areas, offices, car parks, etc.) which have been built there. Also in order to comply with free competition rules, a freight village must allow access to all companies involved in the activities set out above. A freight village must also be equipped with all the public facilities to carry out the above mentioned operations. If possible, it should also include public services for the staff and equipment of the users. In order to encourage intermodal transport for the handling of goods, a freight village must preferably be served by a multiplicity of transport modes (road, rail, deep sea, inland waterway, air). Finally, it is imperative that a freight village be run by a single body, either public or private." (Europlatforms, 2000)

Logistics campus

This appears to be a new concept developed by Exel Worldwide and its sister company DHL and is defined as:

> "A collection of multiple manufacturers focused on consumer products with similar distribution channels. The collection of companies in a single location achieves critical mass in several key areas. It allows for the sharing of resources, freight consolidation and flexibility." (Online TDM Encyclopedia, 2006)

Logistics City

This is the term used by Dubai Logistics City, and the name reflects the very large scale of the undertaking. It defines itself as a:

> "truly integrated logistics platform with all transport modes, logistics and value added services, including light manufacturing and assembly, in a single customs bonded and Free Zone environment. […]This allows companies to focus on the optimization of their supply chains, using:
>
> - DLC as a global supply chain hub for sea-air or air-air transport combinations;
> - DLC as a global hub for value adding logistics operations such as merge-in-transit, customization, postponement, packaging and labelling, final assembly;
> - DLC as a distribution hub for the greater region while reducing number of required warehouses and improving customer service; and
> - DLC as a platform to re-gain control of the distribution channel, e.g., by the introduction of direct sales." (Dubai Logistics City, 2006)

It is difficult to determine whether there is in essence any difference between a distripark and a freight village. A logistics city differs in terms of scale. A logistics campus appears to differ (in the above

definition, at least) through its focus on the clustering of producers with similar distribution channels to share logistics resources.

Free trade zone (or foreign trade zone)

This has been the subject of a previous ESCAP (2005) publication, which describes in detail the full complexity of the concept. In its most basic form, it is a warehouse operating under customs bond, but may also consist of a number of enterprises where goods are processed and re-exported without customs duty being paid.

Inland logistics port

The term is used in different context. An example is provided below:

> "In April 2004, South-China International Logistics (SCIL) and Hong Kong's Modern Terminals Limited signed an agreement of cooperation using the new model of "inland logistics port". A 100,000-sqm depot of SCIL has already started operation. A 20,000 sqm warehouse is nearing completion and construction of another 40,000 sqm warehouse has also begun. Moreover, the company has applied to customs to set up a "bonded logistics centre" which has 10 major functions: bonded warehousing, export declaration of new containers, tax rebate, distribution, simple processing and value added services, centralised customs declaration, logistics information platform, import-export trade, product display, entrepot trade, and inspection and maintenance. The deal marks the growing trend for Shenzhen and Hong Kong logistics players to strengthen cooperation under CEPA." (*Source*: Business Alert – China, 2006).

Annex C: Example case for legislation related to dry ports – United States

Background

Support for developing inland ports, or so-called "freight gateways" was noted in the NAFTA (North American Free Trade Agreement) legislation, in the Intermodal Surface Transportation Efficiency Act of 1991, and in the Transportation Equity Act for the 21st Century enacted in 1998 and abbreviated to TEA21 (Walter and Poist, 2003). The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 sought greater coordination and efficiency of transportation movement among modes for both passengers and freight, stating:

> "It is the policy of the United States to develop a National Intermodal Transportation System that is economically sound, provides the foundation for the nation to compete in the global economy, and will move people and goods in an energy efficient manner. The National Intermodal Transportation System shall consist of all forms of transportation in a unified, interconnected manner, including a transportation system of the future." (Intermodal Surface Transportation Efficiency Act, Section 2)

ISTEA sought the following improvements (Owens and Lewis, 2002):

- Lower overall transport costs by using the best mode for each stage;
- Increased economic productivity and efficiency;
- Reduced congestion and less strain on infrastructure;
- Higher returns from public and private infrastructure investments;
- Improved mobility for the elderly, disabled, isolated, and economically disadvantaged; and
- Reduced energy consumption, and improved air quality and environmental conditions.

Despite the rapid growth in container movements and efficiencies through economies of scale, there have been problems in developing an advanced intermodal system. The National Commission on Intermodal Transportation (NCIT) in the United States found that there were significant barriers to full integration of the national transport system. Although these barriers refer to the United States, it is certain that they exist in many other countries. First, federal Government is organized according to transport modes and is therefore not suitably structured to encourage intermodalism. Second, intermodal projects must compete with long-established highways projects that traditionally receive most of the available federal funding (Owens and Lewis, 2002).

A key objective of ISTEA was that the intermodal system should be profit-making for private transport companies, and that intermodal partnerships should play to the strengths of each participant. ISTEA required each state within the United States to develop a plan based on 23 planning factors stipulated by ISTEA and covering social, environmental, financial and coordinating factors (Owens and Lewis, 2002). This approach continues in ISTEA's successor legislation, TEA21.

The application of intermodal legislation in the United States has been easier than in many countries because of the existing high-quality transport system, the high level of connectivity, deregulated road and rail freight, an acceptance of competition, advanced use of information technology, and the application of modern logistics concepts such as just-in-time delivery. It is also a large land-mass under a single federal Government (although separate states have substantial law-making powers) in contrast to, say, Europe with its many independent states. Nevertheless, problems have been encountered in the United States in the development of intermodal systems, in particular congestion and highway access to terminals. Metropolitan Planning Organizations (MPOs) have addressed such problems within the powers granted by ISTEA. The great emphasis placed on public-private collaboration is shown in the following extract from the Federal Highway Administration (FHWA) of the United States Department of Transportation. It can be seen as a detailed outline of good practice in developing public-private collaboration for inland logistics ports elsewhere, and is therefore worth quoting at length.

Examples of Freight Planning Activities (Federal Highway Administration (2006)

Freight advisory committees are involved to varying degrees in an assortment of planning activities. Planning organizations across the country are tapping the professional knowledge and resources of the private sector to assist in transportation planning efforts. The MPOs studied indicated that their freight advisory groups were involved in one way or another in generating lists of short-term improvements, conducting/assisting in large-scale corridor studies, working on specific projects, and collecting data or assisting in modeling efforts.

