

INSTITUTIONAL BARRIERS TO PORT INFRASTRUCTURE AND HARBOR DEVELOPMENT

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Ports and their regions have experienced at least a century of crisis from wars (e.g., World War I and II), technological change (e.g., containerization and information and computer technology), political change (e.g., end of the Cold War and liberalization of commerce and trade in countries like China and India) and globalization. As such ports have needed to adjust to these conditions to maintain their competitiveness. They have done this by adapting their physical and institutional infrastructures and the adoption of new technologies. In this paper it is argued however that institutional adaptation is the most important way in which ports have changed in pursuit of sustained competitiveness. The paper defines institutions in keeping with the view of the new institutional economists and develops an institutional typology for framing the analyses of four case studies of ports and/or their regions that faced crisis conditions. The case studies include an analysis of the problems and responses made by the ports and then an institutional examination and evaluation of the adjustment process pursued. Conclusions are made as working hypotheses about the process of institutional adjustment to competitiveness crises of ports and their regions and directions for future research are presented.

Key Words: Ports, Harbors, Hinterland, Regions, Competitiveness, Trade, Institutions, Crisis, Adjustment, Infrastructure, Technology, Transport

1. INTRODUCTION

Ports and port processes are major infrastructure components in the transport network that enables trade. Historically the core functions of ports have been transshipment and value addition that increasingly tended to agglomerate at these break of bulk locations. Thus, understanding and dealing with barriers to trade and related port functions are important for the maintenance of port and national competitiveness. Such barriers are of three types: physical or infrastructure barriers, regulatory barriers and market-induced barriers¹. While this typology is inclusive it is necessary to expand the regulatory category to encompass the broader concept of institutions as regulations are only one type of institutional constraint. For example, cultural traits and values may also be barriers to adjustment. The focus in this paper is on the institutional constraints that slow and hinder ways in which ports respond to threats to their competitiveness, in short, to crises.

Institutions are here defined as social rule structures (for example, regulations, constitutions, values and cultural traits) that facilitate the maintenance and adjustment of social, economic and commercial processes². More specifically well developed institutions reduce transaction costs and thereby facilitate commerce and trade. However, when institutional systems become too extensive they may create undue transaction costs (diseconomies of scale

and scope) and thus hinder commerce and trade. As such, competitiveness may be viewed as an increasing function of institutional infrastructure up to some threshold after which competitiveness decreases because the context is so rule bound as to constrain action. In short, conceptually we can envision an ideal level of institutional infrastructure but only when an equilibrium or equilibrium seeking situation exists. Ports and other trade supporting infrastructure have been continually confronted with significant changes in market conditions making it necessary for continual and significant institutional adjustment as well as physical infrastructure adjustment. Below four case studies are presented that illustrate institutional adjustment undertaken by ports, and their regions, and hinterlands as they addressed competitiveness crises.

2. PORTS AND CRISES

Ports faced continued crisis situations throughout the 20th Century beginning with the need to meet the huge capacity demand that was required in many European, Japanese and North American ports during the First World War and then again during the Second World War. The containerization revolution in sea transport in the 1950s and 1960s required a new vision of how ports would operate and with it massive reinvestment in ports, port facilities and their harbor areas all over the world³.

Further, deindustrialization and the emergence of the information or knowledge age in the latter part of the 20th Century threatened the powerful status ports had acquired as large vertical integrated and interlinked concentrations of value added manufacturing and that defined the foundations of the industrial age. As the industrial age waned Seaports were no longer necessarily the dominate nodes that linked people, countries and regions, high value commodities and cargos. The comparative advantages of ports as production locations weakened and in some cases were nearly lost⁴. Globalization, mass markets and the opening up of new markets as a consequence of political change (for example, the former Soviet Republics, China and India) have increasingly made the vertically organized structures of the past including the traditional port obsolete in the face of the more horizontal and networked flexible production systems that now define their viability⁵. Further, cargo that formerly moved through and by ports is now increasingly carried by air, trucks and fast trains that often bypass seaports and are logistically dependent on the information technology of today's advanced communication systems⁶. Today competition is stronger than ever in an era of rapid communication and increasingly one that begs for support of demand responsive manufacturing and just-in-time inventory requirements that reduce if not eliminate the need for storage and warehousing at the port. Finally, the 21st Century ushered in security and safety issues at a scale that had not previously been envisioned. In general, the comparative advantage of ports underwent redefinition during the last part of the 20th Century due to globalization, structural economic and political change, and terrorism.

