Evaluation of the Terminal Gate Appointment System at the Los Angeles/Long Beach Ports

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Abstract

This report presents an evaluation of the terminal gate appointment system at the Los Angeles/Long Beach ports. The appointment system was implemented in 2002 in response to California Assembly Bill (AB) 2650, which sought to reduce vehicle emissions and highway congestion by reducing truck queuing at marine terminal gates and distributing truck traffic over a greater period of time throughout the day. The legislation permitted terminals to adopt either gate appointments or off-peak operating hours as a means of avoiding fines for truck queues.

Results are based on extended interviews, field observations, a trucking company survey, and data provided by selected terminals. The report concludes that 1) use of the appointment system depends upon operating policies of individual terminals; 2) perceptions of the appointment system's effectiveness differ across user groups; 3) there is no evidence that the appointment system affected queuing at marine terminal gates; 4) while a majority of the terminals did implement an appointment system in response to the legislation, most did so in order to avoid paying the high labor costs associated with extending operations to off-peak hours; and 5) the future use of appointments will depend upon both legislative pressures and the need to better accommodate increased container throughput during off-peak hours. Responses to AB 2650 are largely explained by institutional and contractual relationships that drive port operating practices.

Table of Contents

List of Figures and Tables

FIGURES:

TABLES:

Disclosure

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1. Introduction: The Impact of Goods Movement on Metropolitan Areas

Growing international trade volumes at Pacific Coast ports over the past decade have created many challenges for metropolitan areas. The most visible symbol of growth in trade to the local observer is truck traffic, which has added to congestion problems, noise and other neighborhood impacts. Major highways connecting ports and inter-modal facilities are particularly impacted. Emissions from ships, trains, trucks and port equipment add to air quality problems. Growing public opposition and increasingly successful environmental lawsuits are forcing mitigation, yet most sectors involved in transport of international cargo are exempt from local and state regulation.

Increased international trade has led to calls for massive new investment in highways, rail and airport facilities. However, there is little public consensus regarding where new facilities should be located, and public funds for such projects are inadequate. Added capacity is at best years away, while forecasts suggest a doubling of current trade volumes within the next 20 years. These problems are especially severe in Southern California, where the Ports of Los Angeles and Long Beach have experienced two decades of rapid growth. The Port of Los Angeles did not surpass the 1 million TEU (twenty-foot equivalent unit, the standard measurement of a cargo container) mark until 1985. In 2004, the Port moved 7.3 million TEUs.

Growth of international trade and its impacts on local communities has generated a serious public debate. To what extent do the economic benefits of trade offset environmental and congestion costs? As Erie (2004) notes, international trade generates widespread benefits (e.g. increased economic productivity, lower prices for consumers of imported goods), but concentrated costs (e.g. local air pollution, noise, traffic congestion). Proponents of international trade growth argue that the trade sector is rather unique, in that it remains one of the few sources of good paying, stable blue collar jobs (Husing, 2004; Lakshmanan and Anderson, 2002a). In addition, trade has a large multiplier; for example one estimate of the number of jobs in Southern California associated with port-related trade is 550,000 (State of California Business, Transportation and Housing Agency and California Environmental Protection Agency, 2005). Ports and related trade are also well-know sources of public funds via taxes generated. Thus, local political leaders face the challenge of protecting jobs and economic vitality while addressing the legitimate and growing concerns of constituents.

In California, this challenge has resulted in efforts to reduce negative impacts via regulation. The California Air Resources Board (CARB) has specified emissions controls for diesel truck engines and has mandated cleaner diesel fuel. The South Coast Air Quality Management District (AQMD) has imposed emissions reductions for dock vehicles. However, major generators of particulate emissions – ocean vessels and locomotives – remain beyond state or local control, and emissions controls do nothing for noise or traffic congestion.

To the outside observer, changes in operating practices appear to be the logical short-term response to traffic congestion. For example, empty containers are taken to terminal yards and then picked up for the next load, rather than being taken directly to the next load point. Until the recently implemented off-peak terminal access program known as PierPass, terminals allowed

pick-ups and deliveries only during regular business hours (with few exceptions), concentrating all port-related truck traffic into peak and daytime hours. Changing operating practices to reduce port-related trips or shift some trips out of the peak period was widely advocated by community leaders and policy-makers, yet terminal operators and other stakeholders resisted, citing numerous reasons why such changes were not feasible.

In 2002 California Assembly Bill (AB) 2650 was passed. AB 2650 regulated truck queuing at terminal gates to reduce vehicle emissions. The legislation allowed terminal operators the option of either extending gate operating hours from the typical 45 hours per week to 70 hours, or offering appointments for specific cargo pickups or drop-offs, in order to reduce truck queuing at terminal gates. Under the regulation, terminal operators were subject to fines of $250 for each truck idling in queue for more than 30 minutes.

AB 2650 was highly significant because it marked a turning point in trade-related regulatory policy; it targeted port terminal operations for air quality objectives, rather than targeting emissions directly. As a result, we are interested in the effectiveness of the legislation in meeting its objectives, i.e. in changing terminal behavior as a means of bringing about reduced truck queues. Our research therefore focuses on the response of the terminals to this particular piece of legislation. We ask whether or not terminal operators chose to comply with AB 2650 through extended hours or an appointment system. We also ask how they perceived the regulation, whether they saw it as necessary, reasonable or effective.

Our research also asks how trucking companies responded to the legislation. The trucking community was responsible for making appointments and truckers were perceived as being key beneficiaries of improved operations at the terminal gates. Did truckers use the available appointment systems, and in what ways? Did their perceptions and expectations match those of the terminal operators, the sponsors of the legislation, and other key stakeholders - including local communities - affected by the movement of goods? Most important, is there any evidence that anything has changed as a result of appointments?

In order to explain the various stakeholder responses and their different motivations, and therefore explain the outcomes of AB 2650, we take a comprehensive approach using both qualitative and quantitative data. We first describe the growth of international trade in Southern California and its local impacts. In order to provide some context, we describe the major stakeholders involved in goods movement and international trade and the complex institutional framework of the supply chain which brought about the passage of AB 2650.

We then discuss incentives for increased regulatory oversight of goods movement activity, drawing upon literature from two areas: the congestion-related impacts of the supply chain, with a focus on trucking, and regulatory attempts to influence mobility. We place this particular piece of legislation in the larger context of transportation emissions regulation, noting that such indirect efforts have a mixed record of success. Following is an explanation of research approach and methodology. We conduct interviews and surveys, obtaining data from secondary sources as well as field observations. We evaluate the outcomes of our research in three primary areas: implementation and enforcement of AB 2650; the response of the trucking community; and the impacts of the appointment system on queuing and turn time at the terminals. We end

this report with conclusions and policy implications, commenting upon the role of institutional and power relationships at work along the supply chain.

