

THE HEARTLAND INTERMODAL CORRIDOR: PUBLIC PRIVATE PARTNERSHIPS AND THE TRANSFORMATION OF INSTITUTIONAL SETTINGS

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Abstract

This paper examines the development process of the Heartland Intermodal Corridor from Norfolk, Virginia to Columbus, Ohio in the United States, opened in September 2010. The aim of the project was to decrease transport costs and increase competitiveness for peripheral regions such as West Virginia by upgrading existing branch lines to double-stack capacity and building new intermodal terminals.

The paper develops a theoretical framework for institutional analysis, combining the overall institutional setting with the roles of individual actors confronting a collective action problem. Results suggest that the project represents an observable trend in freight funding policy in the United States, moving away from congressional earmarks which have been criticised in the past for their subjective nature, and towards a more transparent, bid-based system. Findings from the research demonstrate that the institutional setting has been transformed, moving towards a reconciliation between top-down planning approaches and market-driven private sector development. Furthermore, encouragement of multi-state public-private consortia will potentially make it easier to develop national corridors that can support new markets, while generating both public and private benefits.

Keywords: institutional thickness, governance, intermodal, hinterland, corridor, peripheral

1. Introduction

A key challenge of transport geography is to understand shifting notions of infrastructure provision brought about by changing roles of the public and private sectors (Hall et al., 2006), while acknowledging the difficulty of predicting the effect of government investment (see Rodrigue, 2006). Therefore understanding how these processes work is central to analyses of freight infrastructure development.

Regions can become peripheral due to a lack of transport infrastructure development, for instance being bypassed by major intermodal corridors due to the lack of suitable access points or connecting routes. Trade in the region is penalised, leading to a migration of production to better-served locations, and the cyclical process that ensues embeds peripherality and leads to path dependence of major transport operations on the main lines.

The Heartland Corridor, linking the Hampton Roads area to Columbus Ohio, and eventually to Chicago, is the first multi-state private-public rail corridor in the United States. The aim of this project was for peripheral regions such as West Virginia to decrease transport costs and increase competitiveness by upgrading existing branch lines to double-stack capacity and building new intermodal terminals.

Intermodal traffic in this area has been constrained by using older tunnels that could not handle the larger size of modern intermodal container configurations, which affects the competitiveness of regional shippers. Additionally, in relation to the coming expansion of the Panama Canal, east coast ports desire improved hinterland access in order to compete effectively with west coast ports. Due to historical development and legacy investments, Chicago serves as the largest interchange area for railroads in the United States. However the agglomeration benefits of such a situation are becoming outweighed by the increasing costs of congestion, additional handling and longer transfer times.

Onsite interviews were conducted with stakeholders along the corridor route. Interviewees included representatives from the Virginia Port Authority, Norfolk Southern Railroad, federal and state transportation planners, the Association of American Railroads, the Appalachian Regional Commission, the Rahall Transportation Institute, a state senator and local shippers in Ohio. An innovative aspect of this methodology was that state DOT representatives were present on the study tour, therefore the authors had the opportunity to interview them as well as observe their interaction with the other interviewees. This provided additional insights into the planning process. The interviews were semi-structured and included questions on the planning and development process, the role of government at all levels and the nature of public and private funding of intermodal infrastructure. As the

interviews were semi-structured rather than using a structured survey methodology, the results were not analysed statistically but via a theoretical framework based on six factors identified in the literature. Interview results were triangulated with desktop research in order to assess processes of institutional reform leading to and arising from the use of public private partnerships to develop intermodal infrastructure in the United States.

This paper uses a framework derived from institutional thickness (Amin and Thrift, 1995) and the hinterland access regime (de Langen and Chouly, 2004) in order to explore the institutional factors at play in the collective action problem faced when attempting to challenge path dependence. While institutional thickness is a measure of the institutional setting, hinterland access regimes refer to specific projects. The aim of the theoretical framework developed in this paper is to draw both approaches together.

2. Approaches to institutions in the literature

Institutionalism first emerged from neoclassical economics through an increasing focus on the social, cultural and historical context of economic events rather than what was viewed as an overly theoretical and non-contextual framework of universal laws. Jaccoby (1990) summarised the departure in four themes: moving from determinacy to indeterminacy, from endogenous to exogenous determination of preferences, from simplifying assumptions to behavioural realism, and from synchronic to diachronic analysis.

This early or “old” institutionalist economics was however not theoretical enough to prevail against neoclassical approaches (Coase, 1983). Interestingly, Scott (2008) suggested that “new institutionalism” in the social sciences is the direct descendent of “old” institutionalist economics, whereas new institutionalist economics (NIE) is closer to the original (and still prevailing) neoclassical economics. This is because NIE tends to operate within the neoclassical view, in which the firm behaves rationally by acting in certain ways to reduce transaction costs (Jessop, 2001). Yet NIE has departed from some neoclassical assumptions, such as perfect information and costless transactions (Rafiqui, 2009).

While the term New Institutional Economics was first used by Williamson (1975), it developed out of Coase’s (1937) work on transaction costs, which are the costs incurred when dealing with a separate firm through the price mechanism. For example if two firms integrate vertically then the previously external costs of doing business will be internalised. Neo-institutionalist economists use the theory of the firm to examine different methods of lowering transaction costs such as mergers, alliances, contracts, etc.

NIE has been used in maritime transport studies, where authors have explored different methods of coordinating hinterland transport chains (e.g. de Langen & Chouly, 2004; Van der Horst & de Langen, 2008; Van der Horst & Van der Lugt, 2009). In contrast, institutional geography examines how these structures vary across space, place and scale (e.g. Hall, 2003; Jacobs, 2007; Ng and Pallis, 2010).

For North (1990), institutions represent the rules of the game, while organisations are the players. This issue is particularly complicated when attempting to define the state vis-à-vis organisations and institutions. Jessop (1990) defined the state as a “specific institutional ensemble with multiple boundaries, no institutional fixity and no pre-given formal or substantive unity” (p267). Government influence or capacity to innovate is rooted not only in formal but informal institutions, “located in the practices through which governance relations are played out and not only in the formal rules and allocation of competences for collective action as defined by government laws and procedures.” (González and Healey, 2005; p2059).