Lists of Improvements – Freight advisory groups can oftentimes provide valuable information on bottlenecks or other inefficiencies in the freight network which can be easily remedied. Brainstorming and prioritizing sessions can often identify lists of cost-effective efforts which can be easily implemented and provide immediate benefits for the freight community and others. When such improvements are quickly implemented, the MPO generates a positive "track record" which encourages the private sector to continue participating in public-private planning efforts. For example, in the San Francisco Bay Area, one of the first tasks posed to the private-sector members of the Freight Advisory Council was to identify the top ten major bottlenecks in the Bay Area. However, the Metropolitan Transportation Commission (MTC) was surprised when the Council submitted a list that eventually exceeded 40 projects. This list included some proposals that required relatively little expense: signal timing adjustments, fixing the turning radii of certain off-ramps, and truck parking management and enforcement. The "Top-40" list was created from input and suggestions from the Council members, as well as from a survey of truck drivers conducted by the California Trucking Association (CTA) which was completed in two weeks. CTA asked truck operators to identify the eight to ten worst "pinch points" in the system. The Council and the MTC went through the list and categorized suggestions according to the amount of time and money required. Projects identified in this effort were put through the MTC's scoring process to compete with other proposed projects for inclusion in the Transportation Improvement Programme (TIP).

In a strategy similar to MTC, Puget Sound Regional Council (PSRC) considered it important to put out a list of freight projects within the first year of the Roundtable. This list of "timely and essential actions" was called the Regional Freight Mobility Action Packages, published on September 6, 1994. Each action is described in terms of who should do it, what is to be done, timing, and resource requirements. Actors discussed include PSRC, cities and counties, the Port Authorities, shippers, carriers and related third parties, Washington State Department of Transportation (WSDOT), the Washington Utilities and Trade Commission, and the United States DOT. The list is organized as an "Action Matrix". The actions are organized into four categories.

- Institutional: Changes in the working relationships among agencies, firms, labour unions, and other entities making up the transportation industry in the region;
- Operational: Changes in the way the regional freight transportation system operates;
- Infrastructure: Changes in the physical facilities making up the regional transportation system; and
- Financial: Funding one or more actions of the packages.

The Action Packages have three principal messages. First, the report has a "collaborative and action-oriented focus," which reflects the Roundtable's efforts to have the public and private sectors get acquainted at the beginning of the planning process. Second, the report has both systemic and project-level actions. For the process to be effective, both sectors must share the same performance expectations, which will help to identify the crucial issues and develop practical solutions. Third, although the report satisfies the private freight sector's need to be action-oriented, the Roundtable recognizes the need to collect information to create a framework for identifying and understanding

goods movement issues. Similarly, the Freight Stakeholders National Network process recommends holding a "Freight Town Hall Meeting" to kick off a Freight Stakeholders Coalition. Following a key note address and discussion of the purpose and goals of the Coalition, the Town Hall Meeting then breaks participants into groups of eight to ten, preassigned to achieve a mix of transportation modes, manufacturers and shippers, and public sector representatives. Each group, facilitated by a member of the Coalition's organizing committee, identifies needed freight mobility improvements and the means to achieve them. In Kansas City, for example, the Heartland Freight Coalition's process identified a number of "jump-start" projects, including improving signage to intermodal facilities, improving signal timing to mitigate freight bottlenecks, and distributing disposable cameras to freight operators to document bottlenecks and pinch points.

Corridor Studies - Following the identification of bottlenecks, several MPOs have utilized their freight advisory groups to direct and consult on large-scale corridor studies. The PSRC's Freight Mobility Roundtable identified the need for a rail-highway separation programme for the Kent Valley, South Kingdome, and Tacoma Dome areas. To undertake this project, the PSRC and Washington Department of Transportation sponsored a multimodal study of the I-5 corridor. A work group to direct the study will be formed in consultation with the Freight Mobility Roundtable.

Ad Hoc Working Groups – The Toledo Metropolitan Area Council of Governments (TMACOG) advocates a "task force" rather than advisory group approach to the RRTF. In order to mitigate grade crossings, TMACOG grouped all crossings into six priority rail corridors. Each corridor was assigned to a local study team comprised of the affected railroad, rail shippers, local Government and emergency service providers, the school district, the Ohio Department of Transportation, the FHWA and local residents. Teams study the corridors and generate implementation strategies for improving traffic safety, reducing delays and congestion at crossings, and to promote economic development along rail corridors. As of this writing, two of the studies are complete.

Modeling/Data Collection – An effective freight advisory effort can help to direct modeling efforts and provide access to important data. As trust develops through cooperative planning efforts, private sector participants become much more willing to provide data or to help in the collection of data. The CTA assisted the MTC's Freight Advisory Council by conducting a survey of bottlenecks. The private sector can do much to improve the quality of modeling efforts by providing specific information on freight flows. The PSRC utilized its Freight Mobility Roundtable to correct inadequacies in its passenger traffic model to include freight and its associated logistical aspects. When the private sector executive knows and trusts his or her public-sector counterpart, they are much more likely to provide sensitive data. And when a freight advisory group assists in directing modeling efforts, they can assure the data is not misused and that unnecessary data is not collected.

Another part of the above article also discusses organizational issues such as goals, structure, perspectives, motivation of players, and how to locate private sector participants. On the last-mentioned theme, the article suggests the following approach to ensure private sector participation and representatives on a freight council (as the above article shows, various names are used for this type of committee).

- Attract major players from local planning agencies, port authorities, major carriers (railroads, trucking companies), package delivery companies and the region's major shippers.
- MPO staff should develop their knowledge of their region's freight system by visiting prospective members at their workplaces. This also increases the credibility of the MPO's members and is evidence of their commitment to the freight development.
- MPO staffs collaborate with private sector associations such a chamber of commerce or economic development agency.

- Other private sector members are contacted through sources such as professional freight associations, traffic clubs or even directories. The objective is to gain the support of as many shippers as possible.

The following describes the Alameda Corridor, an example of a recent successful intermodal development in the United States.

Example: The Alameda Corridor (Alameda Corridor Transportation Authority (2006)

The Alameda Corridor is a 20-mile-long rail cargo expressway linking the ports of Long Beach and Los Angeles to the transcontinental rail network near downtown Los Angeles. It is a series of bridges, underpasses, overpasses and street improvements that separate freight trains from street traffic and passenger trains, facilitating a more efficient transportation network. The project's centrepiece is the Mid-Corridor Trench, which carries freight trains in an open trench that is 10 miles long, 33 feet deep and 50 feet wide between State Route 91 in Carson and 25th Street in Los Angeles. Construction began in April 1997. Operations began in April 2002.