The purpose of this rather long description of the crises that ports have experienced over the past century is important because institutional change rarely occurs without a crisis. Adjustments to manage such crises are usually required because the institutional framework at any specific time is analogous to the view that generals often take when facing a new confrontation or war; that the existing strategy or institutional infrastructure is appropriate for the last crisis but obsolete for the current one⁷. New strategy and institutions or institutional change are required to adapt to changed circumstances and thus to address new crises. Thus institutional analysis most properly focuses either on describing how institutions explain social, economic or political behavior in times of only incremental change or how they change to address a crisis, and the fruitfulness of the outcome. In this paper the latter perspective is the focus.

These premises in and of themselves are far from

serving as a theory of institutional change but do offer insight into two patterns that are consistent with experience: institutional change is motivated by crises and the existing institutional structure in the face of a crisis is unlikely to be adequate. But, the expansion of these precepts into a theoretical framework must wait for the drafting of another paper.

The purpose here is to examine specific crises faced by ports, and their regions and hinterlands (including harbors and related factors such as industry, land use and surface transportation), and the institutional dynamics that has evolved to address them. As noted above, there are at least three types of barriers to change in the face of crises. In this paper it is argued that institutional rather than physical or technical barriers are often the most difficult to manage and thus the major factors that delay the adjustment process. Further, technologies for addressing physical barriers are usually available and thus rarely pose the primary reason for delays in adjusting the port and harbor system to changed conditions. Market and competitive dynamics are treated as crises or motivations for change as well as barriers to competitiveness. With this view then physical, technical and institutional elements serve as the tools of change.

The paper begins with a discussion of the physical, technical and institutional barriers to port development. This is followed with a more refined definition of institutions and a presentation of an institutional typology and methodology that provides a framework or platform for the analysis to follow. In the next part of the paper four case study analyses of port crisis adjustment are presented with the focus placed on the institutional barriers and their management. The final part of the paper derives conclusions from the analyses and advocates a broader application of the institutional approach for analyzing other transport related topics and issues.

3. PHYSICAL, TECHNICAL AND INSTITUTIONAL BARRIERS TO PORT AND HARBOR DEVELOPMENT

Ports and harbors have been undergoing continuous physical and institutional change for centuries and more specifically, for the purposes of this paper, since the invention of containers and container vessels in the 1960s, followed by de-industrialization and the advance of the information age and related technology that changed the nature of seagoing cargo and transport⁸. As the container

revolution unfolded it made the urban core based port infrastructure of the early and mid-twentieth century obsolete because container shipping required large amounts of land for transshipment and storage. The old downtown docks and terminals became obsolete over a short time of little more than a decade. This posed both new opportunities for port city regions and at the same time a crisis for the old traditional port operations with the related obsolete infrastructure and thus of little use as new container ports emerged, often far from the city center⁹.

Today much of the old port infrastructure has been replaced with new waterfront uses including commercial and retail functions, recreation, light shipping support functions (pleasure boat mooring and docking) and other service functions as well as some transport related services (water taxis)¹⁰. But there are new challenges both in the urban and more peripheral parts of the harbor where the container port functions tend to be found. These challenges vary depending on the specific port but include bridge construction and repair, streamlining of intermodal transport and transshipment systems, dock demolition and land use conversion, new land uses, securing the port, dredging or deepening the harbor to accept larger vessels so as to remain competitive via gaining scale economies, managing intergovernmental units, managing preferences of different groups, managing and defining the roles of the public and private sector, marketing the interests of the port and infrastructure financing. This list contains both physical and institutional elements or issues in the port, its harbor and hinterland related transportation system.

The physical barriers are related to geography and geology, technology, land use, transport infrastructure, water and air quality. While not all of these are necessarily easy to address, most, with perhaps the exception of land use, are ultimately manageable because the technology and know how for the most part already exist. However, this does not hold for institutional barriers such as preference and vision conflicts regarding the future of the port, property rights, conflicts of multiple interest groups, low trust and cooperation levels, regulatory overburden, public and private sector interactions, intergovernmental jurisdiction and cooperation, and political conflict. These issues are the reason that most large scale port and harbor development projects in the face of crisis experience excessive delay that may be as long as a generation to implement¹¹.

4. INSTITUTIONAL ANALYSIS

As adopted for this paper, institutions are viewed as social rule structures that guide behavior². For example, port and harbor transportation is an institution when we view it from the perspective of the rules that guide and define the functions of ports and harbors and the movement of cargo. A specific port is an organization that performs the function of the port, not an institution as defined herein. So the analyses to follow focus on the institutional context of the port and its functions.