2. Trends in Goods Movement and the Response from Industry and Regulatory Authorities

Assembly Bill 2650 was signed by California Governor Gray Davis in 2002, at a time when the attendant effects of growth in international trade on local communities were being scrutinized. It was introduced in the State legislature in the wake of studies documenting the serious health impacts of particulates. Its passage coincided with a labor dispute and subsequent port lockout which raised the visibility of port operations in Southern California and which fed growing public concern that problems tied to the movement of goods needed immediate solution. Because capacity-enhancing infrastructure was at best years away, elected officials turned to port operations in response to the concerns of their constituents. They focused on policy and legislative mandates as a means of changing the behavior of key players including steamship lines, ports and terminals. These stakeholders in particular were perceived as being indifferent to local needs and unwilling to respond without the threat of regulatory action.

Policy makers and local communities were not entirely incorrect. Goods movement activities have largely been exempt from local control because they involve international and interstate transfers and are subject instead to international treaties and federal law, including the rules of interstate commerce. Local harbor commissions, while creatures of local government, operate at arm's lengths from City Councils. They are authorized by State law in California. Because of the revenue they generate, they have historically enjoyed a certain institutional independence.

This chapter presents the different stakeholders and explains why they may have taken different positions with regard to operational changes at the ports. It also offers reasons why certain of them are better placed to effectuate change. Following is an analysis of trends in international trade, emphasizing the powerful economic dynamics at play. We consider trends along the entire supply chain and those most evident in Southern California and why the region developed an increasing awareness of the negative impacts of goods movement activity. We focus on the 2002 west coast port lockout and a major air quality study which raised the profile of the ports among neighboring communities.

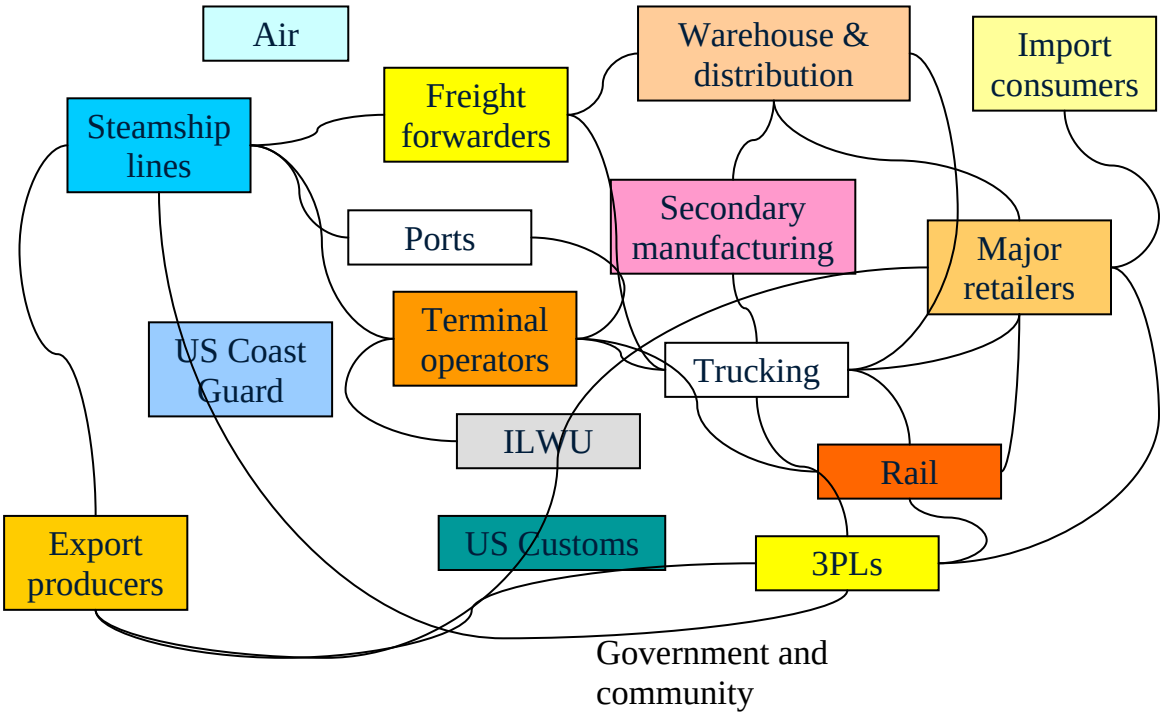
Following is a discussion of the efforts aimed at mitigating the impacts of trade-related activity. There have been long-term plans to enhance the capacity of the regional road and rail networks which have suffered under the burden of both freight volumes and population increases that translate into a greater number of automobiles. There have also been operational changes designed to improve the efficiency of the ports. These often include the adoption of new technologies. We conclude the chapter with the development and implementation of Assembly Bill 2650 in response to these very issues.

2.1 Port Stakeholders

Port activity takes place within a complex institutional structure. The standard linear concept of the supply chain suggests a one-directional flow from supplier, through producer and distributor, to the end customer. In reality, goods movement involves a far more complex network of complex relationships (Figure 1).

Both the Port of LA and the Port of Long Beach operate under the 1911 California Tidelands Trust Act, meaning that the ports' operating authority is granted by the state. The ports are managed by governing boards whose members are appointed by their respective mayors, but have significant authority over port management. The funds of each agency are also largely protected from use for other purposes by state law and city charter. The ports operate as landlords (tenant terminals have long-term lease agreements), and their primary focus is a stable and adequate source of lease revenues. Tenant terminals serve specific products or steamship lines; they coordinate the loading and unloading of ships by longshore labor and manage movement of product to and from landside customers. Steamship line customers include the producers and consumers of products: foreign manufacturers, wholesalers and retailers. Typically, relationships between steamship lines and terminal operators are long-term and contractual.

Figure 1: Ports and the Supply Chain



Dock operations are influenced by longshore labor agreements, which cover wages, working conditions, and allocation of labor. Container cargo is hauled to and from the ports via truck or rail, with about 75% of annual container moves on truck (Agarwal et al, 2004).

The truck drayage industry is composed mainly of owner-operator drivers who contract with small trucking companies. Because they are considered private contractors and not employees, drivers are prohibited under federal anti-trust legislation from cooperative action that could impede interstate commerce. This would include setting a single rate for their services. These are low-skill, low-pay jobs. Drivers receive a lump sum based on the cargo hauled and the distance traveled which must cover all costs including labor, fuel, insurance, registration and maintenance.

Port operations are determined by the major stakeholders – terminal operations, steamship lines, their large customers, and the ILWU. For example, ships are serviced 24/7 in order to minimize time spent at port. However, until very recently, terminal gates typically operated a normal weekday schedule; terminal operators claim that the expected volume of cargo moved during evenings or weekends would not be sufficient to cover the additional costs of dock labor (which under ILWU rules receives substantial shift pay differentials outside of the hours of 8 AM and 6 PM). In addition, it is argued that warehouses and retailers generally will not accept night deliveries, and that there are no secure locations to store cargo once it is off the dock. Cargo moves outside of weekday hours have therefore been historically made for key customers by special arrangement.