Project Need: International trade accounts for one of every 15 jobs in the southern California region, according to the Los Angeles County Economic Development Corporation. The ports of Long Beach and Los Angeles are the two busiest container ports in the country and, together, the fifth busiest port complex in the world. The ports handled more than US$ 200 billion in cargo in 2001. The rail network serving the ports was not sufficient to accommodate rapidly increasing cargo volumes. The Alameda Corridor consolidated four low-speed branch rail lines, eliminating conflicts at more than 200 at-grade crossings, providing a high-speed freight expressway, and minimizing the impact on communities.

Benefits

- More efficient freight rail movements;
- Reduce traffic congestion by eliminating at-grade crossings;
- Improvements to Alameda Street;
- Multiple community beautification projects;
- Cut train emissions;
- Slash delays at railroad crossings;
- Cut noise pollution from trains; and
- Reduce emissions from idling automobiles and trucks.

Funding

The US$ 2.4 billion Alameda Corridor was funded through a unique blend of public and private sources. Revenues from user fees paid by the railroads will be used to retire debts. Railroads initially paid US$ 15.00 for each loaded 20-foot equivalent unit (TEU) container; US$ 4.00 for each empty container and US$ 8 for other types of loaded rail cars such as tankers and coal carriers. Over a 30-year period, fees will increase between 1.5 per cent and 3 per cent per year, depending on inflation. Effective January 1, 2006, fees are US$ 16.75, US$ 4.47 and US$ 8.93 respectively.

Community Programmes

Through its contractors and various community partnerships, ACTA (Alameda Corridor Transportation Authority) administered several programmes designed to provide local residents and businesses with direct benefits that will long outlive actual construction.

- Construction industry-specific job training for 1,281 local residents, including 637 placed in union apprenticeships;

- 30 per cent of all labour hours for Mid-Corridor Trench were performed by local residents living in adjacent zip codes;
- Through aggressive outreach and technical assistance, ACTA helped disadvantaged (primarily small and woman- or minority-owned) businesses compete for and earn contracts worth more than US$ 285 million, meeting the programme goal of 22 per cent of all contracts;
- On-the-job training and education credits for more than 420 young adults (ages 18-23), who performed community beautification work through the Conservation Corps programme; and
- One-on-one technical consulting for 25 local import-export companies and entry-level, international trade-specific job training for 20 local residents through a joint programme with the World Trade Center Association Los Angeles-Long Beach.

Key Features

North-End Project Area:

- Massive Redondo Junction flyover separates cargo trains, passenger trains, and street traffic;
- Multiple rail and street bridges add capacity, eliminate traffic conflicts; and
- Improved rail yard connections enhance cargo flow.

Mid-Corridor Trench

- Trench stretches 10 miles long, 33 feet deep and 50 feet wide;
- Thirty bridges carry street traffic over the trench, reconnect communities; and
- Alameda Street improvements ease traffic congestion.

South-End Project Area

- Henry Ford Avenue Grade Separation, one mile long, adds rail capacity, eliminates conflicts with street traffic;
- Terminal Island Freeway ramp improvements enhance traffic flow; and
- Multiple higher-capacity rail bridges over water channels speed port access.

Annex D: Example case for legislation related to dry ports – Europe

Organizational fragmentation is the enemy of successful intermodal systems. This may be because of the limited single-mode perspective of some carriers, but national identity may also play an important role. One reason for the success of intermodal transport in North America has been the existence of so few national Governments. The European Union (EU) has 25 national Governments of independent states, each with its own policies, and a transport situation that differs to some extent from country to country. The different histories of many nation-states have led to a fragmented Europe-wide transport system, not just technologically, but also in terms of pricing regimes and other regulation. In some other parts of the world the problem of fragmentation is even more serious, particularly in more deprived areas where the infrastructure and technology required for intermodality are still lacking.

A common transport policy was provided for in the original treaty (Treaty of Rome 1957) that instituted the European Economic Community (subsequently called the European Union), but for many years the Council of Ministers (of the member countries) failed to act on proposals made by the European Commission. However, progress has been made in more recent years with developments towards a trans-European network and the liberalization of the European transport market. For example, road cabotage is now accepted and air transport has been opened to competition (European Commission, 2001). However, problems associated with congestion, damage by transport to the environment and health, and road accidents support the view that external costs are not adequately included in the price of transport. The organization of Europe's transport system could also make better use of new technologies. The average speed of international rail haulage is only 18 km/hour. Over the last 30 years, an average of 600 km of railway lines has been closed each year in Europe, whereas the motorway network has increased by 1,200 km a year. (European Commission, 2001)

The European railway sector is a long way from being standardized and has different gauge widths, border crossing problems, different employment regulations in different countries, and priority given to passenger rail transport over freight leading to delays in the intermodal chain. (Rapp Trans/ECORYS, 2005)

The European Union's Common Transport Policy is being adapted to take account of environmental factors and to pursue sustainable development, and to reduce the overdependence on road freight transport. In Europe, only 8 per cent of goods are carried by rail, compared with 40 per cent in the United States (European Commission, 2001). Therefore, the underlying approach of the European Union's Transport White Paper of 2001 is to encourage the use of alternatives to road. The White Paper proposes more than 60 measures, including an aim to break the link between transport growth and economic growth, but without restricting mobility of both people and goods. In the specific area of intermodality, technical harmonization and interoperability between systems are given priority, particularly for containers. A recently introduced Community programme called "Marco Polo" supports innovative initiatives in this area, particularly to promote sea motorways. There is a lack of adequate links between sea, inland waterways and rail within the European Union that can be overcome by the Marco Polo programme through community aid until intermodal initiatives become commercially viable. The Marco Polo programme seeks to attract more environmentally-friendly transport and related operations, in contrast to TEN-T funding which focuses on infrastructure. Prior to Marco Polo, there was a programme called Pilot Actions for Combined Transport (PACT) from 1997 to 2001 that funded a number of inland terminal projects.

The White Paper also advocated the emergence of a new profession specialising in the integrated transport of full loads (exceeding around five tons) and called "freight integrators". Consultants were employed to research the concept (Zentrum für Logistik und Unternehmensplanung, 2003) and the extent to which freight integrators were required or available. Subsequently, a consultation paper was released by the Directorate General of Energy and Transport (DG TREN) of the European

Commission in 2003 (European Commission, 2003) seeking the views of interested parties on an action plan to support the organization of intermodal freight transport. This project, called Integrated Services in the Intermodal Chain (ISIC) is divided into a number of tasks (Rapp Trans/ECORYS, 2005):

Task A: Management and coordination;
Task B: Improving intermodal liability and documentation;
Task C: Harmonizing technical requirements for intermodal transport equipment;
Task D: Improving the quality of intermodal terminals;
Task E: Certification and training for intermodal transport;
Task F: Promotion of intermodal transport; and
Task G: Socio-economic cost-benefit analyses.

