



## **LATIN AMERICA TRADE AND TRANSPORTATION STUDY (LATTS) II**

### **Introduction**

The relationship between transportation infrastructure and economic development has been the focus of increasing analysis, discussion and interest during the past decade. This represents a new paradigm in analyzing transportation investments. Historically such investments have been valued based on efficiency gains such as travel cost and time savings. Recently however, there has been a push to promote transportation infrastructure improvements to enhance economic development in terms of jobs, income and tax base expansion.

Stakeholder groups comprised of elected officials, transportation and economic development specialists, government agencies and business leaders have specified numerous ways in which transportation impacts economic development including:<sup>1</sup>

- Linking key economic centers in a region to national markets thus making the area competitive for growth;
- Providing for more efficient flows of commerce through the region to enhance the development potential of areas traversed by the improvement;
- Facilitating the movement of people to new jobs and public services;
- Opening up new sites for commercial and industrial development;
- Providing local access roads to stimulate retail development;
- Enhancing the flow of goods and services within a sub-regional trade area to increase induced economic benefits;
- Facilitating the diversification of the local economy;

- Supporting new business initiatives; and
- Enhancing economic development by lowering the cost of doing business through lower transportation costs.

The recent surge in the recognition of transportation infrastructure as an economic development tool is not rebirth of the “build and they will come” theory that led to many misaligned investments in the past. Instead, the shift is in response to input provided by potential developers and industry experts. The underlying concept is that the lack of improvements or transportation alternatives can retard further economic development if they do not keep pace with the changing demand. For example, the Alliance Region stands to reap substantial economic gains from the increase in trade with Latin America. However, failure to invest in the transportation infrastructure necessary to maintain the region’s competitive stance will result in lost economic development opportunities.

The purpose of one of the tasks in the current study is to identify potential economic development opportunities for the region based on the flow of goods to and from Latin America. This will assist the region in making transportation infrastructure investments in a strategic fashion that results in the region being better poised to take advantage of the opportunity to increase employment and income and expand their tax bases by ensuring seamless movement of goods, both inputs and final products. Failure to make the investments necessary to overcome any potential bottlenecks related to freight movements is likely to lead to lost opportunities.

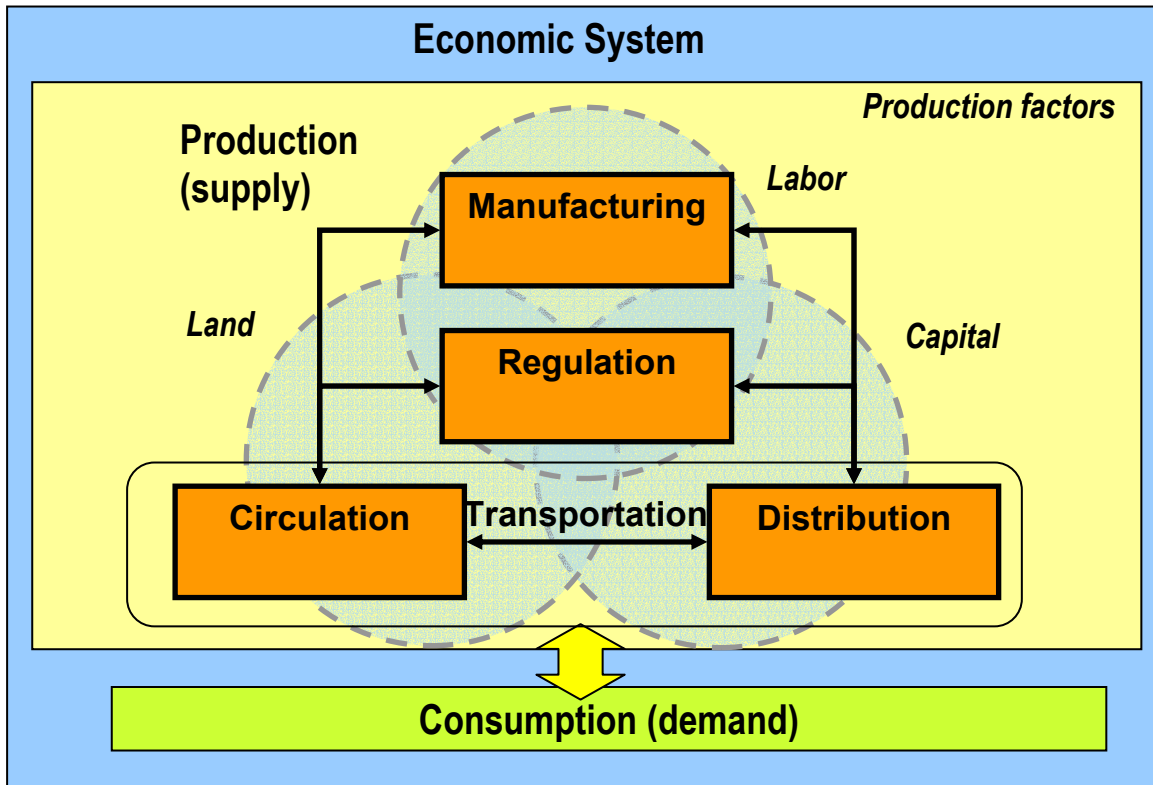
**Transportation in an Economic System**

