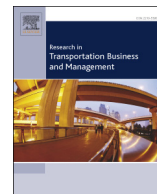




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## Research in Transportation Business &amp; Management



# A review of public and private intermodal railroad development in the Memphis region

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## ABSTRACT

Intermodalism and its accompanying benefits have changed the U.S. economy since the early 1980s. This has not only changed international trade patterns, but also domestic rail shipments, as firms utilize existing intermodal equipment to balance cargo traffic. As international trade, especially containerized traffic, remains a growth area for the U.S. economy, the penetration of intermodal services will only continue, and with it, the demands for improving operational efficiencies and the expansion of intermodal networks. The paper discusses the nature of rail intermodalism in the U.S., using case studies of intermodal facilities in the Memphis region. The paper addresses how different regional and state groups have approached the development and promotion of rail intermodal terminals. Based on the case studies, the paper develops a best practice framework for potential development, planning, and governance of these facilities considering the needs of shippers, carriers, and communities.

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## 1. Introduction

There has been significant research on intermodalism, but many of the practical issues have been overlooked. These issues often constrain effective governance of intermodal facilities. This paper will identify some of the key features of intermodal facility development governance from the literature to identify factors from previous work, then four case studies of intermodal facilities will be analyzed in order to understand the important features of site development and establish a best practice framework based on a synthesis of previous research and these case studies. Findings will be of use to both public and private sector planners and funders seeking successful facility development.

The paper begins with an introduction to the rise of intermodalism in the U.S. to set the stage for the case studies and a literature review. Next there is a discussion of the governance of intermodal facilities. Four comparative case studies of facilities in the Memphis region are presented. This is followed by a discussion of these case studies and practical steps for successful development of intermodal facilities that consider the needs of shippers, carriers, and the community. Recommendations for future research and comments on the contribution to scholarly knowledge complete the paper.

## 2. Literature review of intermodal governance infrastructure development

Driven by the reinventing government movement and the increased usage of public–private partnerships (PPPs), governance has received

extensive attention in the public administration literature since the 1990s (Brinkerhoff & Brinkerhoff, 2011; Frederickson, 1996; Koppenjan & Enserink, 2009). With the governance of transportation infrastructure, in particular highway programs, PPPs have been a major area of research (Ortiz & Buxbaum, 2008; Siemiatycki, 2009). There is a general consensus in the public administration governance literature that risks can be shared in transportation projects, but not all risks, such as environmental or political risks, or even exposure to potential market failures, can or should be shared. Most political investments focus on hard infrastructure while operations tend to be handled by the private sector, with regulatory oversight. Further, the public sector may give up more than it gains by engaging in such programs, and as a result many are calling for improved evaluation and accountability of these types of projects. As it is becoming clear that intermodal transportation systems are effectively PPPs, with different levels of public and private involvement, the question of evaluating governance and its resulting influences on developing successful projects needs to be considered.

Up to the early 2000s, intermodal freight transportation research was still in a pre-paradigmatic phase that focused on operational research and modeling (Bontekoning, Macharis, & Trip, 2004). For example, in a model of freight terminal operations, Ferreira and Sigut (1995) considered two key performance areas, namely: customer service and operational efficiency. A decade later, Sirikijpanichkul, Van Dam, Ferreira, and Lukszo (2007) used an agent based model that combines the interest of four dominant agents, namely, hub owners or operators, transport network infrastructure providers, hub users, and communities. Today, intermodal modeling has become more sophisticated to include governance considerations of both the private and public sectors (Caris, Macharis, & Janssens, 2013). Transportation modeling is still a major

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focus of intermodal research, but more social science (e.g., governance) factors are incorporated into the models.

In the last few years, governance and institutional considerations have garnered increased attention in the intermodal freight literature. Bergqvist and Monios (2014), in an examination of intermodal terminals in Sweden and the U.K., found a variety of governance models with varying levels of power and responsibility shared between public and private sectors. Using the Heartland Intermodal Corridor in the U.S., Monios and Lambert (2013) develop a theoretical framework for institutional analysis, combining the overall institutional setting with the roles of individual actors confronting a collective action problem. Callahan, Pisano, and Linder (2010) compared the leadership and strategy of intermodal projects in Alameda Corridor. In addition, there are entire books devoted to institutional challenges to intermodal transport (Monios, 2014).

An aspect of intermodal governance that has begun to garner more attention relates to the regional milieu in which the logistics facility operates. The logistics cluster concept was popularized by Sheffi (2012), which is an extension of the intensively studied industrial cluster concept from economic development literature (cf. Porter, 2000). Clusters are understood to be governed via collective action regimes (De Langen & Visser, 2005). Governance in clusters depends on leader firms that desire to develop the cluster, collaborative involvement of public organizations, organizational structure that enables cooperation, consensus on a shared value system, and openness or “voice” that allows input from all the components of the cluster (Miller & Stich, 2009). More intermodal case studies are needed to better understand how the industrial cluster governance knowledge applies to logistics.