This report will restrict itself to discussion of Task D (Improving the quality of intermodal terminals). Task D is divided in 6 subtasks (Rapp Trans/ECORYS, 2005):

D1: Definition of terminals and transfer points of "European importance";
D2: Quality Indicators for Intermodal Terminals;
D3: Quality Label and European Benchmark System for Intermodal Terminals;
D4: Standardization of practices, equipment and systems;
D5: Linking State/European funding and quality labels; and
D6: Documentation, conclusions and recommendations.

Terminals are defined as being "of European importance" when they fulfil the requirements discussed below.

Definition of terminals of European importance (Rapp Trans/ECORYS, 2005)

Intermodal terminals and transfer points of European importance provide a complete European high performance intermodal network with international access. They:

- are part of the existing and planned TEN-Network (especially SSS [short sea shipping], inland waterway, railway, etc.) and cover the main corridors of today's and future freight flows;
- cover important economic regions in EU 25, Switzerland and Norway
- provide easy access to the intermodal network, especially from important economic regions with industrial activities;
- provide access to the intermodal network in peripheral regions (minimum network density);
- provide various intermodal options to the industry (connect at least 2 but better 3 and 4 modes);
- provide sufficient transshipment and storage capacity;
- are important nodes in intermodal services networks (connection between different intermodal networks and modes);
- are important nodes in intermodal service providers networks (hub function); and
- provide added value services for the terminal users.

Thus, the indicators used in this evaluation methodology to define European importance cover three areas: location (important economic region, location in TEN-T), performance (surface area or track length, transshipment volume) and service (terminal function, connected modes, number of

departures). Quality and performance indicators for intermodal terminals were also identified to help overcome a number of problems at terminals. These problems are given below.

Problems at Terminals (Rapp Trans/ECORYS, 2005)

- Organizational problems: Unsuitable form of terminal organization. Differences between operational concept of rail transport and terminal design. Missing cooperation between the different actors of the intermodal transport chain etc.
- Management and operational problems: Restricted terminal opening times. Missing or insufficient management of incoming trucks. Inefficient internal administrative processes. Insufficient security management systems. Low awareness of terminal operators for environmental concerns. Too long waiting times for trucks at entry gate. Manual communication and monitoring.
- Communication problems/inefficiencies between main-haul, terminal, pre- and end-haulage. Poor inspection of containers on arrival. Not satisfying information flow in case of delays, abbreviations, incidents. Poor real-time monitoring of operations etc.
- Infrastructural problems: Lack of space for stack and storage. Lack of exclusive parking area. High efforts for shunting due to unsuitable track topology and layout. Missing extension options. Insufficient crane/handling capacity. Incompatible transport means/load units/terminal equipment. Poor railway connection between main line and terminal/port. Breakdown/failure of terminal equipment. Insufficient equipment/procedures for handling of dangerous goods etc.

Benchmarking is used by management to improve performance by learning from others. Proposed benchmarking indicators are transshipment volume/throughput, terminal productivity, utilization rate, total terminal costs per ITU, transshipment costs per ITU, operational process costs, administrative process costs, labour productivity, energy consumption per load unit, crane rate and crane load. Quality indicators refer to the service level and performance indicators describe the productivity of a terminal. (Rapp Trans/ECORYS, 2005)

- Proposed quality indicators: cut-off time, waiting times, turnaround times for trucks, train, barge and vessel, opening hours, possibility for short time deliveries, accessibility/ connection to main road or rail net, hinterland connection, slotting availability, damage frequency, damage to loading unit, security features and control.
- Proposed performance indicators (in addition to the above quality indicators): terminal productivity, labour productivity, energy consumption per load unit.

A quality label provides a quality standard for terminal operation and services with both an internal and external focus. Internally, the terminal operator should operate the terminal following general ISO standards (ISO 9000 and ISO 14000), whereas the external focus measures quality from the terminal user's standpoint. Two main QL have been proposed to meet the requirements of customers and political authorities for intermodal terminal services: an external real quality label and an internal focused QL based on ISO 9000 and ISO 14000. Whereas the internal QL is awarded if the terminal operator organizes the terminal operation following general ISO standards the external QL measures the quality from the viewpoint of the terminal user. These proposals are, as with the examples from the United States, aimed at intermodal developments, but are to some extent applicable to most potential inland logistics ports. At the time of writing (November 2006), the European Commission is conducting a public consultation exercise on "Logistics for Promoting Freight Intermodality" (European Commission, 2006).

Annex E: Example of a World Bank Implementation Completion Report (Extract)

***Source*: World Bank Implementation Completion Report World Bank (2005)**

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:

The project aimed at facilitating inland penetration of seaborne containers from gateway ports to inland cities, thus contributing to a reduction in economic disparity between coastal and inland areas. Supplementing the primary objective, the project also sought to increase productivity of existing facilities to expand container handling capacity at the gateway port of Tianjin.

3.2 Revised Objective:

The development objective remained the same throughout the implementation of the project.

Original Components:

The project had two main components and numerous sub-components:

(a) ICD Development consisting of the development of inland container depots (ICDs) in Baoding, Cangzhou, Handan, Tangshan and Qinhuangdao in Hebei Province; Baotou in the Autonomous Region of Inner Mongolia; and Hangzhou, Huzhou and Xiaoshan in Zhejiang Province and comprising – civil works, – the provision of equipment for operating the depots, – technical assistance for the development of an EDI/MIS, a business plan and an operational manual as well as training in various aspects of inland terminal management and operation. The ICDs would operate under a Customs regime in which import and export containers would be cleared at the ICDs. Embedded in the project were several policy actions to remove impediments to the movement of containers between gateway ports and inland cities; and (b) Upgrading Tianjin Port Container Handling Capacity through – structural improvements of existing berths, container yard and ancillary facilities, – the acquisition of additional container handling equipment for Tianjin Harbour Container Company (THCC) and – technical assistance to establish a better institutional environment for container operations.

Revised Components:

There were no major changes in project components. There was a minor adjustment in the ICD development component when Hebei decided not to proceed with the construction of a depot at Baoding shortly after the Loan became effective.