In earlier work Stough and Rietveld¹¹ present a framework for institutional analysis of transport related issues. They classify institutions in terms of their durability (short term and long term) and formality (informal and formal). For example, values and cultural elements often are durable or long lasting and thus tend not to change easily. Also they are often informal in nature. Constitutions, as the embodiment of deep political, cultural and social values of societies are likewise durable but formal. Conventions such as practices that are not codified but open to change or discretion such as rules that are adopted as best practices are relatively easy to change or are subject to discretion. Such practices are informal and short term in nature. At the same time there are minor regulations, for example, various land use regulations that are formal but flexible (e.g., the granting of zoning variances) that can change over relatively short periods due to no more than changes in political leadership. For example, there are many cases where growth control measures have been adopted and codified only to be relaxed or removed with the election of a new group of political leaders and vice versa. In sum, institutions can be classified in terms of their formality and their durability as illustrated in Fig. 1. Williamson¹² divides his topology of institutions more finely into four levels: informal institutions that include values and cultural practices; formal institutions such as high level laws and statutes like constitutions; governance institutions including

	Less Durable Short term Easy to change	More durable Longer term More difficult to change
<u>Formal</u>	Many land use regulations	Constitutions
<u>Informal</u>	Adopted practices conventions	Values, Culture

Fig. 1 Type of institutions

the regulating infrastructure – formal and informal that are shorter in term.

Stough and Rietveld examine the methodological and data problems that underlie institutional analysis¹¹. These include complexity, difficult to quantify, context comparability in comparative analysis, and data availability in a form enabling quantification. Further, including institutional variables in the regression and quantitative models that are much more common in most transport research is difficult. Consequently, methodologies such as participant observation, executive interviewing, survey questionnaires that are more familiar in the fields of anthropology, psychology, sociology, history and political science, are likely to be more fruitful for institutional analysis in the transport field. Yet it may be possible in transport studies to include institutions as categorical variables in regression modeling and to build in qualitative institutional constraints in optimization models. In fact, the Charleston, South Carolina case presented below illustrates this approach.

5. CASE STUDY ANALYSES

Four case studies are presented below. The four cases were not selected at random, rather they were selected because crises drove the need for both physical and institutional infrastructure change. Three of these examine problems involved in infrastructure changes aimed at improving competitiveness and environmental and quality of life fit. One illustrates the use of a multi-objective land use model in supporting conflict management over the use of land along a navigable waterway.

The first case relates to the Port of Los Angeles/Long Beach and the problems this port experienced in cargo shipment by rail across the city to the interior of the U.S. in the 1990s. The second is an analysis of the Port of Kaohsiung, Taiwan and harbor development decision making and an intergovernmental relations conflict over the management of the port and harbor related functions. The third case is concerned with managing a development and wetlands protection conflict in Charleston, South Carolina, USA. The final case concerns intergovernmental issues in expanding the capacity of the Woodrow Wilson Bridge across the Potomac River in the U.S. national capital region. The issues focus on interest group conflicts, financing, intergovernmental relations and preference conflicts. Each case study begins with a description of the problem and situation and solutions achieved or the

lack thereof. This is followed by an institutional analysis of the case.

5.1 The port of Los Angeles/Long Beach

The Los Angeles/Long Beach port is one of the largest ports in the world. It serves as the main port anchoring the land bridge from west to east across the U.S. Consequently, vast amounts of cargo must move to and from the port along the Alameda Corridor across various political jurisdictions in Los Angeles County resulting in considerable disruption of urban traffic flow and significant environmental and quality of life impacts¹³. Port traffic is supported by three railroad companies using four routes that cross the region in the Alameda Corridor. In this corridor the railroad lines crossed streets at 200 locations resulting in considerable traffic congestion, safety, noise and environmental impacts. In sum, seven cities and Los Angeles County were impacted.

Port, transport and community leaders saw a need to reduce the railroad crossings. Eventually they formed the Alameda Corridor Transportation Authority (ACTA) in 1989¹⁴. The ACTA included 7 city governments, 3 national scale railroad companies, and federal, state, local and regional government agencies. As such the ACTA was formed as a public-private partnership to reduce the railroad crossings and improve traffic flow and safety. ACTA was created under a Joint Powers Agreement (JPA)¹⁵. A JPA is an agreement on the part of participating jurisdictions to share in the development of a project and its cost according to provisions in the agreement.

The goal of the ACTA was to build a consensus among its members to achieve congestion mitigation and reduce the environmental and quality of life impacts¹⁶. While there was broad involvement of the stakeholders (members) there was considerable disagreement over the design due to conflicting views. At the same time studies were conducted that showed that traffic would grow regardless of any action that might be taken and that achieving the goals of ACTA would have a positive impact at the local, state and national levels.