An economic system consists of a supply side or production and a demand side or consumption. Traditionally, factors of production-land, labor and capital - are identified. However, because the way in which we do business in the market has changed, transportation is quickly becoming the fourth factor of production. As shown in Exhibit 1,

transportation is key to the circulation of goods, or getting inputs from the supplier to the manufacturer, and the distribution of goods, or getting the final goods to the consumers.

Therefore, just as having the best land, labor and capital can provide businesses with a competitive advantage, so can having access to an efficient, reliable transportation system.

**Exhibit 1: Transportation in an Economic System**



Of course the degree to which transportation systems impact the production or supply of goods depends on the relative importance of transportation in the production process. The sectors with the highest logistics cost to total cost have traditionally been agriculture, mining and manufacturing.

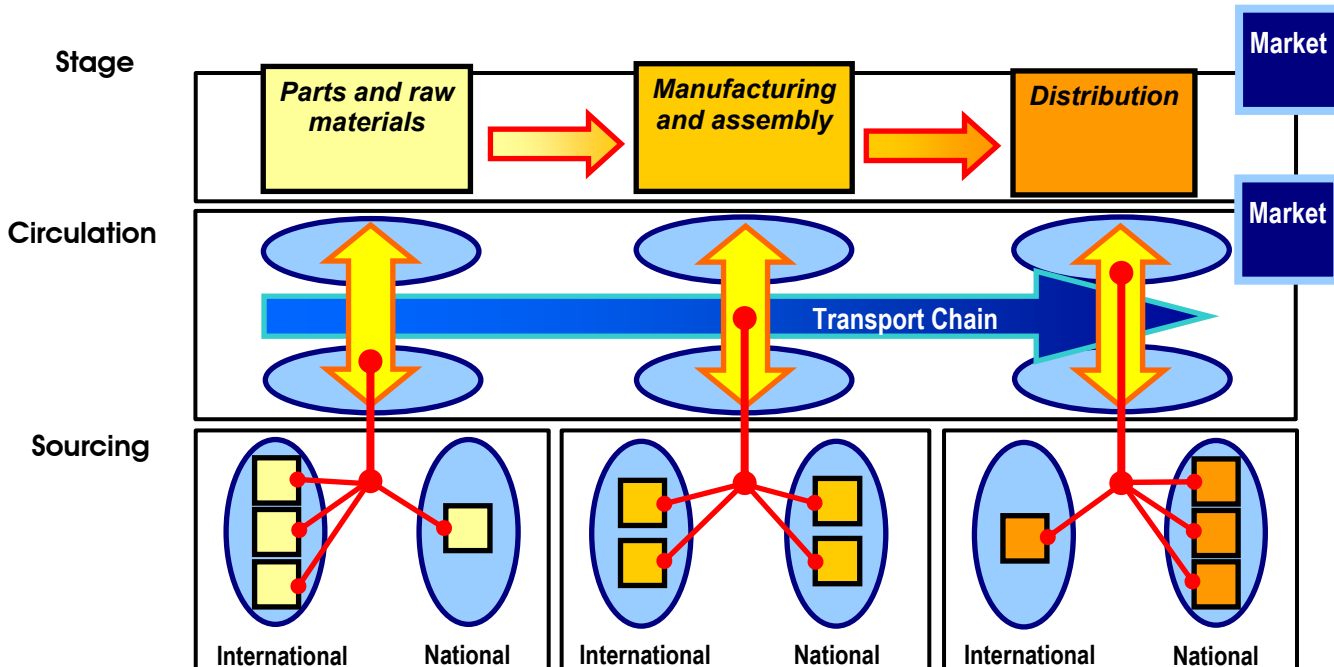
**Transportation and the Production Process**