Quality at Entry:

Quality at entry is rated satisfactory. The assessment is based on the

(a) consistency of the project development objective with the Bank's strategy for alleviating transport bottlenecks and China's policy and plan for increased economic development in interior regions;

(b) attention given to lessons learned from past projects implemented by multiple agencies in the preparation and design of the project; and

(c) comprehensive range of policy actions for institutional improvements.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

The development objective of the project has substantially been met. The indicator for measuring performance is the value of imports and exports to and from project cities.

Outcome/achievement of objective:

The development objective of the project has substantially been met. The indicator for measuring performance is the value of imports and exports to and from project cities. At project appraisal, it was expected that the ICD cities would generate some US$ 49.1 billion of imports and exports by 2003. Actual performance for the year turned out to be US$ 25.3 billion, increasing to US$ 31.7 billion the following year. The essence of the ICD component of the project was the development of an institutional and infrastructure framework in which containers could move inland without regulatory and physical impediments or constraints. When the project was conceptualized, import and export containers underwent quarantine and Customs inspections prior to delivery or shipment only at gateway ports. "Off-port" inspection and clearance of cargo were not available and there were little or no proper facilities for the handling of containers under bond in inland cities. The project overcame these impediments at the selected cities by providing them with common user container handling facilities and a system and procedure for cross-border inspections and clearances of cargo. Several policy actions were also implemented to remove certain regulatory constraints on the trucking of containers. These included declassifying sea-borne containers as heavy cargo and separating the registration of trailers from prime movers, thus providing greater flexibility in the use of vehicles.

Outputs by components:

A. ICD Development

Outputs achieved under this component comprised:

(a) civil works that included a container yard, a container freight station, a workshop, a vehicle weighing station, an administrative building and security fencing that meets the standard of the Customs for bonded cargo of varying sizes depending on the traffic at each of the cities;

(b) equipment consisting of top-loaders, forklift trucks, tractor/trailers, hardware for an MIS/EDI, communication and office equipment, electronic weighing scales, a security monitoring system and ancillary equipment;

(c) technical assistance in the form of the development of a business plan, an operational manual, an MIS/EDI and training.

B. Upgrading Tianjin Port Container Handling Capacity

The primary objective of this component was to increase capacity and enhance the productivity of existing container handling facilities operated by Tianjin Harbour Container Company (THCC).

4.3 Net Present Value/Economic rate of return:

The economic evaluation covers the two components separately as well as the entire project combined. Both costs and benefits reflect December 2005 prices. The economic internal rate of return (EIRR) of the project is estimated at 25 per cent, and the net present value (NPV), at a discount rate of 12 per cent, is estimated at Y 868 million; compared to the PAD [Project Appraisal Document] estimate of 39 per cent and Y 950 million, respectively. Component-wise, the Tianjin Port (THCC)

component has an EIRR of 51 per cent, compared to the PAD estimate of 44 per cent. The EIRR of the ICD component is estimated at 11 per cent, compared to the PAD estimate of 33 per cent.

THCC: The recalculated EIRR and NPV of the Tianjin Port component are higher than anticipated at appraisal mainly because of: (a) the lower project cost (about 30 per cent lower than the PAD estimate), and (b) the higher container traffic demand (about 60 per cent higher than the PAD estimate).

ICD: The recalculated EIRR and NPV of the ICDs are lower than the estimates mainly due to the lower container traffic demand (average only about 9 per cent of the PAD forecasted at appraisal), despite the project cost of the ICDs being lower than estimated by about one third.

4.4 Financial rate of return:

THCC and the eight ICDs are financially independent companies in their provinces, responsible for the day-to-day management, operations and maintenance of the facilities. The main incomes of these companies come from container handling, transportation, warehousing, and freight forwarding. The companies plan to use operation revenue to cover their financial obligations, including the Bank and domestic loans. Based on the current revenue and operating costs, the eight ICDs may have difficulties in generating enough internal cash flow over the loan period to finance the operation, maintenance, and debt services due to the low demand for container services.

4.5 Institutional development impact:

Despite the wide gap between forecasted and actual container traffic at the inland terminals, the project has had a positive institutional development impact. The availability of “off-port” clearances of cargo will promote the through-transportation of containers, thereby relieving congestion at the gateway ports, expediting the turnaround of containers and, in the process, reducing logistics costs of China’s export/import trade.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of Government or implementing agency:

There were two major factors outside the control of both the Government and the implementing agencies that had a significant impact on the ICD Development component of the project. The first was the response of the shipping, transport and trading communities to the facilities and services provided by the project. So far, the extent of use of the facilities and services available at the ICDs has been limited. The second factor was the degree of competition provided by local trucking companies. Intense competition has lowered the rate for the haulage of containers.

5.2 Factors generally subject to Government control:

The major factor in the project that was subject to Government control concerned “off-port” clearance of import/export containers at the ICDs. This entailed the stationing of Customs officers at the ICDs. However, the power of the provinces to designate ports was transferred to the Customs General Administration (CGA) in February 2002. Consequently the provinces could not fully implement their plan and only Baotou, Hangzhou and Xiaoshan were able to persuade Customs to station officers at their ICDs. For the rest, Customs officers from the local Customs office were available to inspect and clear cargo at the ICDs upon request until such time as the volume of traffic handled at the ICDs justified stationing them full time at the ICDs.

Annex F: Defining the notion "cluster" (Extract)

Porter (1998a, p. 199):

"A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities."

Crouch and Farrell (2001, p. 163)

"The more general concept of 'cluster' suggests something looser: a tendency for firms in similar types of business to locate close together, though without having a particularly important presence in an area."

Rosenfeld (1997, p. 4)

"A cluster is very simply used to represent concentrations of firms that are able to produce synergy because of their geographical proximity and interdependence, even though their scale of employment may not be pronounced or prominent."

Feser (1998, p. 26)

"Economic clusters are not just related and supporting industries and institutions, but rather related and supporting institutions that are more competitive by virtue of their relationships."

Swann and Prevezer (1996, p. 139)

"Clusters are here defined as groups of firms within one industry based in one geographical area."

Swann and Prevezer (1998, p. 1)

"A cluster means a large group of firms in related industries at a particular location."

Simmie and Sennett (1999, p. 51)

"We define an innovative cluster as a large number of interconnected industrial and/or service companies having a high degree of collaboration, typically through a supply chain, and operating under the same market conditions."

Roeland and den Hertog (1999, p. 9)

"Clusters can be characterized as networks of producers of strongly interdependent firms (including specialized suppliers) linked each other in a value-adding production chain."

Van den Berg and others (2001, p. 187)

"The popular term cluster is most closely related to this local or regional dimension of networks. Most definitions share the notion of clusters as localized networks of specialized organizations, whose production processes are closely linked through the exchange of goods, services and/or knowledge."