Initially the ACTA with its large core membership was found to have such diverse interests and representation that it was unable to act. It was decided to reduce the 16 members of its board including all 7 cities in the Corridor to 7 members. These members included the Los Angeles and Long Beach Ports, Los Angeles and Long Beach city councils, Los Angeles County, the Metropolitan Transportation Authority and two other agencies. This required court action and tireless negotiation, and when eventually accomplished the resulting agreement

granted the cities review and approval rights on plans and mitigation grants (necessary for land acquisition and off setting costs to individuals and commercial establishments that were to be impacted by the changes)¹⁵.

The ACTA created a 10-mile long inter-modal project¹³. The design included a 33 foot deep trench for rail and 29 flyovers. It was a \$2.4 billion project, a mega-project by most definitions¹⁷. Funding the initiative was of course a major problem, however ACTA as a Joint Powers Agreement (JPA) under U.S. law meant that it was underpinned by formal institutions. Under the rules of a JPA the ACTA was empowered to raise and coordinate funding for the effort. The funding included:

- 55 percent from revenue bonds,
- 18 percent federal government loans (repaid by fees on corridor use & containers),
- 18 percent from the ports,
- 8 percent from the State of California (state grants),
- 5 percent from other sources.

The funding was amassed and administered by the Los Angeles county Metropolitan Transport Authority on behalf of the ACTA.

Several lessons can be gleaned from this case. First, informal institutions underpin the success of this example. American Exceptionalism¹⁸ is a perspective that among other things argues that leadership for community and public projects usually comes from outside of government. This occurs because the U.S. culture has very weak political institutions maintained in its constitution that ensure separation of power (among branches of governments and between the states and the federal government) and intricate other power blocking or leveling elements. It is for this reason that leadership for projects like the Alameda Corridor tends to come from outside of government or from government in collaboration with other groups such as the railroads and community groups. The Alameda Corridor project was a community oriented initiative that included government but was not led by government. In short, we can interpret the approach adopted as directly related to U.S. values that create and maintain weak government institutions. Consequently, action solutions to community and public problems most often come from outside of government with elected officials and public servants often following along in support.

Formal institutions provided important input to the outcome. If the ACTA had not been created as a Joint Powers Agreement under California Statutes it would not have had the authority to lead the process and to design and implement, and for that matter guide the way the

funds were raised and spent. Without this status or a similar one (e.g., interstate compact) the project would have been much more difficult to achieve and manage (see the Woodrow Wilson Bridge case below).

Shorter term formal institutions also played a role. The ACTA governance structure was a formal one created under the Joint Powers Agreement. However, because the ACTA was envisioned as a temporary organization to achieve specific but limited goals it did not have the durability and the level of formality found in government bodies such as states or cities. Moreover, the governance structure was flexible as witnessed by the reduction of the membership that occurred to ensure a more actionable organization.

Short term and quasi-formal institutions were also important for the Corridor project regarding the allocation of resources. The construction of the trench for the railroad line to and from the port across the Los Angeles urban landscape and the 29 flyovers were highly disruptive of the existing land uses despite the goal to create a more functional and livable urban environment. Consequently, there were significant impacts to individuals and businesses and that required compensation. The ACTA arranged grants from higher levels of government to the cities to provide this compensation. Without such compensation the project would not have occurred.

5.2 Kaohsiung, Taiwan port and harbor

The Port of Kaohsiung is one of the five largest container ports in the world. While its volume and the value of its cargo have declined relative to some other ports over the past ten years (it was ranked third in 1995) it is still one of the largest in the world. The port is located on the Southwest coast of Taiwan and enjoys a particularly good physical port with easy access to the sea and to the downtown part of the city of Kaohsiung¹⁹.

Until the early 2000s the port of Kaohsiung operated under leadership from the Provincial Taiwan government with some additional oversight from the national Taiwan government particularly with respect to defense. The goals of the modern port which was established in the early 20th Century when Taiwan was under Japanese rule were to maximize revenue from port services, support industrial development, serve as infrastructure for national defense and as an element of the national transportation infrastructure. The port is linked to the national transportation infrastructure by rail and road and the Kaohsiung International Airport is located nearby. But the goals of the provincial and national governments were only partly coincident and complementary to those of the

local Kaohsiung government²⁰ which holds provincial government status in Taiwan along with Taipei⁶.