In a similar vein, Aoki (2007) identified exogenous and endogenous institutions. The former represent the rules of the game (following North, 1990), while the latter represent the equilibrium outcome of the game. Combining these two elements, Aoki provided the following definition: “An institution is self-sustaining, salient patterns of social interactions, as represented by meaningful rules that every agent knows and are incorporated as agents’ shared beliefs about how the game is played and to be played.” (p6)

A number of key issues have been raised from the study of institutions. A conflict is often observed between legitimacy and efficiency (see Meyer and Rowan, 1977). Innovation may be stifled by inappropriate formal structures, and monitoring may become primarily ceremonial and related to the formal structure rather than to the real activities of the organisation. Problems can arise when transferring a governance structure from elsewhere (Ng and Pallis, 2010), thus Meyer & Rowan (1977) noted that “institutionalized rationality becomes a myth with explosive organizing potential” (p346).

The constant changing and re-making of institutions is also a notable problem. Jessop (2001) remarked on “the contingently necessary incompleteness, provisional nature and instability of attempts to govern or guide them.” (p1230) This point can be developed with particular focus on multi-scaled governance, leading to complications through confused sovereignty, multiple authorities and funding sources. (Meyer and Scott, 1983; Scott and Meyer, 1983).

Moe (1990) noted that political organisations must make trade-offs that economic organisations do not:

[Political organizations] are threatened by political uncertainty. They want their organizations to be effective, and they also want to control them; but they do not have the luxury of designing them for effectiveness and control. Economic decision-makers do have this luxury – because their property rights are guaranteed. They get to keep what they create. (Moe, 1990; p228)

Moreover, the eventual structures of political organisations depend on the interaction between the voters (or other political interest groups), the politicians (both current and opposition) and the civil service. An attractive strategy then becomes “not to try to control how it gets exercised over time, but instead to limit it ex ante through detailed formal requirements. . . . In politics, it is rational for social actors to fear one another, to fear the state, and to use structure to protect themselves – even though it may hobble the agencies that are supposed to be serving them.” (Moe, 1990; p235). One key application of this insight is in the way governments channel money towards infrastructure investment to the benefit of private firms. Public bodies often establish complex funding and grant structures so that any decisions are based on rules set out from the start rather than being the decision of individual politicians or administrators. However the result can be a “hobbled” ability to wield effective influence.

Path dependency is a key issue, arising from high setup costs, learning effects, coordination effects and adaptive expectations and can lead to indeterminacy, inefficiencies, lock-in and the primacy of early events (Martin, 2000). Martin (2000) wrote that institutions “tend to evolve incrementally in a self-reproducing and continuity-preserving way” (p80) and also noted the importance of different development paths of institutions at different regional and local contexts: “if institutional path dependence matters, it matters in different ways in different places: institutional-economic path dependence is itself place-dependent.” (p80).

States at all levels are under increasing pressure to provide an attractive entrepreneurial culture to draw increasingly mobile global capital flows, but scales are becoming important because “the capital-labour nexus was nationally regulated but the circulation of capital spiralled out to encompass ever-larger spatial scales” (Swyngedouw, 2000; p69). In light of the decreasing role of the national state, local and regional authorities attempt to secure these flows through strategies of clustering and agglomeration.

3. Developing the theoretical framework

The concept of “institutional thickness” was defined by Amin and Thrift (1994, 1995) as a measure of the quality of an institutional setting. It has four elements: strong institutional presence; high level of interaction amongst these institutions; well-defined structures of domination, coalition building and networking; emergence of a common sense of purpose and shared agenda. Institutional thickness has not been used extensively, but where it has been applied the focus has been almost exclusively on economic development (see Raco, 1998 and 1999; Henry and Pinch, 2001), with the exception of Pemberton (2000) (more below). Henry and Pinch (2001) noted a coalescence between the rise of institutionalism in economic geography and the rise of the “new regionalism” as a focus on regional economic development.

MacLeod (1997, 2001) highlighted resonances with other concepts such as Lipietz’s (1994) “regional armature”, Cooke and Morgan’s (1998) “institutions of innovation” and Storper’s (1997) “institutions of the learning economy”. He wrote that: “These processes help to illustrate that, as Amin outlines, attempts to achieve collaboration between entrepreneurs and institutions through policy dictate and ‘overnight institution building’ can be deeply problematic.” (MacLeod, 1997; p308.) MacLeod (1997) showed that lowland Scotland demonstrated institutional thickness, but it did not help the region retain transnational capital, nor develop new Scottish-controlled industry, leading him to conclude that one must be careful when de-emphasizing the role of the nation-state vis-à-vis the region.

MacLeod (2001) insisted on a multiscalar perspective on the state, “so as to reveal which particular regulatory practices and elements of an ‘institutional thickness’ are scaled at which particular level.” (p1159). Furthermore, such scaling represents an ongoing process, therefore it cannot be accepted uncritically as an input into an institutional analysis: “far from being existentially given, geographical demarcations such as cities and regions are politically constructed stakes in a perpetual sociospatial struggle over capitalist relations and regulatory capacities.” (p1159).

Pemberton (2000) applied Amin and Thrift’s institutional thickness concept to a study of transport governance in Tyne and Wear in the northeast of England. Concurring with MacLeod’s note of the absence of the role of the nation state in Amin and Thrift’s concept, Pemberton included Jessop’s use of neo-Gramscian state theory. Coulson and Ferrario (2007) discussed the advantages and disadvantages of the institutional thickness theory and its lack of penetration over the last decade. They identified potential issues with cause and effect, a risk of conflating organisations with institutions and the difficulty of creating or replicating an institutional structure through policy actions.