Self-interested stakeholders are not inclined to change standard operating procedures, even if they result in negative impacts on the entire chain. The steamship line is primarily concerned with getting cargo unloaded and getting the ship back in transit. The terminal operator is primarily interested in moving cargo off the docks; congestion on the freeways is the concern of others. Overwhelming growth in trade volumes however has made stakeholders much more aware of the relationship between supply chain functions. Improvements in efficiencies at a single node can have a positive effect on all nodes, or can generate new bottlenecks. As a result, ocean carriers, marine terminals, labor, truckers and shippers are becoming more responsive to trade trends in general, not just those involving a single industry segment.

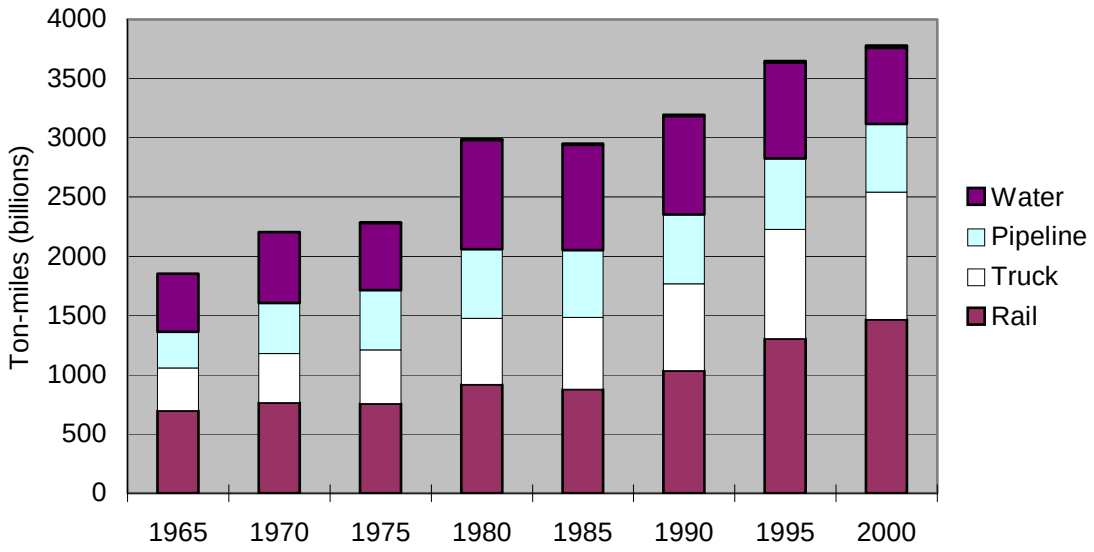
2.2 World Trade Trends and the Role of LA/Long Beach

Growth in international trade has been accompanied by structural changes in the global economy that imply much greater volumes of goods transport and more dependence on a low cost, fast, and reliable transportation system. These changes include manufacturing processes distributed around the world, just-in-time inventory practices, and combined manufacturing and warehousing among others.

The US plays a critical role in international trade as a market for goods produced elsewhere and as a key link in the supply chain. The U.S. is the world's largest maritime trading nation. Based on Bureau of Transportation Statistics figures during 2001, the value of water-borne goods shipments exceeded all other modes of transport of international merchandise freight, accounting for about 37% of all US international merchandise trade value. This is reflected in economic figures. The share of US GDP attributed to international trade grew from

13.8% in 1991 to 22.2 % in 2001; and growth in domestic freight has increased across all modes, as shown in Figure 2. Air freight has also increased but is not represented because it carries a very small share of all ton-miles.

Figure 2: Domestic Intercity Ton-miles by Mode
Source: Calculated by the authors from BTS data



Trade in both goods and services has been steadily increasing at a global scale over the past decades (Figure 3). Total US imports will likely increase by 87% through 2020; the comparable figure for exports is 148% (Haveman and Hummels, 2004). Asia has played a pivotal role. Since the early 1990s, East Asian exports to the US have grown some 7% annually, outstripping trade with Europe; and US trade with China is expected to more than double by 2020. Not surprisingly, the largest ports and the most rapid growth in container volume are found in Asia (Tables 1 and 2).

Figure 3: World Export of Goods and Services, 1970-2003
Source: International Monetary Fund

The proximity of the US west coast to Asia makes it particularly important in the global trade network. As larger ships carrying greater numbers of containers are unable to pass through the Panama Canal, Los Angeles-Long Beach, Oakland and Seattle-Tacoma become import-transshipment centers. In 2004, 25.2 million twenty-foot equivalent unit containers (TEUs) moved in and out of US ports (Waterfront Coalition, 2005). Half of that total was moved through the West Coast. In terms of imports, the West Coast handled 57% of the total volume.

Table 1: Top Container Ports, 2004
Source: Journal of Commerce

	Volume 2004 (Million TEUs)	Volume 2003 (Million TEUs)	% Change
Hong Kong	21.98	20.45	7.5
Singapore	20.6	18.1	14.1
Shanghai	14.56	11.28	29.0
Shenzhen	13.62	10.61	28.2
Los Angeles/Long Beach Combined	**13.1**	**11.84**	**10.6**
Busan	11.44	10.41	9.9
Kaohsiung (Taiwan)	9.71	8.84	9.8
Rotterdam	8.28	7.14	15.9
Los Angeles	**7.32**	**7.18**	**2.0**
Hamburg	7	6.14	14.1
Dubai	6.43	5.15	24.8
Antwerp	6.06	5.45	11.4
Long Beach	**5.78**	**4.66**	**24.1**
Port Kelang (Malaysia)	5.24	4.84	8.3

While port growth is occurring in general along the west coast, the San Pedro complex is leading the charge (Figure 4). The share of traffic coming through LA and Long Beach relative to the other major west coast ports has increased from below 50% in 1992 to 62% in 2002 (Chang, 2003; Keyser and Huang, 2003). During the first five months of 2005, LA-Long Beach accounted for 75% of west coast imports.

Table 2: Top Container Ports, Percentage Change 2003-2004
Source: Journal of Commerce

	% Change
Ningbo (China)	44.5
Jeddah (Saudi Arabia)	36.5
Dalian (China)	32.4
Shanghai (China)	29
Colon (Panama)	28.5
Shenzhen (China)	28.2
Tianjin (China)	26.5
Khor Fakkan (UAE)	25.5
Dubai (UAE)	24.8
Long Beach (US)	**24.1**
Xiamen (China)	23.2
Qingdao (China)	21.3
Santos (Brazil)	20.7
Guangzhou/Huangou (China)	19.5

Together, the San Pedro Bay Ports form the largest container shipping facility in the U.S. in terms of both value of cargo and container traffic. Los Angeles and Long Beach together handled close to 13.1 million TEUs in 2004 (Figure 5). Total trade valued $240.6 billion. This was an increase of 10.4% over 2003 figures. China was the chief trading partner of the two ports, accounting for $102.4 billion, or nearly 43% of the total, an increase of 19% from the previous year (Port of Long Beach, 2005).