Some of the key trends that are impacting how the economy depends on transportation systems include JIT manufacturing, 3PL, global supply chains and the increased efficiency of multi-modal transportation systems. All of these trends lead are forcing businesses to focus on supply chain

management. Increasingly, the supply chain is becoming the economic unit of competition. Historically, firms relied on more productive labor or improved technology to gain a competitive edge; however, as these factors of production have become more equalized across regions, companies are turning toward supply chain management to lower cost and be more competitive.

Transportation systems are the key to supply chain management. Exhibit 2 illustrates the transport chain and freight flows in the production process. The flow of goods is crucial to every stage of the production process and involves circulation of goods from national and international markets both to and from the factories and/or facilities.

**Exhibit 2: Supply Chains, Freight Movements and the Production System**

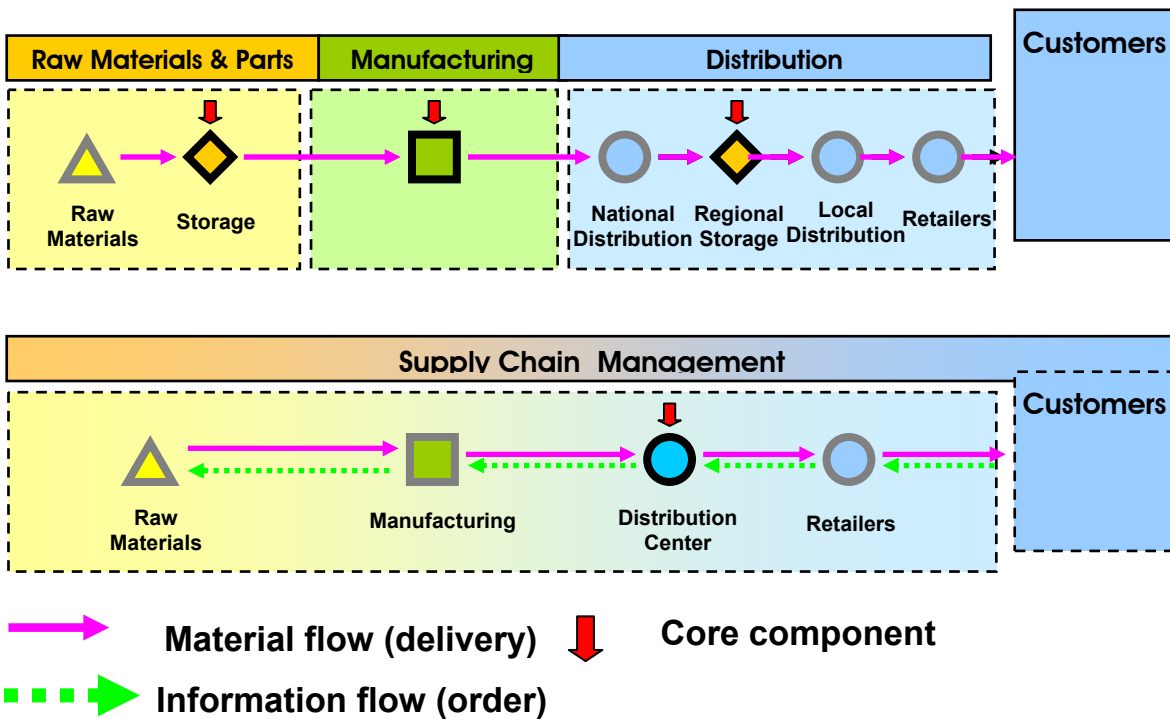


As a result of the increased focus on supply chain management, freight flows have changed (see Exhibit 3). Traditionally, the core component was storage for inventories, both for raw materials and inputs and for final goods. Because suppliers, manufacturers and retailers kept large inventories of goods, the pressure on the transportation system was not as great. However, due to technological advances and the trends we have already mentioned, things have changed dramatically. Now the core component is a distribution center for final goods with the only inventory being the

product in the containers on the trucks, ships and/or railcars. In other words, trucks on the highways and railcars on the tracks serve as today's warehouses.

Information sharing between retailers, manufacturers and suppliers allows for this move away from inventories and large warehouses to JIT manufacturing and delivery. Of course this creates pressure to provide a transportation system that is fast, reliable and efficient. States and regions must be able to provide this system in order to retain and attract businesses.