Certainly the port functions were a compliment to the City in that it was and is a source of significant employment both directly and indirectly in the factories and plants supported by the port. Further, the security functions which are near pure public goods are also of great benefit to the City. However, the goal of maximizing revenues from port functions and services was at odds with other interest groups' preferences and objectives. Revenue maximization meant that the waterfront was totally devoted to port and industrial uses by the 1990s, partly as a result of Taiwan's rapid drive to development that unfolded over recent decades. Consequently, water front access for residents for fishing and recreation was not possible except in a very limited way that was inconsistent with the experience of residents in coastal cities throughout the developed world¹⁰. Nor was it available for non-industrial commercial uses. Further, neither the port nor the harbor area had been integrated into the broad spectrum of city life²⁰. Finally, as a consequence of the narrow thinking focused on maximizing the value of the port as a revenue generator it had not been well integrated into the national transportation infrastructure. This meant that its role as an element in the supply chain for industry all over Taiwan was limited and posed an impediment for Taiwan's national development⁶.

The port was removed from Provincial government control in the early 2000s thus creating an opportunity for the first time for new and diverse interests to register their preferences. For sure traditional port and industrial interests had been and were represented and for sure the revenue generation function was still important but not as a "cash cow" to support Provincial goals that were often not even transport or development related²⁰. The potential for using the harbor for recreation, for improving environmental conditions, for commercial and residential uses, and for building a strong inter-modal transportation hub were recognized. The City leadership and its residents have been planning and implementing changes in port and harbor usage to include new and expanded functions for the past several years.

Institutions played an important role in the Kaohsiung port and harbor example. Command and control governance under Provincial government control mitigated against the leadership and residents of Kaohsiung being able to envision the potential of the Port and its waterfront. This was the case in Kaohsiung until the change in the early 2000s when the process of governance was altered to enable participation in the governance of the

Port region and to learn that new uses could improve general living quality. Formal and durable institutions existed that gave the Provincial government a mandate to govern the port and its uses. That this regulation had existed from the founding of the Republic of China and was thus sanctioned by the national government meant that it was durable and resistant to change. That is why changing the control structure to a leading role for Kaohsiung City took so long. Once control was passed to the City less emphasis was placed on revenue generation and more on broader economic development and its integration into the national development plan, quality of life and broader social objectives. That new goals and implementation plans could be initiated so quickly is an illustration of how strong the former command and control governance system was but how rapidly change occurs when a relatively high level institution is changed.

5.3 The Charleston, South Carolina, U.S.A. case

Charleston South Carolina is located on the Southeast coast of the United States about 500 miles south of Washington, D.C. and about 300 miles to the east of Atlanta, Georgia. It is a medium sized port with easy access to the Atlantic Ocean (it is about 5 miles across the Charleston Harbor to where ships can enter the Atlantic Ocean). The harbor has several long deep estuaries formed by rivers that flow to the harbor. One of these is the Cooper River which is the longest and deepest (navigable for 22 miles inland) and enters on the north side of the City. The shallower and shorter Ashley River enters to the south. Near where the Cooper River enters the harbor another estuary named the Wando River enters. The City of Charleston is located on a peninsula between the Cooper and Ashley Rivers. Charlestonians describe where they live as north of the Cooper, South of the Ashley or in the city – on the peninsula. A nuclear submarine fleet is based out of the Charleston port as well as other naval shipping. The military related part of the port is located several miles up the Cooper River estuary. Little of the old port located on the Charleston city waterfront remains today but there are several small terminals there. A container terminal was built on the peninsula between the Cooper and Wando Rivers in the 1970s and 1980s. This is the major focus of activity for the modern port of Charleston²¹.

Charleston is a high amenity sunbelt metropolitan region. It has a subtropical climate and access to great sport fishing and beaches but it is best known for its heritage. Because Charleston grew little over the 100 years following the U.S. Civil War its downtown area failed

almost totally to experience urban renewal that redefined many cities in the U.S. following World War II. Consequently, in the 1960s and 1970s as heritage preservation became an important national goal Charleston began to flourish because it had thousands of dwellings built over three centuries that while in rather poor condition were still standing and functional. Today Charleston has more structures on the National Historic Record than any other city in the U.S. Thus it has a well developed heritage and cultural tourism industry.

As a consequence of the heritage identity of the region it is a place where maintenance of environmental and heritage integrity are strong and related preferences play a strong role in the enactment and maintenance of quality of life and environmental quality policy. Because the region became highly attractive as a tourist attraction tied to heritage and the quality of the outdoor environment it is no surprise that the conflict between growth management and environment interests and developers is strong. This has and continues to be a powerful attribute of institutional life in Charleston. Like the Los Angeles and the Kaohsiung cases, Charleston also has a complex intergovernmental situation. The metropolitan region is composed of three counties (Charleston, Berkeley and Dorchester) and several city jurisdictions including the City of Charleston, the City of North Charleston (located inland about 10 miles but abutting on the Cooper River in the vicinity of the naval complex on the River) and others such as Sullivan's Island, Folly Beach, The Isles of Palm, Summerville and Edisto Beach. Further, because it has several rivers that form the harbor and a number of beach communities that lie beyond the U.S. Inter-coastal waterway that stretches along the coast for about 30 miles north and south of Charleston, a number of state agencies (e.g., South Carolina Coastal Council) and federal agencies (U.S. Coast Guard, U.S. Department of Defense – Navy, National Oceanic and Space Administration, National Endowment for the Arts, Environmental Protection Agency) as well as a focus of organizations of national scope like the Heritage Foundation and National Wildlife Federation) have a role in local affairs.