Long Beach saw more dramatic growth than Los Angeles (24% compared with 2%) largely because of its ability to accommodate the new 8,000 TEU vessels. Four ships of that size began operation on Trans-Pacific routes in 2004, and all of them berthed in Long Beach. November 2004 was the busiest month ever at that port, a time when peak season is usually already over. The Port of Los Angeles is also now able to handle 8,000 TEU ships at two of its terminals.

Figure 4: West Coast Container Traffic, 1995-2004
Source: American Association of Port Authorities

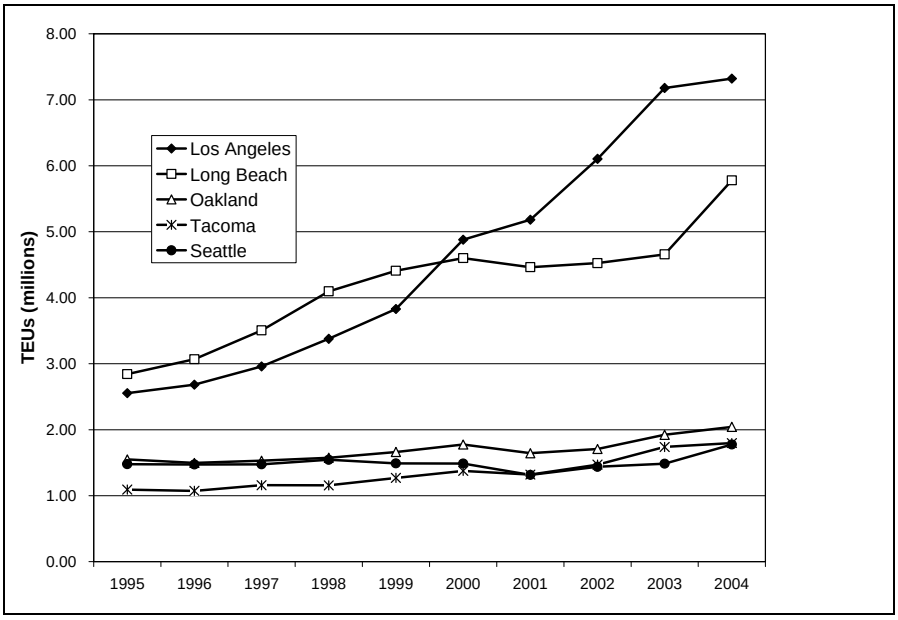
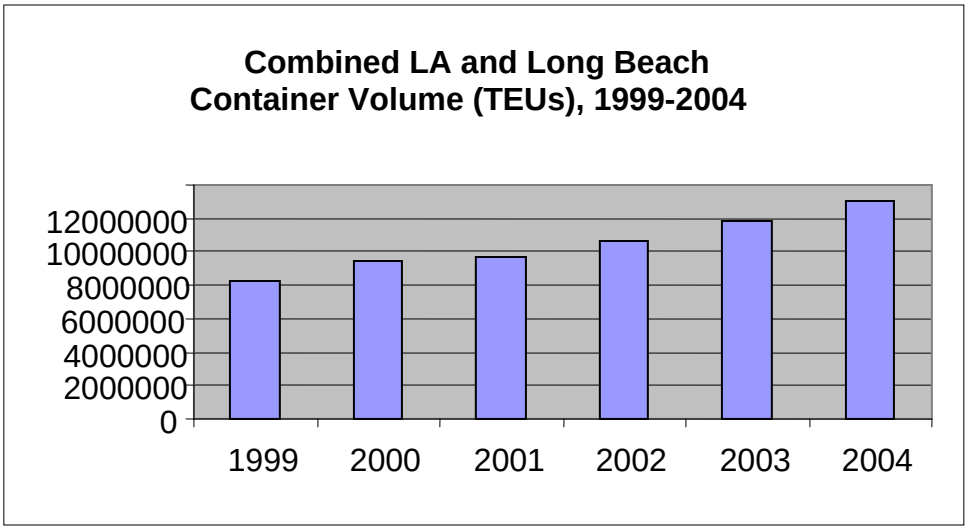


Figure 5: Combined LA and Long Beach Container Volume (TEUs) 1999-2004
Source: Ports of LA and Long Beach



The activity at the Port of Los Angeles brings in over $1.4 billion in state and local tax revenue to Southern California (Port of Los Angeles, 2004). The figure is comparable for Long Beach, where the port reports that it is responsible for one in every eight jobs in the City. It is estimated that port-related international trade accounts for about 550,000 jobs in the Los Angeles region (California BTH and EPA, 2005). Standard and Poor's Financial Report Card grades both the Port of Los Angeles (AA rating) and the Port of Long Beach (AA- rating) favorably. The

Port of Los Angeles' rating is the highest for any US seaport not receiving taxpayer support (Mayor's Office of Economic Development, 2004).

Complementing the activities at the two ports are more than 32,500 wholesale trade establishments and 7,300 trucking companies (Los Angeles County Metropolitan Transportation Authority, 2002). Apart from shipping, trucking, and warehousing, the commercial goods movement market includes several types of intermediary firms that facilitate freight transportation. Intermediaries include freight forwarders, freight brokers who operate primarily within the trucking industry; intermodal marketing companies (IMCs, formerly known as shippers' agents) who work primarily with railroads; and third party logistics (3PL) providers who coordinate logistics over a company's entire supply chain.

2.3 Infrastructure Pressures and Environmental Concerns

With growth in international trade in Southern California, there has come an awareness of the impacts of goods movement on the environment. Those who live and work in and near the ports are concerned about air quality, water quality, congestion and noise.

Widening and deepening channels may make harbor transport safer and more efficient but could harm marine life. Marine vessels discharge waste that contaminates local waters. Diesel exhaust is emitted by the cranes and lifts that are used to move goods from ship to shore and by aging rail locomotives. Even trains emit harmful exhaust, particularly the aging locomotives that are used in on-dock rail operations (National Resources Defense Council, 2004). Runoffs from the terminals themselves may contain harmful pollutants from on-site activities.

The Ports of LA and Long Beach represent the single largest source of air pollution in Southern California. More than 90% of emissions of harmful particulate matter at the ports comes from ships, container handling equipment, trains and trucks. A single container ship produces an equivalent amount of particulate matter and nitrogen oxides as a mid-sized oil refinery (Talerico, 2003). The approximately 16 ships that visit the Ports of LA and Long Beach on any given day emit pollutants equal to 1,000,000 vehicles (Natural Resources Defense Council, 2004). The ports as a whole produce the equivalent of 16,000 tractor-trailers idling their engines 24 hours a day (Starcrest Consulting, 2004).