The concept of Hinterland Access Regimes was introduced by De Langen and Chouly (2004), in which hinterland access was framed as a governance issue because individual firms face a collective action problem: “Even though collective action is in the interest of all the firms in the port cluster, it does not arise spontaneously.” (p362) The hinterland access regime is defined as “the set of collaborative initiatives, taken by the relevant actors in the port cluster with the aim to improve the quality of the hinterland access.” (p363) The concept is then broken down into six modes of cooperation: “markets, corporate hierarchies (firms), interfirm alliances (joint ventures), associations, public-private partnerships and public organisations.” (p363) The paper refers to issues such as path dependence and how it can be overcome. Five factors are identified that influence the quality of the HAR: the presence of an infrastructure for collective action, the role of public organisations, the voice of firms, a sense of community and the involvement of leader firms. This framework was used by de Langen to analyse collective action problems in port clusters (de Langen, 2004; de Langen & Visser, 2005).

While the study of collective action problems fits firmly within new institutional economics, these five indicators provide a means to explore the effects of space and scale and thus tie into geographical approaches. Indeed, these five indicators have much in common with the four indicators of institutional thickness mentioned earlier. While institutional thickness is a measure of the institutional setting, hinterland access regimes refer to specific projects. The aim of the theoretical framework developed in this paper is to draw both approaches together.

Van der Horst & de Langen (2008) highlighted five reasons why coordination problems exist: unequal distribution of costs and benefits (free rider problem), lack of resources or willingness to invest, strategic considerations, lack of a dominant firm, risk-averse behaviour/short-term focus. In another interesting use of institutionalism in transport studies, Groenewegen and de Jong (2008) attempted to apply the new institutional economics models of Williamson and Aoki to an analysis of institutional change in road authorities in the Nordic countries. They concluded that those models were unable to capture the complexity of political power play and social and cognitive learning amongst actors, and developed a ten-step model through which actors become “institutional entrepreneurs”. These actors benchmark their own “institutional equilibrium” against a new “pool of ideas”, then spread this new belief system through “windows of opportunity”, using their own “power instruments or resources”, also dealing with “reactive moves made by the formerly dominant actors” (pp68-9). While ostensibly working in the field of institutional economics, their

approach fits well into earlier discussions of agency and legitimacy found in sociological institutionalism. Aoki (2007) also contributed interesting ideas in relation to how a political champion can alter the game.

Therefore the framework adopted in this paper results from a combination of institutional thickness and hinterland access regimes, modified to include insights from MacLeod and others on the role of the state, Groenewegen and de Jong on actor behaviour game theory and Van der Horst and de Langen on defining the collection action problem. Table 1 outlines the theoretical framework, based on six key factors.

Table 1. Six key factors to determine the quality of the institutional setting and how it interacts with actual projects

No.	Factor	Supplementary information
1	The reasons for the collective action problem	Unequal distribution of costs and benefits, lack of resources or willingness to invest, strategic considerations, lack of a dominant firm, risk-averse behaviour/short-term focus. (Van der Horst & de Langen, 2008)
2	The institutional setting 1: the roles, scales and institutional presence of public organisations	Including rescaling the state (MacLeod, Pemberton, etc.) and identifying at which level institutional presences are scaled. Scale issues can lead to complications through confused sovereignty, multiple authorities and funding sources. (Meyer and Scott, 1983; Scott and Meyer, 1983). A related point is the constant changing and re-making of institutions (Jessop, 2001). In addition, limited government organisations due to political designs can mean that delivery of government policies may be “hobbled” (Moe, 1990). Conflict may exist between legitimacy and efficiency (see Meyer and Rowan, 1977).
3	The institutional setting 2: the presence (or otherwise) of a well-defined infrastructure for collective action	The institutional environment is instantiated in the presence or otherwise of an infrastructure for collective action, represented both as the rules of the game and the current equilibrium outcome, i.e. a shared understanding of how the system works (Aoki, 2007). Innovation may be stifled by inappropriate formal structures, and monitoring may become primarily ceremonial and related to the formal structure rather than to the real activities of the organisations. This point overlaps with the previous factor as the efficacy of formal structures relates both to the institutional presence of public organisations and to the infrastructure for collective action.
4	The kinds of interaction amongst (public and private) organisations and institutional presences	A well-defined infrastructure (see previous category) makes interaction easier, but informal collaboration and influence can be difficult to map. Danger of response bias in interviews.
5	A common sense of purpose and shared agenda	Stakeholders must establish agreement upon the priority and message necessary to complete the task. Without such a vision, achieving expected outcomes remains difficult.
6	The role of leader firms	Institutional entrepreneurs benchmarking their own institutional equilibrium against new ideas, using their own resources which leads to reactive moves by other firms (Groenewegen and de Jong, 2008).

It is recognised that as this framework is drawn from the literature, it aims to cover all situations and is therefore quite broad. Some issues may not be relevant to the current case, but will be useful in others. Thus one aim of this paper is to use the Heartland Corridor as a test case for the applicability of this framework.

The following sections will give an overview of port and rail movements in the United States before presenting the case study on the development of the corridor.

4. Overview of ports and rail in the United States

Table 2 shows the major US ports by container throughput. The dominance of the Los Angeles/Long Beach port complex can clearly be seen.

Table 2. Top ten US ports by container throughput in 2009

USA Ranking	World Ranking	Port Name	Trade Region	TEU
1	15	Los Angeles	West Coast	7,261,539
2	18	Long Beach	West Coast	5,067,597
3	20	New York/New Jersey	East Coast	4,561,831
4	41	Savannah	East Coast	2,356,512
5	51	Oakland	West Coast	2,051,442
6	58	Houston	Gulf Coast	1,797,198
7	59	Virginia	East Coast	1,745,228
8	63	Seattle	West Coast	1,584,596
9	65	Tacoma	West Coast	1,545,855
10	74	Charleston	East Coast	1,277,760

Source: Containerisation International

The seven class I freight railroads operating in the United States are, in descending order of revenue, the two western railroads Burlington Northern Santa Fe (BNSF) and Union Pacific (UP), the two eastern railroads Norfolk Southern (NS) and CSX, the two Canadians Canadian National (CN) and Canadian Pacific (CP), and Kansas City Southern. Due to historical development reasons, they all meet at Chicago; these intermodal terminals are some of the largest sites in the world, each handling many hundred thousand lifts per year. Approximately 14m TEU (about half of all US rail freight) transited the metropolitan area in 2004 (Rodrigue, 2008). Memphis and to a lesser degree Kansas City are also significant rail hubs in the US, and eastern railroads Norfolk Southern and CSX are both aiming their strategy towards making their new terminals in Ohio into major hubs for the north east of the country.