Enright (1996, p. 191)

"A regional cluster is an industrial cluster in which member firms are in close proximity to each other."

Source: Martin and Sunley (2003).

Annex G: Almaty Programme of Action (Priority 1 to 4 in detail)

Priority 1 Fundamental transit policy issues

- An integrated approach to trade and transport sector development (social, economic, fiscal, policy, regulatory, procedural and institutional considerations).
- Develop and modernize existing facilities and increase the commercial orientation of transport and infrastructure by eliminating non-physical barriers to transit transport.
- Transport sector reform with greater private sector partnership.
- Promote public/private sector dialogue.
- Establish regional transport corridors and adopt common rules and standards where appropriate.
- Strengthen existing institutional mechanisms at the policy and operational levels.
- Promote integrated training programmes at all levels in both the public and private sectors.

Priority 2 Infrastructure development and maintenance

- A greater share of public investment to the development of infrastructure.
- Encourage competition among different transport modes, particularly road and rail transport, and develop multimodal transport.
- Construct “missing links” in the regional and subregional transport network.
- Develop private sector partners, in transit transport infrastructure development, through co-financing, Build-Operate-Transfer (BOT), and through them attract foreign direct investment and facilitate access to bond markets.
- Develop common ICT systems to promote private-public partnership platforms along trade and transport corridors.
- Specific to rail transport
  - New or rehabilitated railway connections at the bilateral, subregional and regional levels.
  - Improve the maintenance of track and rolling stock, purchase new rolling stock and expand the railway network, where justified by traffic volume.
  - Harmonize gauges, develop reloading capacities, expand training and inter-railway staff exchange programmes.
  - Comply with relevant international conventions related to rail and combined transport.
- Specific to road transport
  - Give high priority to transit corridors.
  - Accede to and implement relevant international conventions.
  - Gradually liberalize road transport services, and in particular review the quota system, transit and transportation costs, roadblocks and custom supervised convoys.
- Specific to ports
  - Modernize or establish new terminals, and simplify procedures.
  - Expand capacity to handle transit trade, and allow private terminal operations to promote competition and encourage efficiency.
  - Greater institutional coordination for transit traffic in ports (customs administration, security personnel, port authorities, commercial banks, clearing and forwarding agents, insurance companies).

- Establish dry ports in landlocked and transit developing countries.
- Expand training programmes for port workers.

- Specific to inland waterways
  - Rehabilitate and expand the lake/river infrastructure facilities along the corridors linking landlocked developing countries to ocean ports.
  - Legal and other arrangements for collaborative actions at the subregional level and to promote more efficient river/lake transit systems.
  - Develop new waterways, maintain and expand existing waterways.
- Specific to pipelines
  - Cooperate and coordinate construction of pipelines along appropriate routes.
- Specific to air transport
  - Expand physical infrastructure facilities.
  - Make a more effective use of existing freight capacity through liberalization.
  - Pool arrangements at the regional, subregional and bilateral levels to permit economies of scale.
  - More training programmes at the national and subregional levels.
- Specific to communications
  - Improved cargo monitoring systems.
  - Expand telecommunications facilities with private sector participation.

Priority 3 International trade and trade facilitation

- Accession of landlocked and transit developing countries to the World Trade Organization should be accelerated.
- Needs and interests of landlocked and transit developing countries should be given full attention in international trade negotiations.
- Landlocked and transit developing countries should be assisted in the area of trade facilitation in the light (Doha Ministerial Declaration).
- Financial assistance to facilitate transit traffic through border posts, to expand IT, to implement efficient customs control systems and simplification of documents and procedures, and to strengthen the capacity-building of Government agencies.
- Participate in international conventions and instruments applicable to various transport segments.
- Establish or strengthen national trade and transport boards or committees involving all major stakeholders, including the private sector.

Priority 4 International support measures

Various conditions and features of international financial assistance by the international community are outlined as specific actions. Areas considered a priority for financial assistance are:

- Completion of “missing links” in the transit transport chain to extend railways and roads to landlocked developing countries.
- Maintenance of existing physical transit transport infrastructure.
- Construction, maintenance and rehabilitation of oil and gas pipelines.

- Development and maintenance of cost-effective routes.
- The development of dry port projects in landlocked and transit developing countries.
- Projects to improve existing or establish adjacent border points.
- Joint projects in trade and production to help bolster subregional and regional trade.
- Rehabilitation and reconstruction of the transport infrastructure, particularly in countries or regions emerging from war and internal conflict and natural disasters.

Areas considered a priority for technical assistance:

- Agreed bilateral, subregional, regional and international transit agreements.
- Social and market-oriented transit transport policies.
- Exchange of experience related to the development and management of transit transport systems in different regions.
- Privatization programmes within the transport sector.
- Training programmes, e.g., customs procedures freight forwarding and clearing of transit cargo infrastructure and equipment maintenance road safety environmental protection transit insurance dry port development and management and expanding regional databases on road transport.
- Trade facilitation projects for imports and exports.
- Assisting Governments on relevant international conventions.
- Facilitating access to bond markets and enhanced risk-sharing between public and private sector financing.

Priority 5 Implementation and review

This refers to action by Governments and international institutions and is outside the scope of this report.

Annex H: The local advantage in China

China has taken steps to improve its high capacity direct access to ports with a dramatic increase in the number of ISO containers. See Figure 0.1 below. Figure 0.1 shows that, whereas the number of ISO container TEUs increased by around 688 per cent from 1993 to 2001, the number of non-ISO containers fell. Container port traffic also grew rapidly during the 1990s, mainly along the coast and using road transport. Rail containerization increased mainly after 1996 when the Railway Container Transportation Centre (CRCTC) was set up. By 2001, 271 out of 544 Chinese railway stations were ISO-designated (Loo and Hook, 2002). Numbers have fluctuated since, but finance has been lacking to achieve full modernization, particularly gantry cranes. There is a need to develop a few LLCs (land-based load centres) to serve as key nodes in the country's inland port distribution (IPD) system (Loo and Liu, 2005).

The Chinese Government identified fifteen railway stations as priority for development as LLCs. They were Beijing, Chengdu, Chongqing, Guangzhou, Harbin, Kunming, Lanzhou, Qingdao, Shanghai, Shenyang, Tianjin, Urumqi, Wuhan, Xian, and Zhengzhou (see Figure 0.2). They should be equipped for container handling and have sufficient freight volume to justify the level of investment. Loo and Liu (2005) doubt whether every station will succeed and set up a model to investigate potential for LLC development. The dimensions and variables of the model are repeated in detail in the extract below as they are directly relevant to the development of inland logistics ports.