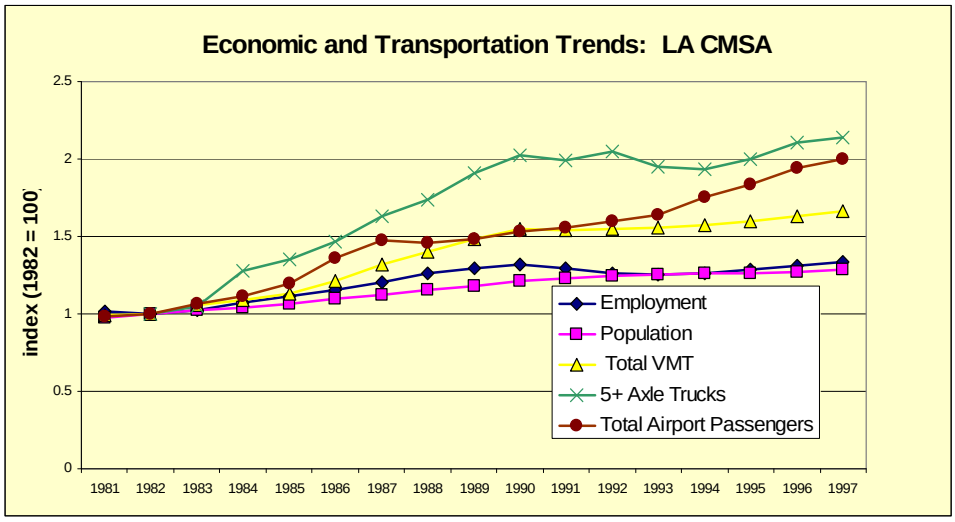
All of these have an impact on public health. The entire San Pedro Bay complex generates approximately 25% of the diesel pollution in the region; and research conducted by the University of Southern California has shown that children living in the region's most air polluted communities have reduced lung capacity and more school absences than children living in less polluted areas (Coussens, 2004).

Despite the impact from ships and yard equipment, trucks are the most visible reminder of goods movement activity because they traverse various communities on the region's roads and freeways after leaving the port. Between 1980 and 1998, US intercity truck ton-miles doubled from 555 to 1027 billion (USDOT, 2002). In the Los Angeles region, heavy-duty truck (HDDT)

miles (i.e. those trucks with five or more axles) have more than doubled since 1982, a growth rate greater than population, employment or total vehicle miles traveled (Figure 6). It is estimated that terminal activity at the Port of Long Beach alone generates an average of more than 403,000 annual HDDT trips (Starcrest Consulting, 2004); and the Southern California Association of Governments estimates that the shipment of goods on some major routes near the ports reduces average highway speeds in excess of 65% (Haveman and Hummels, 2004).

Heavy duty trucks also add disproportionately to non-recurrent congestion. According to the California Highway Patrol, between January 2000 and August 2003, 20% of all incidents in Los Angeles County that impeded the flow of traffic for 30 minutes or more involved trucks. Furthermore, when trucks were involved, the length of the delay averaged two hours (California Highway Patrol, 2003). Many of these incidents are maintenance-related.

Figure 6: Indexed Economic and Transportation Trends, 1981 – 1998
Source: Calculated by the authors from REIS (Regional Economic Information Service), State of California data.



For many years, the negative impacts of trade-related activity were outweighed by the economic benefits. However, two important events dramatically raised the profile of port activities with surrounding communities. The first was the release of the AQMD Multiple Air Toxics Exposure (MATES) II Study in 2000 (South Coast Air Quality Management District, 2000). MATES II was an ambient air monitoring and risk modeling exercise using 10 fixed regional sites and 14 mobile platforms in communities throughout Southern California. It assessed potential disproportionate cancer burdens and determined that 71% of all cancer risk from air pollution comes solely from diesel exhaust. A widely circulated map from the report showing concentrated diesel emissions was used to demonstrate that a "diesel death zone" existed in and around the ports.

The second event that contributed to a political backlash against the ports was the 2002 port lockout. Ports along the US west coast were closed for 10 days from September 27 to October 8, 2002. The shutdown was the result of an unresolved labor dispute between the International Longshoremen and Warehouse Union (ILWU) representing the dock workers, marine clerks and foremen, and the Pacific Maritime Association (PMA), a group representing ports and shipping lines.

An assessment of the lockout's impacts determined that, during the 10 day period, there were large reductions in heavy-duty truck traffic on the I-710 and I-110 near the ports, and a significant reduction in total traffic volume on the I-710 as well (Giuliano et al, 2005). Once President Bush intervened and the ports reopened, the situation became chaotic. There were delays in locating cargo, picking up cargo, and making deliveries to customers. These delays occurred despite 24/7 operation of the terminals that helped clear the backlog of ships in the harbor. There was no change in terminal gate hours, so cargo simply accumulated on the docks. This led to serious congestion on the docks; as containers piled up, container stacks got larger, so each container move took longer. As more surface area was filled with containers, there was less room for vehicles.

The terminals were overwhelmed; there was no plan for recovery. Containers were lost, and the ports reported queues of trucks miles long. There was also no plan as to how to get cargo on and off the docks; this, in turn, affected truckers and the railroads, and generated delays throughout the supply chain that lasted for months, particularly on the distribution end.

For elected officials and the community, the shutdown revealed the lack of cooperation among stakeholders in the supply chain. There was no effort, for example, to temporarily extend terminal gate hours so that truckers could pickup and deliver more cargo. Rather, late fees were imposed on truckers when containers were not picked up within the delivery window. Steamship companies insisted on getting ships out as soon as possible, apparently without regard for the consequences on the dock. Both the number of trucks needed to clear up the post-lockout backlog and the time required to do so gave goods movement a new and unwanted profile.

The release of the MATES Study and the shutdown occurred as the amount of container activity at the two San Pedro ports was rapidly increasing. Between 1999 and 2002 when the lockout occurred, the number of twenty-foot equivalent unit containers moved through LA and Long Beach rose from 8.2 million to 10.6 million. There was an urgency on the part of port officials and elected officials to address both the air quality issues revealed by the MATES II Study and the congestion issues made evident by post-lockout truck traffic.

2.4 Mitigating the Impacts of Port-related Operations

In an effort to control the negative impacts of trade in general and truck operations in particular, the ports, the trucking community and elected officials have looked to three primary solutions: infrastructure investments to enhance the capacity of the supply chain and road network over the long term, operational changes – including the adoption of new technology – to

enhance capacity in the near term, and finally, legislative responses to force change when the first two are slow in coming.