The majority of traffic from the Far East still comes through west coast ports because it is the preferred route for shipping lines, however three new opportunities are arising that have the potential to influence port competition in the United States.

The first is the expansion of the Panama Canal, due to accommodate 13,000 TEU vessels by 2014. This will allow large vessels coming from the Far East to bring cargo for the eastern United States through the canal and directly into east coast or gulf ports (draft permitting). The port of Virginia at Hampton Roads is expecting to be the major beneficiary of this development. New York/New Jersey also has the requisite draft but is currently limited by air draft restrictions (although plans are being developed to raise the offending bridge). Other ports in the Gulf and the Atlantic Seaboard are struggling to get the necessary depth to receive these larger vessels. However the additional time taken to traverse the canal and reach the east coast may be unattractive to shipping lines. For example, to reach Chicago via Los Angeles/ Long Beach takes 14 days at sea plus 5 days on rail, whereas it takes approximately 25 days to reach Norfolk by sea from Shanghai, with an additional 2 days to Chicago.

Moreover, the role of the Los Angeles district as the largest manufacturing area in the country means that many forwarders may not want to forego the economies that can be gained by transporting all their US cargo to this location then separating freight for inland destinations at this point for onward transportation by rail.

Secondly, the advent of the port of Prince Rupert in Canada provides a one-day shorter west coast option to shipping lines seeking to access North American markets. The port currently has a capacity of 500,000 TEU (but with room for expansion up to 2m TEU), and with sufficient depth to accommodate container ships up to 12,000 TEU (Fan et al., 2009). In 2009 the port handled 265,258 TEU (Containerisation International). This challenge is likely to be more significant to west coast ports than the Panama Canal expansion, especially in the context of the rail access provided by CN from Prince Rupert all the way to the Memphis rail hub, with the option to bypass Chicago when desired due to the purchase of additional lines.

A third and (less important) development is the gradual westward movement of some manufacturing in the far east (to India, Thailand, etc.), leading to a potential scenario whereby the Suez Canal route to eastern American markets becomes time-competitive with the Pacific route to the west coast, and would require a shorter rail journey once the cargo is landed, not to mention removing the requirement to change from western to eastern railroads at Chicago.

All three developments will challenge the dominance of the San Pedro Bay ports, although it is unlikely that any of these changes have the potential to capture more than a small percentage of their cargo. However, as will be discussed below, hinterland access strategies of these ports will have a determinative impact on port competition.

5. The Heartland corridor

The Appalachian region covers an area twice the size of Great Britain but with only about one-third the population (figure 1). The Appalachian Regional Commission (ARC) was created in 1965 to coordinate economic development opportunities in the region.

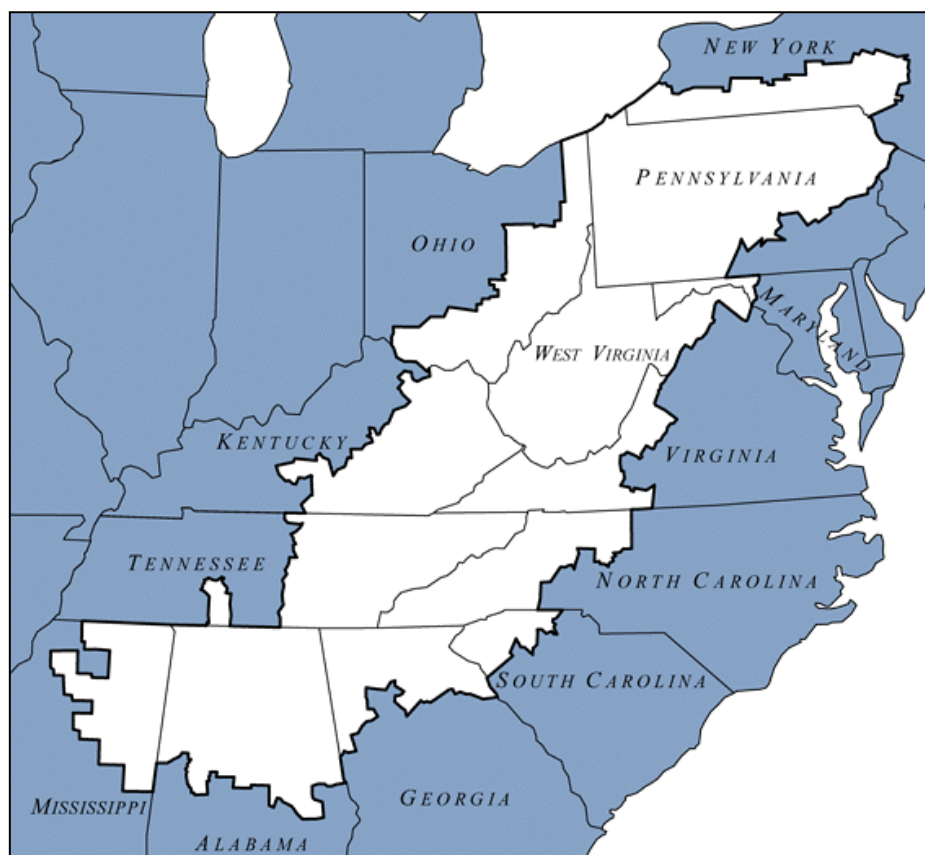


Figure 1. Map of the Appalachian region

Source: ARC

In 1999 the ARC commissioned the Nick J. Rahall Appalachian Transportation Institute (RTI) at Marshall University to undertake studies of commodity flows (phase I) and transport costs (phase II) which found that there were impediments to shippers in the region due to poor access to major rail and port traffic routes. The low traffic volumes and difficulties in sourcing backhauls, in addition to the rugged terrain requiring numerous tunnels (therefore

precluding double stack operation) were all major issues that resulted in increased trade costs to local shippers (RTI, 2000). A detailed study of new track and terminal infrastructure was recommended, including costs and benefits for all parties and increased cooperation between the region, state and national governments as well as the railroad companies.