Because of the adversarial relationship between growth control and growth advocates and because of the rich organization environment in Charleston, public policy and decision making regarding growth decisions is complicated, complex and difficult²¹. For example, wetland maintenance along the navigable waterways has been in conflict with development. To wit, the expansion of the Port of Charleston to the container terminal site between the Cooper and the Wando Rivers threatened

large acres of wetlands as the area contains one of the largest single concentrations of wetlands on the east coast of the U.S.²¹. Other development interests face the issue of wetland protection whenever projects on or adjacent the waterways are proposed. In short, there is an extreme and deep seated distrust between development interests and heritage, amenity maintenance and environmental protectionist interests (this conclusion is supported by surveys of leaders and government officials in Charleston²¹ as reported in Stough and Whittington, 1986).

To help inform the waterfront land use decision making process, a multi-objective mathematical programming model²² for estimating the tradeoffs between developed waterfront land and protected wetlands was constructed and calibrated for the land along the navigable waterways in the Charleston region²¹.

The details of the model, analyses and mapped results can be found in Stough and Whittington²¹ and thus are described only in summary form here. First, the model analyses showed the likely conversion of land to developed uses would occur much sooner in remote parts of the region than local planners and developers thought. Second, the large area of wetlands in the lower Cooper and Wando estuaries served to direct development elsewhere. Third, little commercial development was anticipated in the Ashley estuary until the later stages of land conversion because the channel depth was significantly less than in the other estuaries including some far removed from the Charleston Harbor and related estuaries described above along the inter-coastal waterway in more remote parts of the region. In short, some unexpected results occurred.

The results of the model runs were presented to a group of regional planners and developers. They were asked to discuss the usefulness of the results. There were also surveys that sought to measure before and after the meeting views. The panel agreed that the conflict in the region over wetlands preserved and development of the land along navigable waterways was extreme. They stated that the forecasted conversion patterns were not fully anticipated. In fact, they found some of the results provocative and stimulated debate over plausibility and thus were educational. The exercise sensitized officials to the fact that growth and development pressure and development policies in the various jurisdictions were not independent from one another²¹. This latter conclusion was based on the second run of the model that constrained the amount of conversion allowed in Charleston County thus forcing it to other parts of the region in Berkeley County after a conversion threshold was reached. Indeed

one of the jurisdictions was considering growth control legislation at the time of the analysis that would nearly eliminate all conversion of waterfront or waterway land. This study illustrates in a modest way how analytical support can be provided to help inform and better manage institutional conflict in harbor and port development settings, particularly dynamic ones under the crisis of development pressure.

It is useful to take a moment to reflect on the role of analytical methods for supporting management of institutional issues. This case used multi-objective programming land use modeling but there are many other techniques and methods that have and can be used. These include: faster than real time simulation and modeling, GIS and space-time modeling, transport modeling, port and harbor impact models, financial modeling, competition modeling (e.g. game theory approaches), environmental modeling, management modeling and strategic planning (see Stough and Whittington²¹ for more discussion of this).

5.4 The Wilson Bridge case study

The Wilson Bridge spans the Potomac River estuary in the U.S. National Capital Region and is a critical link on the Interstate Highway 95 expressway that serves as the major surface transport roadway traversing the east coast of the U.S. from Miami Florida to the Canadian border. Traffic volumes on this roadway are large in most places but particularly intense in the National Capital region because the region is one of the most congested in the U.S. with considerable commuter and cross region traffic complimented with a large volume of flow through traffic. In short, it is one of the most congested areas in the U.S. The background for this case draws upon four technical reports²³⁻²⁶.