Current research on intermodal facility site selection demonstrates that intermodal success is based on governance e.g., balancing the needs of shippers, carriers, and the public sector (Fuller, Robinson, Fraire, & Vadali, 2012; Poist & Walter, 2003; Steele & Hodge, 2011). For example, Bergqvist and Tornburg (2008) approach intermodal hub site selection by combining the interest of public and private entities by focusing on the economic and environmental (noise and vehicle emissions) interests of each. Profitability combined with committed political entrepreneurs is found to be essential for intermodal facility location success (Bergqvist, Falkemark, & Woxenius, 2010). The consensus in the literature review is that public and private collaboration is essential for intermodal facility development, but how the shippers, carriers, and public sector work together from an institutional perspective needs further research and clarification. In some areas, the approach of broad sectional studies may not fully represent the interplay that occurs over time within a single geographical area. So, the focus on broad trends may also not grasp the benefits of growth in a logistics cluster at a single facility or region. The following research begins to fill in this gap by providing comparative case studies, as well as identifying a basic framework for project success.

### 3. The emergence of intermodal freight transportation in the U.S.

Malcom McLean is credited with developing the metal shipping container in 1956 (Levinson, 2010). This containerization led to the extreme growth of the intermodal container business today. The simple process of containerization, among other factors, led to the rapid unloading and loading of containerized cargo at ports in the United States. Prior to 1956, cargo was hand-loaded on and off of the vessels. This resulted in a cost of US\$5.86 per ton in 1956 (Ebeling, 2009). With the efficiencies of containerization, the cost was significantly reduced to US\$0.16 cents a ton (Ebeling, 2009). Likewise, the amount of time the vessels stayed in port was reduced, which allowed the shipping lines to better utilize their high cost assets. These increases in port and ship productivity facilitated the globalization of trade as the total cost of imported goods was cheaper than U.S. manufacturing, and firms outsourced to Asia. Simultaneously, U.S. exports were increasing in overseas markets.

The changing regulatory framework of the early 1980s allowed for cooperation between different transportation groups, enabling them to develop intermodal capabilities. One law was the Staggers Act of 1980 which removed many of the regulatory restraints on the railroad industry (Palley, 2011). The Staggers Act reduced the number of crewpersons needed for each train, which lowered the amount of labor needed for each train. Secondly, the Staggers Act removed several pricing and scheduling limitations, which increased the railroad's ability to be flexible to meet changing market needs. These changes were designed to make the railroads more competitive for transporting long distance domestic freight, a key component that had been lost to trucking companies during the 1970s. Moreover, the Shipping Act of 1984 relaxed many restrictions faced by the carrier operators and allowed an ocean carrier to provide inland distribution on a single through Bill of Lading.

The passing of the Staggers Act, gave railroads flexibility and efficiencies within their operations. This led to numerous mergers to occur over the next 16 years resulting in the few Class 1s that exist today. At the same time, the intermodal business was growing significantly. In 1980, intermodal volumes (containers and trailers) were 3.1 million units. By the end of 2013, intermodal volumes totaled 12.8 million units, a 413% increase in a relatively short period of time – 33 years (Association of American Railroads, 2014). It is important to note that in the early years, there was significant use of piggyback trailers on flat cars (TOFC). With containerization, the ease of vessel unloading and loading led to a shift in the volume of containerized traffic. Additionally, the economics of double stack (described later in the paper) resulted in increasing the amount of containers on flatcars (COFC) versus trailers (TOFC) on the railroads. Combined with the huge growth in the intermodal segment compared to other market segments, containerization has led to the large amount of investment the railroads have spent on building or enlarging intermodal facilities. It is no surprise therefore, that the intermodal volume in 2013 was the highest on record and is poised for future growth (Association of American Railroads, 2014).

### 4. Governance of intermodalism

To set the stage on the growth of the intermodal business and operational constraints on effective governance, we must first define governance. Governance, in the early days of intermodal and in this context, is defined as simple oversight of a facility. It is important to realize that the railroads before 2000 relied on their own corporate decision-making to decide which intermodal terminals needed to be enlarged, closed, opened or use some of the technological advancements at the time to increase the volumes efficiently and effectively through their respective intermodal terminals.

During the 1980s and 1990s, railroads were aligning themselves strategically with respect to potential partnerships and mergers. Additional advancements in technology led to some additional savings for the railroads. By merging train and intermodal operations, which are typically kept separate by each specific railroad, railroads gained some additional efficiencies and savings. While some mergers had a short-term negative effect on service; the combination of deregulation, containerization and technological enhancements has led to significant improvement of the railroad industry's health with increased service, overall lower rates and improvements in rail safety. With the increased involvement of public participation for economic development needs, the term has shifted from simple oversight to include implications for regulatory, safety, and other operational considerations (Steele & Hodge, 2011).

As such, the role of governance of intermodal facilities may be categorized into three areas: pre-construction, construction, and ongoing operational and business support. While the majority of the paper focuses on the relationship between the public and the private sectors concerning pre-construction and construction, the ongoing success of a project often lies in the ability to understand the role of a project in the larger regional economic profile, and support continued growth through workforce and

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