After initial meetings in 2000-2001 between the steering group comprising West Virginia DOT, Norfolk Southern railroad, the Ohio Rail Development Authority, Virginia Department of Rail and Public Transportation, ARC and RTI (ARC, 2010), this second study was commissioned. The research was funded by the states of West Virginia and Ohio, RTI, Norfolk Southern and the Federal Highways Administration (FHA), and was tasked with selecting the best route, estimating the costs of double stack clearance and measuring the project benefits for all stakeholders. Both eastern railroads, Norfolk Southern and CSX, were invited to take part in the study, but after initial meetings CSX declined therefore only Norfolk Southern routes were considered. The selected route (see figure 2) was used primarily by coal trains delivering coal to the port of Norfolk, where the largest export coal terminal in North America is located; its inability to accept double stacked container trains limited the competitiveness of regional shippers, who had to drive longer distances to access intermodal terminals. The study found that a penalty of \$450-650 applied to each container movement.

In order for containers to reach the lower Appalachian area, the main choices were through west coast ports then by rail via the Chicago hub (where the container will change from western to eastern railroads), or via east coast ports. If coming through an east coast port such as Norfolk, the rail options were single stack direct or double-stack on a route that added over 200 miles and around 24 hours to the journey, hence increased cost. Therefore trade to this region was penalised. At the time West Virginia ranked 40th out of 50 states in the percentage of Gross State Product derived from exports (RTI, 2003).

The challenging topography in this mountainous area increased the costs of engineering work, which were initially estimated at up to \$111m. However the BCR was estimated at between 2.0 and 5.1. This finding was supported by the American Association of State Highway Transportation Officials (AASHTO), which identified the corridor as one of three multi-state rail projects with the potential to deliver considerable public benefits (AASHTO, 2003). The study concluded that, despite substantial benefits for the private sector, the corridor upgrade was unlikely to proceed without public support. The next step was to raise interest in and support for the project: “In state capitals, town halls and business offices, and on Capitol Hill, scores of familiar questions were answered thousands of times, while both

methods and conclusions were constantly scrutinized. As a product of this process, untold numbers of stakeholders helped shape and promote what eventually became a coherent legislative initiative.” (ARC, 2010; p9)

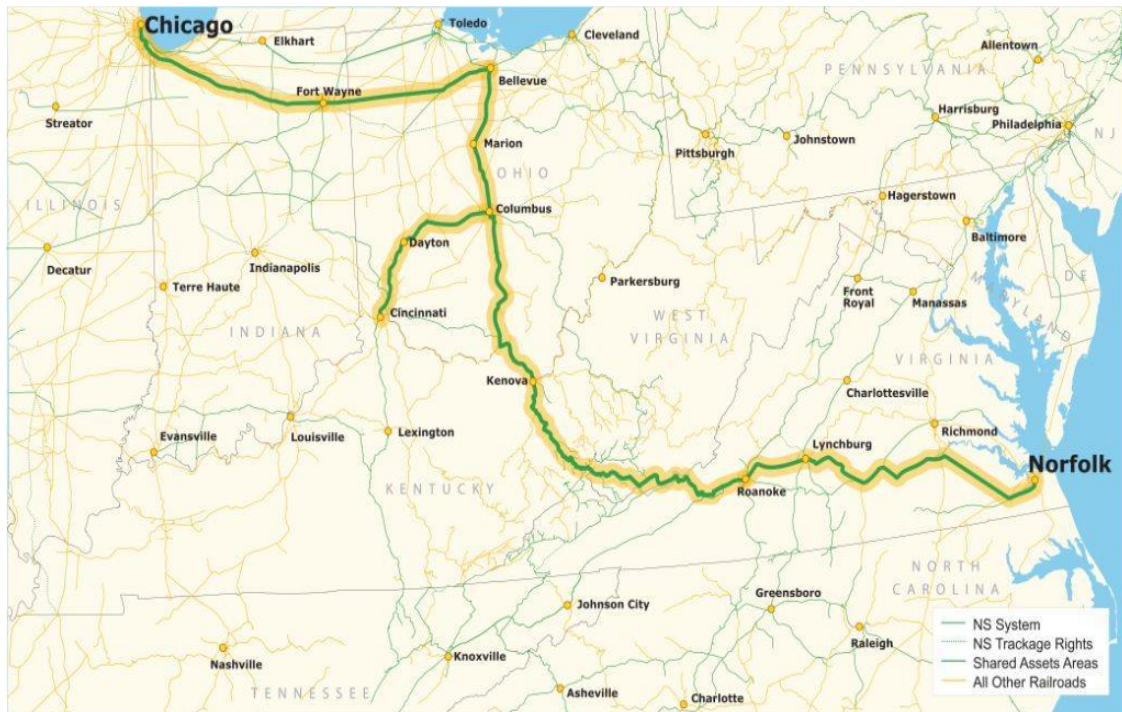


Figure 2. Map showing the Heartland Corridor route.

Source: Norfolk Southern

Local interviewees noted that these discussions helped the representatives at the federal level realise the importance of developing corridors of national significance. It took a great deal of meetings in Washington DC to promote this agenda and interviewees agreed that it was the trade argument that interested federal legislators the most. While investing government money in the project would benefit a private company, it was found that significant economic development benefits would accrue to the improved trade access for the region, and it was therefore on that basis that a public private partnership was pursued.

When the 2005 SAFETEA-LU legislation was passed, the Heartland Corridor was designated as a Project of National and Regional Significance, authorising \$95m in federal funds for the project (reduced to \$84.4m by estimated obligation limitations, rescissions, etc.). Of the total cost of \$195.2m, \$84.4m was federally funded, \$101.0 million was contributed by Norfolk Southern, \$0.8m from the Ohio Rail Development Commission

(ORDC) and \$9.0m came from the Virginia Department of Rail and Public Transportation (VDRPT).

