

As these technical and socioeconomic changes occur, U.S. and OECD multinational production and transport firms (who are the major agents of globalization) develop strategies to stay competitive in this changing technical, social, economic, and policy environment of a fiercely competitive global economy. A major component of these strategies is to reduce costs by the broadening of sourcing of raw materials and intermediate products in an increasingly interdependent global market. While global sourcing responds to the needs of manufacturing and service firms it can be implemented only if reliable and timely transport is available in a production system which maintains lean inventories¹. Moreover, the increasing trend towards intrafirm trade (resulting from a division of labor on a global basis within multinational firms), which amounted to \$800 billion in the mid-90s, is dependent on a responsive transport system (World Bank, 2000).

At the same time, transport firms have responded to these challenges by a combination of transport and information technological innovations, and business and organizational innovations. The contribution of the convergence of transportation technologies (containers, stack trains, double & triple trailers, etc.) and information technologies (ITS, GPS, EDI, etc.) to the transformation of transportation and distribution system is widely documented (BTS, 1997).

The adoption of these transport and information technologies has been facilitated by a combination of supportive public policies and a number of business organizational innovations. The role of the public sector's contribution to the vast changes in the transport and distribution system has been two-fold. First, at a broad policy level the development over the last two decades of policies, which increased liberalization and deregulation of the transport sectors and

¹ The Cato Institute showed that carrying and holding costs represented 25-30% of the value of inventories in US firms due to "product, depreciation and interest" (IMD, 1999). Inventory reduction has become for the firm of paramount importance, and also feasible due to changes in production technology--with use of computer controlled manufacturing, robotics and other uses of information technology for cost effective smaller production runs. In 1998, more than 60% of production and sales were processed from direct orders rather than from stock (Gwilliam, 1998)

lowered most of the economic and physical barriers to cross-border goods movement, has transformed the economic incentives for the transport sector, releasing competitive forces and business innovative opportunities (e.g. third party logistics, Tradenet, etc.). Second, new public sector policies are improving the *operational efficiencies* in the freight transport sector. The time and cost efficiencies have been enhanced in the transport sector by the government's promotion of intermodalism and of increase of infrastructure capacity. In the latter case, public investments in new infrastructure are complemented by ITS strategies which not only increase the supply of infrastructure capacity but also manipulate the demand for infrastructure capacity (BTS, 1996, 1997). Further, recent government innovations such as performance standards (stimulated by the Government Performance Review Act or GPRA) and benchmarking (ECMT, 2000) may prove to be important tools as the public sector seeks to more effectively monitor, measure, and assess the activities of the emerging freight sector (FHWA, 1998).

Table 1 summarizes some dimensions of change in transport logistic operators as they have responded to the evolving technical, social, economic, and policy environment. In the pre-1990 era, independent factories, supplemented by clusters of Original Equipment Manufacturers and subcontractors, constituted the industrial structures. The focus of transport firms was on shipments and material flow—typically captured by commodity shipments by mode, origin, and destination as in The Commodity Flow Surveys of BTS (1993 and 1997). The economic emphasis in the transport sector was on reducing costs. The logistics function was organized in a separate department with little or no links to production departments or decisions of the firm. Information support for transport logistics was modest compared to today, limited to telephone, telex, fax, and an in-house computer. The post-1990 logistical structure in Table 1 exhibits many