Alleviating congestion in to and out of the ports involves improvements to both the truck and rail networks. There is a particular interest in diverting as much truck traffic to rail as possible. The primary example of this is the Alameda Corridor, which opened in 2002. This $2.4 billion project, widely praised as the model for future public/private investment partnerships, is a 20 mile freight rail corridor that connects the ports of Los Angeles and Long Beach with intermodal facilities in Los Angeles and with the national rail network. By consolidating several at-grade rail lines and eliminating 200 at-grade crossings, the Corridor was expected to reduce street congestion, reduce diesel emissions from idling trucks and trains, and greatly improve rail travel time (Erie, 2004). There were also expectations that the Corridor would help to reduce truck traffic on the I-710, the major conduit for truck traffic from the ports, and shorten rail travel time. This did not happen, as approximately 25% of port cargo now moves in and out of the marine terminals via the Corridor (Agarwal et al, 2004).

Proponents argued that the Corridor was one piece of a much larger set of rail improvements that would be required to handle more container volume. Partial funding has been secured for the Alameda Corridor East, a proposed 35-mile connector extending east from the existing Corridor terminus near downtown LA through the San Gabriel Valley. This $910 million project would eliminate another 20 grade crossings, further facilitating access to the transcontinental rail network. However, with complete funding for these additional rail capital improvements uncertain, it has become apparent that rail does not offer an immediate solution to truck traffic.

During the same time period, plans for a major expansion of the I-710 were developed. The preferred plan called for a ten-lane facility, six lanes for general traffic and four truck lanes. The plan required additional right-of-way that would remove a large number of businesses and residences. Public reaction was negative and swift, and city and county leaders quickly withdrew the plan. Although another round of planning was initiated and public criticism tempered, growing state fiscal problems have made it apparent that major expansion of the I-710 is at least a decade away. Both the freeway and Alameda Corridor East projects secured less than the hoped for amount of funding from the 2005 federal transportation bill, SAFETEA-LU.

In the absence of money and political will, the goods movement industry is looking to more cost effective, shorter term solutions which depend upon operational changes and the adoption of new technologies. The most often talked about solution involves opening the marine terminal gates over a longer period throughout the day to enable the ports to accommodate an increase in cargo and to spread out truck traffic. This has proved problematic because of the need for all industry segments, including those at the receiving and distribution ends, to also modify their operations.

Other procedural changes however have had a positive affect on operations inside the terminals. New hiring metrics allow the Pacific Maritime Association to more accurately predict labor needs. The terminals are also experiencing a reduction in tardy shift starts. A recent arbitration ruling determined that ILWU workers trained for equipment-operating jobs have to

take those jobs rather than wait for higher paying marine clerk positions to be announced in the dispatch hall. This allows a greater percentage of shifts to start on time.

More success has come with technological advancements that speed up goods movement, at least dockside. Many of the rules regarding the adoption of new technology at the ports are regulated by the latest contract agreed upon by the International Longshore and Warehouse Union (ILWU) and the PMA. The contract allows a terminal to implement new technology but must alert the union each time it plans to do so. The union has the right of challenge. Under these guidelines, terminals in LA and Long Beach have installed Optical Character Readers to help automate the check-in process for trucks at the gate. The 2002 agreement also allows for the adoption of labor and time-saving technologies such as bar code and optical scanners, GPS systems, Internet solutions, remote hand-held devices, and information sharing tools.

Some technological innovation has also come about as a result of the threat (and success) of legal action. In 2000, the National Resources Defense Council (NRDC) sued the Port of Los Angeles over the environmental review used to approve the new China Shipping Terminal. As part of a negotiated settlement, the Port agreed to outfit the terminal with new alternate marine power (amp) technology, also called cold ironing. Cold ironing allows ships calling at a terminal to shut down their on-board engines and plug into shore side power generated by locally regulated power plants. It is the first example of a commercial harbor anywhere in the world using the technology. 70% of the ships calling at the new terminal will be able to use the cold ironing process, reducing marine vessel emissions. Each ship could eliminate some 30% of its emissions in the process (Talerico, 2003).

The success of the NRDC lawsuit in forcing change upon marine terminals and ports was not lost on the community or elected officials. Regulatory action is increasingly being used as both a carrot and a stick to encourage goods movement stakeholders to make their operations more environmentally friendly. At the federal level, the US Environmental Protection Agency (USEPA) is charged with setting emission standards for marine diesel engines and fuel quality standards for tugs and ferries. Diesel refining has been modified so that fuels have less sulfur, a factor in both acid rain and smog.

In 1997, the federal government through the US EPA Agency also adopted new emission standards for model year 2004-and-later diesel trucks. Newer standards will take effect in 2007 to regulate the emission of particulate matter. Other standards, including limits on sulfur content, will be phased in by 2010.

Given the sheer volume of containerized goods moved through the Ports of Los Angeles and Long Beach, and the ever increasing attention being paid to the impacts of international trade, it is not surprising that state and local legislators have attempted to respond to the concerns of their constituencies and move beyond federal regulations.

In 1993, the California Air Resources Board established rules for a specially formulated California-only diesel fuel; and while the USEPA was adopting new emission standards for model year 2004-and-later diesel trucks, California was moving beyond federal regulations. State certification for trucks with engine model years 2005-2007 has an added requirement for a

supplemental emission test as well as limits that are 1.25 times stricter than the federal test procedure standards.

Both the State, through the California EPA's Air Resources Board, and the South Coast Air Quality Management District have also attempted to control diesel emissions by regulating yard equipment. The off-road engines used in this equipment will likely produce 74% of the state's diesel particulate matter emissions in 2010 (California Environmental Protection Agency, 2004). The ARB also passed new rules to take effect in 2005 making it illegal to leave diesel-powered trucks and buses running idle for longer than five minutes.

The AQMD has issued regulations for tractors; and in October 2000, the ARB approved a risk reduction plan to reduce particulate matter emissions from diesel-fueled engines and vehicles. The agency has already established control measures for truck refrigerators; and is in the process of establishing new statewide standards for mobile diesel-fueled cargo handling equipment at intermodal facilities.

What is telling about all of these efforts is how little control regulators have over certain aspects of the supply chain. The major source of emissions – the ship – is exempt from regulation under international law. Railroads are exempt from local regulation under US interstate commerce provisions. Only trucks and on-dock vehicles can be targeted by local air quality regulators; but a legal basis for regulation is required to do so. One such basis is the reduction of truck vehicle emissions associated with queuing at terminal gates.

2.5 The Development of Assembly Bill 2650

Assembly Bill (AB) 2650 was passed by both the California Senate and the State Assembly in August of 2002 and became law with the signature of Governor Gray Davis on September 30, 2002. The legislation imposed a penalty of $250 on marine terminal operators for each truck idling more than 30 minutes while waiting to enter a terminal gate at either the Port of Los Angeles, Long Beach or Oakland. Wait time here refers to time spent in line outside of the official entry of the terminal property, and not the time spent waiting between the entry and the pedestal inside the gates where trucks receive permission to enter the docks. AB 2650 had no jurisdiction over queuing within the terminal.

Terminals could avoid fines by extending gate hours to 70 per week (65 hours at the Port of Oakland), i.e. adding full service evening or weekend gates designed to spread out truck traffic, or by offering a gate appointment system to trucks to drop off or pick-up cargo containers.