Two Memoranda of Agreement, one between the Federal Highway Administration (FHWA), the Eastern Federal Lands Highway Division (EFLHD) and Norfolk Southern, and the other between FHWA, EFLHD and the three states were completed in August 2006. The agreements identified roles and responsibilities for the environmental planning, design and construction of the Heartland Intermodal Corridor Project. Furthermore, the first MoA established an unprecedented funding mechanism that allowed money to flow directly from the federal government to the railroad.

A key aspect of the second MoA was that since the majority of the tunnels were in West Virginia, the other states had to agree that the majority of the money would be spent there, as they would all benefit. Along the route, 28 tunnels and 26 other overhead obstructions needed to be raised to allow the passage of double-stacked container trains. Construction began in October 2007 and the first double stack train ran on 9th September 2010. The project removed over 200 miles and nearly 24 hours from the route between Norfolk and the Midwest (ARC, 2010). Furthermore, as the aim of the connection is mainly maritime access, the trains will be made up primarily of wagons that take 20ft, 40ft and 45ft boxes rather than 53ft domestic boxes (Boyd, 2010), which is also attractive because the US network is currently experiencing a shortage of 53ft well cars for double-stack operation.

A central aspect of the success of the upgraded corridor was a large intermodal terminal within a large logistics park, built to serve as an alternative hub to Chicago in the northeast of the United States. The Rickenbacker Inland Port outside Columbus, OH (opened 2008) was developed through a \$68.5m partnership between Norfolk Southern and the Columbus Regional Airport Authority (with \$30.4m coming from a SAFETEA-LU earmark). While much government attention is focused on the infrastructure for the trunk haul, every single container needs to come from a warehouse. Each warehouse may only be contributing a handful of containers a day/week to the terminal, therefore a large amount of warehousing space is required to feed the terminal and make the rail operations economically viable. A large purpose-built site like Rickenbacker with a good amount of greenfield space for future development can help to attract companies like 3PLs and large shippers to locate in one area, thus reducing the road haul and increasing the attraction for intermodal transport. One interviewee noted that they built a new warehouse at the Rickenbacker site early on in the process because they felt that the new rail connection with east coast ports would be “one of the most important developments for trade in Columbus since the interstate.” Smaller

terminals on the route are being planned at Prichard, WV and Roanoke, VA but funding is still being sourced before work can begin at these sites.

6. New developments in government policy and funding

Until recent years, US federal freight policy was still concerned primarily with national highways as other modes were privately owned and operated concerns. In some cases, modal agencies may be primarily responsible for safety rather than infrastructure investment, while in other cases the role of regulatory oversight may reside in different agencies, depending upon the area of concern. In addition, a national ports policy is not possible because the US Constitution places limits on the role of the federal government in relation to ports (Talley, 2009).

Normally the federal DOT allocates money to the state DOTs and they decide how to spend it, but this system creates little incentive for states to spend money on projects that are perceived to be of primary benefit to other states. Therefore there appears to have been a realisation at national level that attention should be paid to cross-border projects. This led to the projects of national and regional significance, earmarked by Congress in the 2005 SAFETEA-LU legislation. This represented a new development in US transportation policy, especially for railroads to be eligible rather than just road projects. The Heartland Corridor was one of the projects thus designated.

The Safe, Accountable, Flexible and Efficient Transportation Act: A Legacy for Users (SAFETEA-LU) (2005) introduced approximately \$1.8bn in congressional earmarks, designated projects of national and regional significance. These were large infrastructure project funds decided by Congress and generally driven by politicians on behalf of their constituents, and indeed drawing criticism on this point (Proost et al., 2011). Benefits could include improving economic productivity, facilitating international trade, relieving congestion, and improving safety.

When the American Recovery and Reinvestment Act (the stimulus package in response to the recession) was introduced in 2009, it provided \$1.5bn for transport projects through the Transportation Investment Generating Economic Recovery (TIGER) programme. This money was available for all transportation projects (not just freight) and was awarded on a competitive basis, with applications due in September 2009 and announcements made in February 2010. Private money in TIGER applications was matched by public money.

The five major goals for TIGER grants were economic competitiveness, safety, state of good repair, liveability and environmental sustainability. This was the first time money was

awarded in this fashion, and a second round of \$600m was awarded in September 2010. The popularity of the funding programme meant that the DOT was swamped with applications for each round of funding, receiving almost 1,500 applications totalling nearly \$60bn for the first round, and almost 1,000 applications totalling \$19bn for the second round. The recent experiences of the TIGER Program demonstrated the need for such programs, but also the lack of guidance available to engage in such broad comparisons.

The result of this round of funding has been a significant revival of interest in rail projects. As public bodies (e.g. states, ports, local authorities) were the only eligible applicants, Class I railroads were required to form partnerships with the states in order to process an application. The list of recipients indicates that taking an integrated approach to transport problems by focusing on corridors was considered an attractive proposition for federal legislators.

7. Recent development of intermodal corridors in the USA¹

The famous Alameda Corridor was the first such major PPP intermodal corridor in the United States, opening in 2002 with a total cost of \$2.43bn, split between \$1,160m revenue bonds, \$400m federal loan (the first of its kind), \$394m from the ports, \$347m MTA grants and \$130m from other sources. (ACTA, 2010) The ports are directly involved in the project, as they are the financial guarantors of the corridor and will lose money if the route is not used and incurs losses (Jacobs, 2007; Callahan et al., 2010).

However the Heartland Corridor was the first multi-state PPP intermodal project, and it can be viewed as a major influence on subsequent developments of large multi-state intermodal corridor projects. CSX's National Gateway is a PPP that also joins Norfolk with Ohio (via a different route), involving 61 double stack clearances, the construction or expansion of 6 intermodal terminals and will cost \$842m (CSX, 2010), including \$98m in funding from the first TIGER programme. Norfolk Southern has proposed a number of projects along what they call the Crescent Corridor, a 1,400 mile stretch running between New Orleans and New York. They are aiming to develop a PPP to cover the estimated cost of \$2.5bn. The project involves 13 states, 11 new or expanded terminals and 300 miles of new track. In February 2010 the project was awarded \$105m in TIGER I grants through an application from Pennsylvania DOT and in August 2010 six states submitted applications under the TIGER II programme totalling \$109.2m, although none were successful.