**Exhibit 3: Changes in Freight Flows**

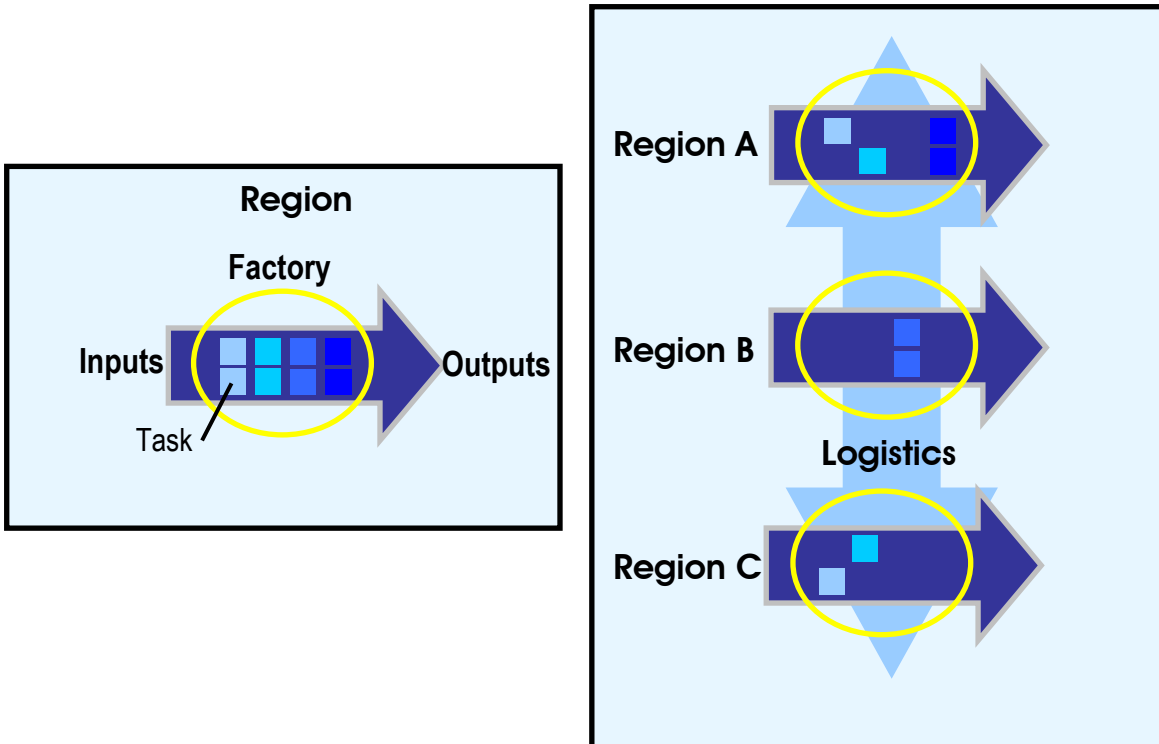


Another result of the global trends is the fragmentation of production processes or the outsourcing of many steps in the production process. Exhibit 4 illustrates the effect of fragmentation of the production process on logistic requirements. A great example is the automotive industry. The major manufacturers now outsource complete components or modules of the automobile and all these subcomponents produced in different regions are sent to the assembly plant, again placing an increased emphasis on the ability to transport goods

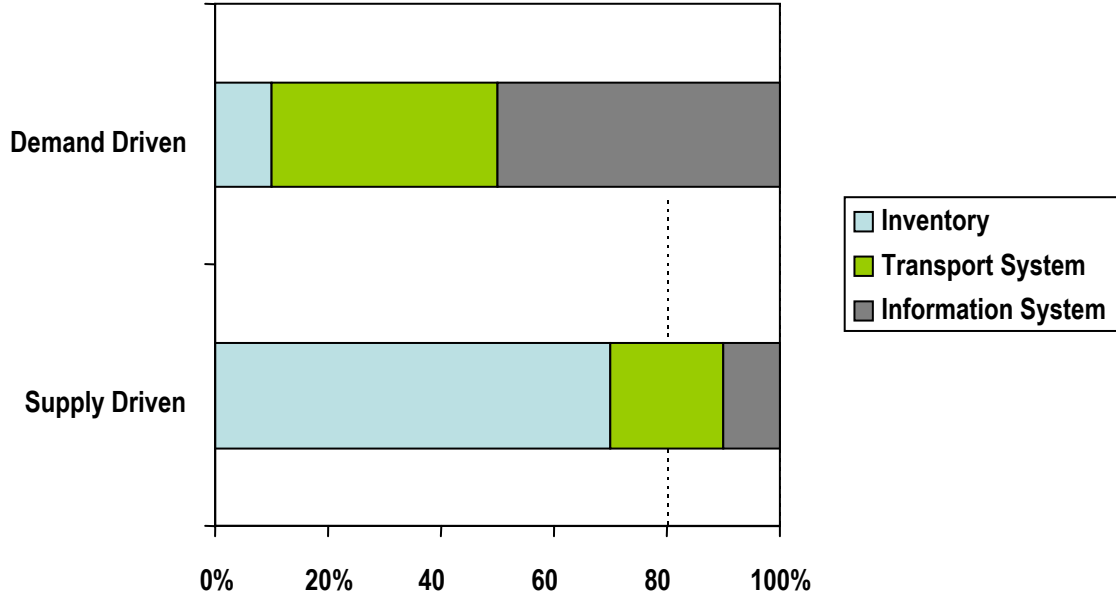
in a seamless and efficient manner.

Further evidencing the increasing role of freight transportation systems in demand driven production systems (e.g., JIT manufacturing process) is the relative change in the percentage of total distribution costs comprised of transport costs. As can be seen in Exhibit 5, transport costs comprise roughly 40 percent of total distribution costs in a demand driven production process as opposed to 20 percent in a supply production driven process.

**Exhibit 4: Effects of Fragmentation of Production Systems on Freight Requirements**



**Exhibit 5: Role of Transport Systems in Distribution**



**Opportunities for the Alliance Region**

Wilbur Smith Associates analyzed ways to leverage the transportation system to spur economic development opportunities associated with current and forecasted trade with Latin America for the Alliance Region. The analysis first required an understanding of the regional economy. For this, an economic base analysis was conducted and key industrial clusters were identified. Once the industries were identified, an analysis of the supply chain of those key industries was conducted.

Combining the knowledge of the key economic supply chains and transportation requirements for various industries and commodities with input/output analysis of those key industries and current and projected commodity flows through and within the region, allows for the identification of economic development opportunities.