The Wilson Bridge is nearly 40 years old, about a half mile long but is the centerpiece in a 5 mile corridor that extends from the bridge into Virginia and Maryland, has three lanes of traffic in both directions and is in extremely poor condition (Haynes, et. al.,2001). In fact parts of the bridge periodically fall into the estuary. The bridge is under the jurisdiction or control of Washington D.C. (the U.S. federal district) but traffic enters the bridge from two states, Maryland and Virginia meaning that responsibility and control for egress and ingress belongs to them. Thus, the bridge is jointly managed by these three governments. Further, because it is also a draw bridge and spans a navigable waterway, the U.S. Coast Guard has jurisdiction over water traffic that moves beneath the bridge. In summary, the bridge lies in a complicated in-

tergovernmental situation that involves control issues across the federal District of Columbia, two states and various federal agencies, and thus provides the most complicated intergovernmental situation observed among the four case studies.

It was recognized some 20 years ago that a new bridge was needed because traffic demand analyses showed that insufficient capacity existed and, later because of a failure to act in a timely fashion, the fact that the bridge was falling apart. A 12 to 16 lane bridge was needed to absorb expected growth in demand and the cost was estimated to be about \$1.5 billion (the bridge is under construction now and the cost is expected to be more than \$2 billion).

More than twenty years passed while the various jurisdictions debated how many lanes were needed, where the funding would come from and who would take responsibility for ensuring the bridge was replaced. Unlike the Alameda Corridor project no ACTA type authority was formed. Planning was eventually carried out cooperatively between the states of Maryland and Virginia and the District of Columbia but continued to be problematic given the different cultures and governance structures of these jurisdictions. Without an inter-governmental authority to build cooperation and provide leadership the project experienced considerable problems in dealing with a complex of interest group conflicts. For example, the west end of the bridge is located in the City of Alexandria, Virginia. Alexandria is an old city dating to the settlement of the Washington region in the 17th Century and thus has a historic patina created by its old structures (to some extent it is similar in this respect to Charleston, South Carolina). Thus, the Alexandria community objected on the basis of heritage and scenic impacts of the plan to build a much larger bridge to replace the three lane Wilson bridge. Further, financing issues arose, although there was agreement among the three sub-national governments that the federal government should pay most if not all the cost. Finally, serious control issues arose between the two states, the District of Columbia and various federal agencies (e.g., Coast Guard) given the location of the bridge.

Today the new bridge is under construction with most of the pilings and foundation infrastructure now in place but it will not be completed or operational until 2008²⁷. As a consequence, congestion management is still a problem and it is a daily burden to manage the bottleneck the bridge construction creates for commuters and flow through traffic. Given this, it is instructive to mention several institutional issues that could provide

some guidance for similar projects in the future.

Deep seated American values appear to have played a role in the delays to the replacement of the bridge. Weak government institutions and strong individualist tendencies mark the American experience as noted above as codified in the American Exceptionalism perspective. Control issues, financing responsibility, cooperation problems and a lack of cross jurisdiction leadership all serve to underscore how the traditional American values of individualism and weak government leadership played themselves out in this case. Community leadership emerged slowly if at all and only through long intertwined discussions did any trust at all evolve among representatives of the two states and the District. Eventually it did develop to a point that the project could be designed and aspects of the contracting allocated to the different parties.

The City of Alexandria's concerns and interests were not fully addressed²⁸. The bridge being constructed is perceived by residents of Alexandria as creating significant indirect (psychological and community identity) costs as the new bridge will be much higher than the existing bridge and thus more visible. Finally, the project has not been well integrated into the development along the Potomac estuary although some progress seems to be emerging now that the new bridge is under construction. However, it is such a large project that it is in some ways driving development decisions along the estuary itself because it constrains development possibilities in the vicinity of the bridge.

Perhaps the most important lesson to be learned from the Wilson Bridge case is that one way or another such projects will be built if the need is ultimately perceived to be sufficiently large. However, without a formal organization in multiple jurisdiction settings being responsible for coordinating the multiple interests and related problems such a project will take much longer than necessary. If an ACTA type organization for the Wilson Bridge project had been formed and charged with the responsibility of providing leadership for the project, and assigned responsibility for managing the financing, planning and construction, a much more focused and timely effort would likely have occurred and time would likely have been saved, the interests of various groups would likely have been better served and cost would have been less.

6. SUMMARY AND CONCLUSIONS

While it is not possible to generalize on the basis of the four case studies, it is possible to identify some patterns that are consistent with experience (and some that are inconsistent) and thus can serve as working hypotheses for future research and perhaps practice. These patterns are discussed from the perspective of the two-by-two institutional framework outlined in Fig. 1 that classifies institutions as formal/informal and long term vs. relatively short term.