¹ See Monios and Lambert (in press) for a more detailed comparison of US intermodal corridor development projects.

One key result from these corridor developments will be to transform Ohio into an intermodal hub for the US, with both eastern railroads having major intermodal terminals there. This will allow traffic to bypass Chicago, thus redrawing the map of intermodal transport in the country.

8. Applying the theoretical framework

Table 3 draws together the key evidence for the six indicators relating to the institutional aspects of this project.

Table 3. Applying the theoretical framework.

No.	Factor	Supplementary information
1	The reasons for the collective action problem	<ul style="list-style-type: none"> • Unequal distribution of costs and benefits • Lack of willingness to invest • Lack of a dominant firm (served by two Class I railroads) • Lack of understanding of the role of regional access to global markets
2	The institutional setting 1: the roles, scales and institutional presence of public organisations	<ul style="list-style-type: none"> • Roles were well-defined at local, state and federal level. • Institutional thickness was strongest at state level (see MacLeod) but needed regional impetus to draw states together. • While political design of transport agencies means that they don't have a great deal of power for direct intervention, their roles are clear therefore new stakeholder groups are able to facilitate their own actions. Moreover, the limited state role allows freedom of action for other groups to access funding directly without involvement in planning bureaucracy. See Moe (1990)
3	The institutional setting 2: the presence (or otherwise) of a well-defined infrastructure for collective action	<ul style="list-style-type: none"> • Initially there was not a well-defined infrastructure therefore a political champion was particularly important at the early stages to connect the stakeholders with funding opportunities. • Initiated by the regional development agency that was able to build informal networks. • This multi-state concept was then replicated in other projects seeking federal funds, thus a well-defined infrastructure for collective action can now be observed.
4	The kinds of interaction amongst (public and private) organisations and institutional presences	<ul style="list-style-type: none"> • Market studies conducted to identify options • Regular steering group meetings. • Early involvement of private sector railroad operator • Regular promotion to convince relevant people of the benefits. High level of interaction noted by interviewees as being of central importance.
5	A common sense of purpose and shared agenda	<ul style="list-style-type: none"> • Regular steering group meetings. • Regular promotion of the project in different contexts. • Agreement on a multi-state corridor approach. • Recognition by all stakeholders of shared benefit was essential in allocating the funds to specific locations. • Developed common presentation and outreach materials
6	The role of	<ul style="list-style-type: none"> • Norfolk Southern involved from early in the project, contributed funding,

	leader firms	flexible with requirements. <ul style="list-style-type: none"> • Other firms followed afterwards in similar multi-state corridor projects, most notably CSX’s National Gateway (CSX had declined to take part in the Heartland Corridor). • States now looking at other related investment along the corridor for intermodal terminal access
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Table 3 shows that the collective action problem resulted from a lack of motivation on behalf of the railroads to challenge the current situation, requiring the promotion by ARC and others of a greater understanding of the role of regional access to global markets.

In this case, state rescaling issues were not particularly active as roles and responsibilities were well defined at all levels. MacLeod noted that it is necessary to identify at which scale institutional thickness is strongest; in this case it is clearly the state level as evidenced by the state DOTs. However, a regional impetus was needed to draw states together, which began with a relatively weak regional organisation (ARC) drawing together stronger individual organisations such as state DOTs and the privately-owned railroad Norfolk Southern. While a trend towards devolution has been noted in many areas of the world (Rodríguez-Pose & Gill, 2003), states in the USA have long been the primary level of institutional presence with regard to transportation (Haynes et al., 2005). Findings in this research on the importance of regional cohesion in devolved governance systems can thus be of relevance to other contexts.

From an institutional point of view, the notable feature of the existing system was the clear roles for existing organisations within their institutional setting, however the reason behind this clarity was that public organisations occupied a small role with little influence over the railroad sector. Railroad development is for the most part planned and funded by the private sector, which in this case had little impetus for potentially risky investment. Therefore as a well-defined infrastructure for collective action did not exist, informal arrangements, brand development, political championing and congressional earmarks were required to bring the two sectors together and highlight the potential for both private and public benefits. Interestingly, a move away from congressional earmarks towards a discretionary system means that legislators will potentially have less influence over strategic planning as such a system would depend on ad hoc bids (see Moe, 1990). On the other hand, if multiple private and public sector partners are required to form consortia in order to attract federal money, greater strategic cohesion across larger areas becomes more likely than via the usual state-by-state approach.

While the project was started by the regional development agency, once stakeholders were on board the project developed its own identity. Regular meetings, promotional events and a political champion were particularly relevant in the early stages.² Vital for the successful development of such multi-partner, or indeed multi-region or multi-state projects is the agreement amongst stakeholders that the investment will benefit all locations along the corridor (McCalla, 2009).

Since this project, the institutional setting has been altered by developing more transparent funding systems, based on a clear bidding process for pre-determined funding sources. In doing so, organisational arrangements such as PPPs have been encouraged to develop, demonstrating that a well-defined infrastructure for collective action did not exist before the project, but has since been developed. However, a key point is that in order for the public and private funds to be blended, a new framework of agreements had to be developed ensuring that funds were spent in certain ways, which is contrary to traditional federal funding programs.

As noted earlier, institutional thickness relates to the institutional environment while hinterland access regimes refer to specific projects. The aim of this theoretical framework is to draw both approaches together, therefore some indicators relate to the overall system, while others relate to the role of actors within this institutional setting.

The current institutional setting is constituted by the roles, power and influence of public and private organisations, in their various instantiations through such areas as planning, policy, operations and the marketplace. While there is a general government policy in favour of intermodal transport, in the USA planning for the intermodal sector does not normally include direct intervention as it is the private sector that owns and operates railroad infrastructure and services. Therefore while planners desire to remain informed of any issues to which they can contribute some assistance, it is not their role to intervene and they do not possess sufficient instruments to influence the situation.