Figure 0.1. Growth of ISO and Non-ISO containers in China from 1989 to 2001 (in TEUs)

ISO Boxes							
	Water		Road		Railways		All Modes No. (in million)
	No. (in '000)	%	No. (in '000)	%	No. (in '000)	%	
1989	1 151.6	…	299.0	…	…	…	…
1993	2 682.0	78.4	631.8	18.5	108.0	3.2	3.4
1997	5 590.5	74.3	1 355.1	18.0	582.0	7.7	7.5
2001	10 572.4	45.2	11 156.5	47.7	1 680.0	7.2	23.4
Non-ISO Boxes							
	Water		Road		Railways		All Modes No. (in million)
	No. (in '000)	%	No. (in '000)	%	No. (in '000)	%	
1989	93.8	…	1 841.0	…	…	…	…
1993	72.0	0.7	2 424.0	22.9	8 080.0	76.4	10.6
1997	29.1	0.4	1 551.9	20.6	5 956.0	79.0	7.5
2001	69.9	1.0	1 301.7	19.4	5 330.0	79.5	6.7

Sources: 1. Zhongguo Jiaotong Nianjian, various years.

2. Loo and Liu (2005).

Hinterlands for the 15 stations were identified for 250- and 500-km radii to reflect short- and long-term scenarios, respectively. The methodology used by Loo and Liu (2005) is applicable at both national and regional levels. At the national level the objective is to make best use of scarce resources by developing the most suitable LLCs, and at the regional level local policymakers are able to identify their relative advantages and disadvantages in the national system.

Box 0A.0.1. Evaluating the potential of railway stations to develop into LLC

The first factor concerned the availability and conditions of transportation infrastructure linking the railway station with its hinterland. This is referred to as the infrastructural dimension. The more developed the infrastructure around a railway station, the higher its potential for developing into a LLC. Eight sets of transportation-related data were used in the analysis. They are: (1) the number of provincial railway lines, (2) the length of railways in operation, (3) the extension length of trunk lines, (4) the length of navigable inland waterways, (5) the length of highways, (6) the length of expressways, (7) the number of ocean container berths, and (8) the number of inland river berths. In this analysis, provincial lines refer to the railway network connecting provincial capitals and provincial level municipalities. The larger the number of provincial lines reaching a railway station (either as a terminal or as an intermediate stop), the better the accessibility of the railway station in the Chinese railway network. As the above information was not readily available for the hinterland areas, data were compiled from the China Railways and City Transportation Atlas (2000) and the China Statistical Yearbook 2001 (State Statistical Bureau 2001).

The second factor was related to the level of development of industry and trade within the hinterland and is called the economic dimension. Obviously, the higher the level of development of industry and trade within the hinterland area, the higher will be the container freight volume generated. This not only relates to goods produced within the hinterland (either for export or domestic consumption) but also goods required for local consumption (including both imports and local products). Four sets of industrial output and trade-related data were selected to help investigate this factor. They are (1) industrial outputs, (2) total retail sale of consumer goods, (3) value of exports, and (4) value of imports. The data were compiled from the China Statistical Yearbook 2001 (State Statistical Bureau 2001).

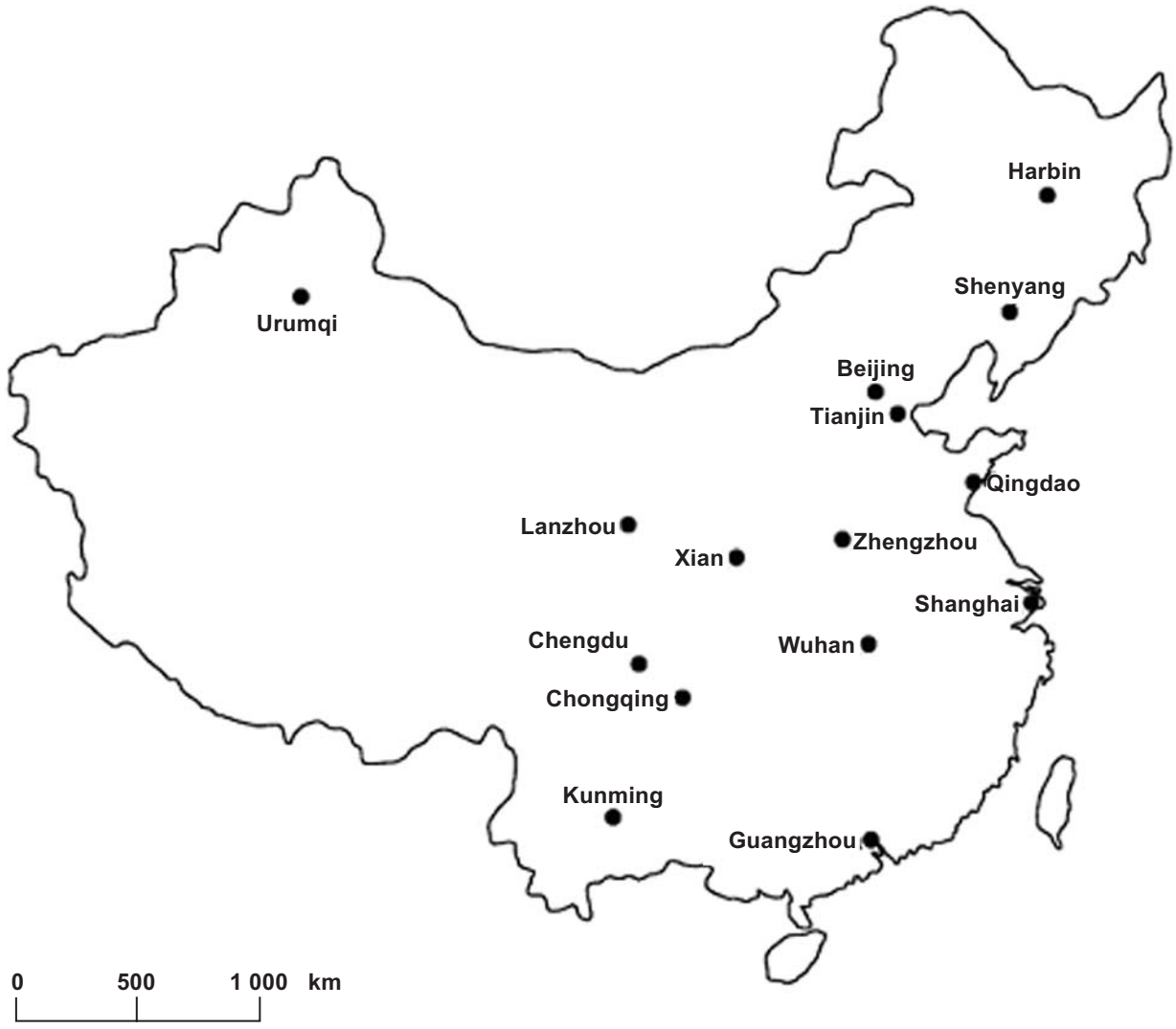
Thirdly, it was expected that the state of development of the transportation and logistic sector in the hinterland would be highly important to the development of LLCs….