Appointments are made via a proprietary web-based information system. The terminal operator determines which service is to be used, and the trucking companies and others pay to access the service based on volume of transactions. The most widely used is e-Modal, which existed prior to AB 2650 as a container information system. It is used by trucking companies to determine cargo availability and whether there are any holds on the container because of demurrage fees (fees paid for violations of allowable free time prior to pick-up) or needed

customs clearance. There are at least two other systems apart from e-Modal also in use. Based on the information offered by these various systems, a customer orders delivery, and the truck company makes the appointment and dispatches the truck. Since the information system is neither mandatory nor standardized, not all trucking companies that serve the port are information system subscribers. The same is true for importers and exporters.

For terminals with an appointment system, the legislation levied fines for only those trucks making use of the system. Terminal operators were given approximately one year to develop an action plan to reduce gate delays. As a result, appointment systems and extended gate hours had to be in place by July 1, 2003.

In Southern California, the provisions of the bill were enforced by the South Coast Air Quality Management District (AQMD), which assigned a full-time inspector to the two port complexes. The AQMD was a likely candidate to oversee enforcement since it already regulates both stationary and mobile pollution sources in the Los Angeles Basin and administers grant programs on behalf of the State Air Resources Board to offset the costs of projects that reduce emissions from these sources.

For the purposes of monitoring AB 2650, the AQMD established a Working Group designed to provide interested parties with a forum in which to discuss implementation and assess the bill's impacts. This Working Group initially met on a monthly basis after it was first convened in December 2002; in February 2004, the schedule was revised with meetings held on a quarterly basis.

The bill's sponsor, Assemblyman (now Senator) Alan Lowenthal of Long Beach, proposed AB 2650 in January 2002 at a time when port operations were under increased scrutiny. As a representative of the port community, Lowenthal was well aware of the economic benefits of goods movement but also increasingly of its cost. In 2000, he introduced a bill to cover open petroleum piles at the ports. Lowenthal has also identified the release of the MATES report as a contributing factor to increased general awareness of the impacts of goods movement activities and, as a result, to the development of this particular piece of legislation (Long Beach Press Telegram OpEd, December 5, 2004).

Appointments were not part of the first version of AB 2650 that Lowenthal introduced in February of 2002. At that time, the goal was to permit trucks to conduct transactions at a terminal in less than 15 cumulative minutes. Violators were still fined $250; the fine was $750 if there was an attempt to divert a truck to an alternative staging area. Exemptions were allowed for terminals providing at least 16 continuous hours of uninterrupted, fully staffed gates each day, five days a week AND two continuous hours of full gates two hours prior to and after peak hours each day, five days a week.

From the beginning, the legislation enjoyed the support of the longshore union and the teamsters which held a rally in support of AB 2650 in April 2002. The Long Beach City Council also voted to support the bill. The Long Beach Board of Harbor Commissioners initially opposed it but reversed itself when the Pacific Maritime Association offered an amendment removing the references to maximum turn times.

In February 2004, Lowenthal introduced AB 1971 which was designed to clarify that AB 2650 applies to both engine idling and truck queuing, thereby facilitating the compliance process for the Air Quality Management District inspector. This bill was passed by the State legislature in the summer of 2004 and signed by the Governor in September. It became effective on January 1, 2005.

In February 2005, Senator Lowenthal introduced another piece of legislation tied to Assembly Bill 2650. Senate Bill 761 would have removed the 70-hour exemption, mandated appointments for every truck and required a 60-minute turn-time for trucks "while conducting business at a marine terminal." This bill failed passage while in committee in April of 2005.

Despite the fact that the Senator was unsuccessful in bringing about mandatory appointments, AB 2650 was significant. It sent a clear message to the goods movement industry that elected officials were willing to introduce (and could successfully push through) legislation that indirectly imposed operational changes on terminals. In this case, the bill was an air quality measure that did not target emission sources directly. Instead, it used gate operations (appointments and extended hours) as a tool to minimize truck queuing and the negative air quality impacts associated with it.

3. Incentives for Increased Regulatory Oversight: Lessons from the Literature

There is little prior research directly relevant to our analysis of AB 2650. The combination of dramatic increases in freight traffic and transportation systems operating at or near capacity has only recently resulted in growing visibility of freight and its role in urban congestion and environmental problems. Research is also limited by lack of data: goods movement is a largely private sector endeavor, and the available data sources are particularly limited at the metropolitan level. This chapter will highlight the relevant goods movement literature, including the congestion-related impacts of the supply chain, with a focus on trucking.

We are also concerned with the kind of indirect regulatory attempts that are exemplified by AB 2650. There are examples of regulations controlling operating practices in the goods movement arena. Truck drivers for example are subject to maximum hours of service and minimum break regulations. These are federal health and safety guidelines designed to protect both the driver and the public. They directly impose operational standards on the driver and have clearly defined measurements, namely the number of consecutive hours on the job. There are also examples of air quality regulations that directly target stationary and mobile sources of harmful emissions. Air quality measures have been used to regulate the kinds of fuels that commercial trucks can use.

There are far fewer examples of indirect air quality control measures that target behavior and/or operations. This is partly because impacts are difficult to measure and partly because there are political risks to placing burdens on private individuals or businesses. Efforts to improve air quality through land use and urban development controls have been largely unsuccessful for example. There are however lessons to be learned from attempts to influence driver behavior by regulating employers. One well documented example, Regulation XV, occurred in Southern California and involves the South Coast Air Quality Management District, which plays an obvious enforcement role in AB 2650. We therefore concentrate on the literature evaluating this indirect regulatory measure.

3.1 Congestion Related Impacts of the Supply Chain

Much of the research focus in the area of supply chain congestion has been on road congestion. Problems on freeways and local road networks are seen as symptoms of greater problems throughout the goods movement chain. Regan and Golob (1999) conducted a survey of about 1,200 trucking firms operating in California to identify the major constraints and deficiencies affecting freight transportation in the state. Factors identified included congestion, highway capacity, safety, geometrics and surface conditions, and intermodal connections. The Southern California Association of Governments (SCAG, 2003) has conducted studies of heavy duty trucks within the region as part of long range planning efforts.

A few studies have addressed the environmental impacts of port-related goods movement. Lena et al (2002) conducted a study of truck traffic in low income neighborhoods near the New York-New Jersey port. They document high volumes of truck traffic in these

neighborhoods, and estimated associated increases in emissions. They conclude that low income residents experience higher exposure levels as a result. In Southern California, the MATES Study found that 71% of all cancer risk from air pollution comes from diesel exhaust (SCAQMD, 2000), and the entire San Pedro Bay port complex generates approximately 25% of the diesel pollution in the region. A recent health study has established a relationship between childhood asthma and exposure to traffic-related pollution (Gauderman et al, 2005; Coussens, 2004). The same long-term child health survey from Southern California demonstrated a significant relationship between school absences and exposure to particulate concentrations. Other studies have supported the notion that airborne particulate matter has significant health risks (Jerrett et al, 2005).