However, private sector actors can find it difficult to make investments in transport infrastructure, therefore they depend to a significant extent on public sector support through the planning system. Although when public funding is used to support an infrastructure project, questions of infrastructure ownership are raised, which is one reason why the private sector has traditionally been wary of accepting public money. Private organisations will generally do what is most profitable, responding to operational requirements or signals from

² For studies on the key aspects of successful policy implementation, see Gunn (1978), Ison and Rye (2003).

the market. However a public organisation with little institutional presence such as ARC has the flexibility to draw together policy-led planning departments and profit-seeking private operators in order to fulfil the aims of local shippers who feel that neither the policy and planning arenas nor the operations and market focus of the private sector are likely to address their problems if the current institutional setting is not altered.

Therefore the way the institutional environment has been altered in this instance is to provide access to public money for private operators to bring forward their operational requirements, rather than enforcing a planned system of infrastructure investment from the top down. The role for this money is to enable large consortia to come together where public and private benefits can be clearly identified amongst all the parties. This is not necessarily to say that the TIGER programme should replace funding through transportation legislation, and indeed there is an important conversation to be had on that issue, but its influence will be felt in succeeding bills. In any case, the federal government could never spend enough money to exert significant influence on the operations of the rail industry. Indeed, railroads in the past have been reluctant to accept public money for fear of strings being attached.

Therefore path dependant transport chains can be disrupted by peripheral regions through the coordination of public and private bodies. The success of multi-state PPPs can lead to governance reform in the way transport planning and public investment are restructured to attract private interest, and bring forward large rail infrastructure projects that otherwise would not be pursued.

9. Discussion of the wider context

Returning to the wider theoretical context in which this research is situated, it can be concluded that the framework utilised in this paper was able to explore the extended concept of institutional thickness developed in the literature review. However, it was found in the current application that the framework tends to highlight positive trends such as identifying the drivers for institutional change. The framework could be refined in future work to take care to identify negative trends as well, for example locating potential sources of resistance.

The literature identified the potential conflict between legitimacy and agency, and this trade-off can be observed in the case study through the importance of informal networking as opposed to the formal institutional thicknesses scaled at state level which can often be ineffective due to the way they are designed (Moe, 1990). However, according to the interviews, the actors were acting rationally in their own interest, which would seem to fit with the NIE approach discussed earlier which retains a generally neoclassical view of the

rational actor, despite leaving behind some limitations such as perfect information and costless transactions. Or is it simply that the framework derived from the NIE literature obscures non-rational actions? It was noted in the literature review that Groenewegen and de Jong (2008) found that NIE models were unable to capture the complexity of political power play and social and cognitive learning amongst actors. The difficulties encountered in the methodology adopted in this paper support those findings. While some elements of these processes were uncovered through interviews (the most important being the role of a political champion and the need for promotion and marketing in lobbying for federal funds, as well as the institutional entrepreneur seizing a window of opportunity which then results in a reactive move by the competing operator), there is a limit to the efficacy of the interview as a data collection method. Similarly, Aoki's (2007) discussion of a shared understanding on how the game is played is another issue that can be subject to response bias.

Response bias in interviews tends to result in a rational account of behaviour, thus potentially obscuring an important part of the process. This problem was reduced somewhat through triangulating interview results with desktop research and document analysis. Triangulating interview data with action research could produce a better result, but action research would normally focus only on one organisation thus missing the bigger picture; it would also be at risk of observer bias. In any case, attempting to document institutional change is always a difficult process; what the researcher can do to ensure validity is to provide contextual information so that future researchers may make their own decisions about the validity of the conclusions and whether such findings are transferable between two cases (Seale, 1999; LeCompte & Goetz, 1982).

10. Conclusion and future research agenda

This paper has presented the Heartland Intermodal Corridor from Norfolk to Columbus in the United States, opened in September 2010, as a successful example of a public private partnership that was able to bring together numerous local communities, states and almost \$200m of investment to achieve the aim of improved trade access to the peripheral region of Appalachia. Thus the use of informal networking on behalf of the ARC has helped the region to overcome the adverse effects of path dependence by bringing in firstly the private sector and secondly federal funding sources. Although the organisations with strong institutional presence were mostly at state level, a regional body was able to draw numerous states together along with a multi-state railroad operator, combining institutional presences into a

successful project. A new mechanism was developed for channelling federal funds to private operators, representing a new direction for the FHA.

As noted by Coulson and Ferrario (2007), it is important not to conflate correlation and causation when a successful project and a strong institutional environment are observed. Therefore, while it is not possible to claim that this project caused a change in policy, a clear trend may be observed from federal loans to grants (through earmarks) to competitive bids. In addition, two major multi-state corridor projects have since commenced, based partly on PPPs and federal funding through the TIGER programme. Therefore another trend may be observed, towards multi-state projects. Thus governance of transport infrastructure development has moved towards a reconciliation between top-down planning approaches and market-driven private sector development.

The literature suggested a conflict between legitimacy and agency and a limitation of political organisations due to their design, both of which were confirmed in the findings. These issues account for the high incidence of policy churn, lack of agency and sometimes lack of communication between the public and private sectors. The role of informal networking was found to be important as it can overcome institutional inertia, although it is difficult to capture this process, and harder still to attempt to institute it in another setting through policy action.

The framework developed in this paper represents an attempt to bring together analyses of individual projects and institutional settings, reconciling institutional economics and institutional approaches from economic geography. Being drawn from a vast institutional literature, it is fairly broad at this stage; it therefore requires application in more cases in order to test it further and improve its relevance and explanatory power. Particular areas to develop are attempts to capture the subtleties of actor behaviour which presents as rational in the interviews but may not always be so, as well as elucidating both positive and negative influences on institutional transformation. As discussed in the previous section, these methodological difficulties arise from the nature of the theoretical issues themselves.

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