Reference to American Exceptionalism¹⁸ has been made in three case studies. This perspective argues that the way the U.S. was formed as a country resulted in protection of individual rights (strong individualist values), weak government institutions and a rural community/cooperation orientation that together created strong non profit institutions or associations that often provided leadership for community problem solving. This community leadership approach, as Lipset notes, was observed with fascination by de Toqueville during his extended visit and tour of the U.S. in the mid-Nineteenth Century¹⁸. The three American case studies are all consistent with this perspective as these values can be viewed as significantly influencing approaches and outcomes. For the Alameda Corridor project the formation of the ACTA to provide organizational leadership and implement the project was consistent with the community approach and with the weak government institutions claim of American Exceptionalism. One also finds in the archives of the extended debates over compensation for individuals and groups that were impacted by the project strong individualist tendencies. The Charleston and Wilson Bridge cases on the other hand might be viewed as exhibiting the down side of strong individualist and weak government institutions because of the deep polarization that occurred among those with standing and the difficulty governments had in providing leadership for guiding and managing the major actors. In short, all three U.S. based examples support the view that government institutions are relatively weak and that for leadership to be effective and timely it often must come from outside of government for planning and implementing major projects. This does not mean that once leadership is provided that government does not participate, quite the contrary as shown most positively in the Alameda Corridor but also in the Wilson Bridge case.

The Kaohsiung Taiwan port and harbor case is a good example of how somewhat durable institutions like

the law that assigned the management of the port to the Taiwan Provincial Government can change and quite rapidly. It may be the case that such large scale institutional change occurs more easily under unitary-like forms of government as is mostly the case in Taiwan. With the ushering in of a new political regime in the early 2000s, the power of the Provincial Government was seriously reduced and according to some observers essentially eliminated. This made it possible and necessary to re-assign the function of managing the Kaohsiung Port to other units of government; however, it did not necessarily eliminate an essentially command and control orientation of the Taiwan central government. Nevertheless, with this change a set of other relatively short and intermediate term institutions changed also. Informal institutions in Kaohsiung such as preferences, planning and rules for planning for the future of the port became more open to the influence of expanded information and education and in turn were modified. Through this change in responsibility and authority the intergovernmental conflict between the Provincial Government and Kaohsiung City Government was partly resolved. The pattern or lesson here is that the locus of institutional responsibility and leadership changed from one level of government to another in a way that put the responsibility at the geographic location of the activity. This observation along with much other evidence from around the world suggests that whenever possible, authority should be devolved to the lowest level and to the location where the activity occurs. The caveat here is that sometimes the function is also part of a broader responsibility, for example, with a pure public good like the defense function of the port, and thus may need to be openly shared and not managed indirectly through laws and regulations.

The third pattern or lesson comes from the Charleston, South Carolina case and focuses on the role of analytical support for managing problems when deep seated distrust and conflict exist over the goals of development and maintenance of environmental and heritage integrity. Modeling the land use conversion process as a multi-objective programming model and presenting the results of wetland protection and conversion under different assumptions helped inform the contesting parties of the consequences of different levels of protection and conversion and served to help create a better understanding of and need for consensus formation. It would appear that consensus formation and decision-making that is better informed analytically would improve not only the efficiency of the processes but the quality of outcomes. However, the devil's advocate position might be that in

a litigious society like the U.S. more information leads to more dimensions for debate thus deepening conflict. This hypothesis needs further examination.

Additional research is needed to further test these hypothesized patterns and lessons for port and harbor development policy and planning and institutional change. In particular, a more systematic study of the way in which longer term durable formal and informal institutions and shorter term less durable institutions operate in the port and harbor decision process. Hypotheses regarding the influence of the type of intergovernmental relations and the relation of that to governance processes need to be more specifically formulated and tested. It would be an interesting exercise to historically investigate the American Exceptionalism thesis across a larger sample of case histories of ports and harbors in the U.S and match the sample of U.S. ports with similar ones in other countries. The importance of the comparative element of the analysis stems from Lipset's argument that our understanding of institutions can best be obtained from comparative analysis¹⁸. Such investigation could provide a deeper understanding of how informal yet deep seated cultural traits impact a variety of processes like consensus formation, decision making and rent seeking. It would also provide a bench mark against which to compare experiences of ports and harbors in other countries. This point is important because of the rapid globalization the world has experienced during the last decade or two and the related need for a deeper understanding of port and harbor decision processes.

Finally the case study analyses were selected because of the belief that institutional variables are most important in the face of crisis and that institutional change is necessary for the major adjustments (physical and institutional) that are often required to manage the negative impacts of change and to capture opportunities that crisis situations often offer. Further analysis is needed to test the thesis that crisis drives change, however. Additionally, despite the fact that each case analysis of this paper showed that existing institutions were less well developed than needed to facilitate the adjustment process, the thesis that the institutional infrastructure is inadequate because it is obsolete needs further consideration.

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