Transportation is mainly concerned about the movement of people and goods. As the scope of logistics is broader, this factor was identified as the logistics dimension. Being a logistics hub is a critical advantage for the development of a LLC. Four additional variables on (1) the number of logistic companies, (2) scale of logistic companies (total number of employees), (3) number of transportation companies, and (4) scale of transportation companies (total number of employees) were included. Again, the information was not readily available, and the information was compiled from the list of registered companies in Chinainfobank (2002). Based on the addresses of registered transportation and logistics companies, it was possible to trace and find out whether these companies fell within the hinterlands of specific railway stations.

Lastly, we believed that the existing state of the railway station also played a role in determining whether the station had a high potential for developing into a LLC. This is called the capacity dimension. In particular, the operation of “five-fixed trains” has enormously raised the reliability of railway services in China. These train services are labeled five-fixed because they have fixed stops, fixed arrival time, fixed route, fixed frequency, and fixed price. While these service attributes are almost taken for granted in many parts of the world, China’s railway services are notorious for their unreliability. The policy of introducing five-fixed trains on selected routes represents the intention of MOR to facilitate and promote railway containerization at these specific stations. Furthermore, we also considered the number of supporting TEU and FEU-handling railway stations in the hinterland areas. These sets of data included (1) the number of TEU-handling railway stations, (2) the number of FEU-handling railway stations, and (3) the number of five-fixed trains available in a week within the hinterland.

Source: Loo and Liu (2005, p. 565).

Figure 0.2. The 2002 railway containerization plan in China



Source: Loo and Liu (2005).

Annex I: Initiatives for wider regional cooperation (ALTID, AH, TAR)

Asian Land Transport Infrastructure Development (1992)

The Asian Land Transport Infrastructure Development Project (ALTID) launched by ESCAP in 1992 has been at the core of regional cooperation in transport infrastructure development in Asia and the Pacific. Its major contribution was that it drew together the Asian Highway, Trans-Asian Railway and initiatives that facilitate cross-border land transport. ALTID helps countries to identify and formulate routes, set standards, formalize networks and put the networks into operation. Route selection criteria included: capital-to-capital links; connections to main industrial and agricultural centres; connections to major sea- and river ports; connections to major inland container terminals and depots; and connections to major tourist attractions. Furthermore, the number of lines to be included in the networks were to be minimized, and maximum use made of existing infrastructure. A refined implementation strategy was adopted by the Commission at its fifty-fourth session, in 1998, and includes the following components: (i) facilitation of land transport at border crossings and maritime transport at ports through the promotion of the relevant international conventions and agreements in Asia, particularly those contained in ESCAP resolution 48/11; (ii) completion of the formulation of Asian Highway and Trans-Asian Railway networks covering the whole of Asia as well as completion of the missing links; (iii) formalization of the Asian Highway and Trans-Asian Railway routes/networks. A legal framework in the form of "ESCAP agreements on Asian Highway and Trans-Asian railway routes/networks" should be developed; (iv) improvement of the operational efficiency of the Asian Highway and Trans-Asian Railway routes, including transport logistics; (v) improvement of transport logistics; (vi) Asian Highway and Trans-Asian Railway promotion.

Source: ESCAP (2006b, p. 43).

The Asian Highway after 1992 and its Intergovernmental Agreement (2005)

The Asian Highway network now comprises approximately 140,000 kilometres of roads, passing through 32 member States. The Intergovernmental Agreement on the Asian Highway network was concluded in November 2003 and came into force on 4 July 2005. The contracting parties have agreed to: (i) adopt the Asian Highway network as a coordinated plan for the development of highway routes of international importance; (ii) bring the network into conformity with the Asian Highway classification and design standards; and (iii) place Asian Highway route signs along the network. Members also established the Working Group on the Asian Highway to review its implementation. The ESCAP secretariat acts as the secretariat for the Agreement. The Agreement plays a catalytic role in developing international highways in the Asian and Pacific region. In 2004, ESCAP adopted resolution 60/4 of 28 April 2004 on the Intergovernmental Agreement on the Asian Highway network, in which it invited (i) all the relevant members of the Commission to become parties to the Agreement; (ii) international and regional financing institutions and multilateral and bilateral donors to provide financial and technical support for the development of the Asian Highway network; and (iii) subregional organizations to promote the Agreement and accord priority to the development of the Asian Highway network.

Through a series of subregional meetings with the participation of the World Bank, the Asian Development Bank, the Islamic Development Bank, the Japan Bank for International Cooperation, and related institutions, member countries have identified a list of priority investment projects and prepared project profiles for potential donors, giving highest priority to upgrading the Asian Highway's substandard sections.

Source: ESCAP (2006b, pp. 44-45).

The Trans-Asian Railway after 1992

The Trans-Asian Railway Project aims to enhance the efficiency and development of rail transport infrastructure in Asia, thereby promoting international and bilateral trade and regional economic and social development. Given the extent of the territory covered by the Trans-Asian Railway, the differences in standards between railways in the region and the differences in levels of technical development, a step-by-step approach was adopted to developing the network, starting with four major corridors and focusing on break-of-gauge points and missing links.

Demonstration runs of container block-trains were carried out along different routes of the northern corridor of the Trans-Asian Railway between November 2003 and July 2004. These were followed by more than 200 commercial container block-train runs between 2004 and 2005. A container block-train travelling between Western Europe and North-East Asia covering about 1,000 kilometres per day takes at least seven days less than sea transport.

Transport officials from across the region finalized the draft of the Intergovernmental Agreement on the Trans-Asian Railway Network at an Intergovernmental meeting organized by ESCAP and held in Bangkok from 28 to 30 November 2005. The draft will be submitted for adoption by the Commission at its sixty second session and for signature at the Ministerial Conference on Transport to be held later in 2006.

Source: ESCAP (2006b, pp. 45-46).

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