**Key Industry Clusters**

Key industry clusters were identified by examining the concentration of employment in the region relative to the U.S as a whole. Because different sectors of the economy have different freight needs, clusters were identified in three primary sectors – durable goods manufacturing, nondurable goods manufacturing and service industries. The results of the analysis are depicted in Exhibit 6.



### Exhibit 6: Key Industrial Clusters in the Alliance Region

#### **Durable Manufacturing**

- ◆ Automotive
- ◆ Wood products
- ◆ Electrical Components and Appliances

#### **Nondurable Manufacturing**

- ◆ Beverage and Food
- ◆ Industrial and Other Chemicals
- ◆ Paper Products

#### **Service Industries**

- ◆ Health and Social Sciences
- ◆ Tourism Related
  - Food Establishments
  - Lodging

The different clusters have different freight needs. For example, the durable manufacturing sector relies heavily on just-in-time (JIT) manufacturing. The freight requirements of JIT include the demand for more frequent deliveries, reliable service and higher value shipments. The nondurable manufacturing sector is characterized by freight shipments that are bulky and lower in value. Therefore, industries freight transportation needs for these industries is characterized by low cost, low damage with less emphasis on speed.

The transportation system requirements of the service sector are driven more by passenger needs as opposed to freight needs. This translates into the need for a safe, fast and reliable transportation system with frequent trips.

#### **Key Freight Flows**

After identifying the key industry clusters,

national input/output tables, which detail the inputs required to produce a dollar's worth of output in a specific industry, were used to define the key inputs for each of the industry clusters. This is important because the region's transportation system must be able to provide for the efficient flow of these inputs. Based on this analysis, key freight flows in terms of the industry clusters in the region include:

- Rubber and plastics
- Fabricated metals
- Chemicals
- Instruments

#### **Turning Key Freight Flows into Economic Development Opportunities**

Comparing the commodities being exported to Latin America through the Alliance Region with the key inputs identified via our cluster analysis reveals some opportunities for economic development. Firms supplying these goods for exports from outside the Alliance Region could take advantage of a current market for their goods within the region and potentially lower the transport costs of their exports by locating within the region. For example, chemicals is a key input in three key industrial clusters in the region – rubber and plastics, paper products and chemicals. Firms located outside the Alliance Region exported over 5 million metric tons of chemicals through the region to Latin America in 1998. Exhibit 7 displays the industries identified as potential development opportunities based on existing industry clusters and freight exports to Latin America. It should be noted that further analysis of these specific industries with regards to their location criteria and industry trends is recommended to gain a more detailed assessment of the underlying opportunities.



**Exhibit 7: Potential Opportunities**

**Fabricated Metals**

- ◆ Key input into automotive and electrical/appliances industries
- ◆ Over 1 million metric tons exported through the region

**Rubber and Plastics**

- ◆ Key input in automotive and electrical/appliance industries
- ◆ Over 300,000 metric tons exported through the region

**Instruments**

- ◆ Key input in automotive and electrical/appliances industries
- ◆ Over 81,000 metric tons exported through the region

**Chemicals**

- ◆ Key input in rubber and plastics, paper products and chemical industries
- ◆ Over 5 million metric tons exported through the region

**Conclusion**

The way in which firms compete is changing. The supply chain is quickly becoming the new economic unit of competition. Several trends are contributing to this new way of doing business including increasing global trade, moving from push to pull logistics, e-commerce and JIT manufacturing. Preparing the transportation system to meet these new challenges is key to being able to take advantage of development opportunities.

By identifying what industries are currently important to the region and analyzing the supply chains of those industries, combined with Latin American trade data, this analysis provides the Alliance Region with a regional perspective on some of these potential opportunities.

<sup>i</sup> Weiss, Martin H. and Roger Figura (2003). “A Provisional Typology of Highway Economic Development Projects.” US DOT, Highway Administration: Washington DC.