Most directly related to our own work are studies addressing various aspects of truck queuing and the use of gate appointments as a response to these problems. A study prepared for the US Maritime Administration of the USDOT (A. Strauss-Wieder, 2002) reported that 40% of the top 15 ports (but only 20% of container ports) in the US reported gate access as unacceptable; half of them saw a need for paperless gates. The report speculates that the increasing use of extended gates explains the general level of contentedness with gate operations.

There is slightly more information from the trucking perspective. Huynh and Walton (2005) used simulation models to evaluate appointments as a means of reducing truck turn times. Applying the models to data from the Port of Houston, they determined that limiting truck arrivals into a yard can have a beneficial effect on turn times. They caution however that setting caps too low can be counter productive.

Barber and Grobar (2001) conducted a study of truck delay at the Los Angeles and Long Beach ports. They estimated total wait time (both on dock and at the gates) for almost 20,000 individual moves based on data from three trucking companies. About 40% of all transactions had reported wait times of over two hours. Barber and Grobar estimated more than 3.7 million hours of truck wait time at the ports annually.

Monaco and Grobar (2004) conducted a study of harbor drayage, extended gate hours and gate appointments. Survey results from 60 drayage firms and drivers at the port confirm that drivers spend a significant portion of their workday waiting at the ports. Though firms indicate that they utilize the appointment systems at available terminals, most do not use the system consistently. Truck turn time data (e.g., the total time spent entering a terminal, picking up or dropping off cargo, and leaving the terminal) provides some evidence that time spent inside terminal facilities decreased on average between the summer of 2002 and the fall/winter of 2003, although this differs from terminal to terminal and may depend in part on individual agreements between terminal operators and trucking companies.

Truck behavior is largely dependent upon the actions taken by other, often more powerful, actors along the supply chain. Because of this, the institutional context in which trade occurs matters greatly. Some work has addressed the institutional context of international trade, although not always at the level of the marine terminal. Lakshmanan and Anderson (2002b) consider cross border control systems, financial coordination mechanisms and logistics practices in the NAFTA, EU and Mercosur regions. The role of institutions in the historical development

of port complexes has been examined in the cases of the New York/New Jersey Port Authority (Doig, 2001) and the Los Angeles/Long Beach ports (Erie, 2004). Hall and Olivier (2005) explore inter-industry relationships and linkages, including those involving port authorities and terminals, in the context of automobile imports. Yahalom's 2001 study of productivity at the New York/New Jersey Port Authority's intermodal transfer facilities also underscores the importance of institutional agreements. His research includes an analysis of lease arrangements; and his recommendations include changes in terminal gate operating hours and use of appointments to pick-up and deliver containers.

3.2 Lessons of Regulation XV

AB 2650 is an attempt to bring about these changes via the regulatory environment, seeking to reduce truck emissions indirectly by changing the behavior of terminal operators. The terminal operators are required to meet performance standards, in this case maximum queue and wait times, in order to avoid a fine. This approach is in contrast to more incentive-based approaches.

The most studied indirect regulatory effort is perhaps the Southern California experience with Regulation XV (Giuliano et al, 1993; Giuliano and Wachs, 1997; Multisystems, Inc., 1997). Regulation XV was adopted by the South Coast Air Quality Management District, the AB 2650 enforcement agency, in 1987 and covered the four counties in the South Coast Air Quality Basin. It was developed in response to federal Clean Air Act mandates to set minimum standards for pollution levels that threatened public health. Regulation XV required both public and private employers with 100 or more workers at any work site to submit a plan aimed at reducing average vehicle ridership. This regional effort was bolstered by a City of LA requirement, adopted in 1988, for many of the same employers to offer a transit fare subsidy to those employees taking public transit to work.

The regulation had some effect in encouraging regulated employers to provide preferential parking for vanpools and carpools and to offer public transit incentives. These were affordable alternatives allowable under the tenets of the regulation (Giuliano and Wachs, 1992).

Opposition to the regulation grew as the AQMD increased enforcement and imposed large fines on a few major employers. Employers went to the State Legislature, and in 1995 were successful in getting legislation passed to prohibit mandatory employee trip-reduction programs. In response, the AQMD replaced Regulation XV with a program permitting trip reduction options that included employee education programs. These rules were later replaced in 1996 with fully voluntary programs. Regulation XV analyses determine that while the program did result in increased average vehicle ridership at targeted sites, enforcement proved difficult and the political imperative was short-lived.

Regulation XV set the standard for employer-based trip reduction programs. In January 1994, these plans became mandatory in nine major metropolitan regions that at the time met federal standards for air quality non-attainment areas. Texas followed a similar path as California, first mandating trip reduction programs, and then suspending them in favor of voluntary efforts (Lewis, 2000).

While other areas have pursued mandatory programs (New York for example required city companies that pay for employee parking to offer transit benefits to workers), most regulatory agencies now use the "carrot" and not the "stick" approach. The Massachusetts Port Authority has independently adopted employee trip reduction programs in an effort to limit congestion in and around Logan Airport (Addante and Ricard, 1994). Pagano and Verdin (1997) determine that employee trip reduction programs without government mandates can result in reduced solo driving rates. Their study of Chicago area programs indicates that the elimination of government mandates can reduce the cost of implementing an employee-based program by 50%.

These results indicate that indirect programs like Regulation XV can have some positive impact, but they are easily undone. The desire to either encourage or mandate behavioral change on the part of employers (who bear the costs of these trip reduction programs) can be at odds with efforts to promote job growth and economic development. The decision by the State of California to prohibit mandatory employee trip reduction programs while local and regional government promoted them is a case in point.

The next section considers the development of AB 2650, another indirect government program to regulate the decision-making of others. In this case, the issue is the willingness of truck drivers to use an appointment system designed by terminal operators in response to legislative action. We have cause to revisit the question of who has the incentive to make such a system work, how its benefits are measured, and whether the benefits, if realized, are sustained.

4. Research Approach and Methodology

This chapter presents our approach and methodology for data collection. We use both qualitative and quantitative measures, relying upon data from a variety of sources including terminal and trucker surveys; data provided by selected terminals; field observations; interviews with other stakeholders including longshore labor, public agency representatives and elected officials; SCAQMD compliance reports; publicly available data on port operations; and newspapers and newsletters.

Because the means of compliance with AB 2650 varied from terminal to terminal and because the terminals are not required to share information on port transactions with the public, we were unable to obtain data that would allow us to make a systematic analysis of operations both before and after the legislation. We relied instead on retrospective information, attempting to isolate the impacts of AB 2650 from other confounding factors in play at the time. These include the implementation of new technologies, the opening of new terminals and expansion of others, and changes brought about by the 2002 ILWU-PMA labor agreement.

Because AB 2650 sought to mitigate the air quality impacts of trucking by regulating terminal operators, our research approach focuses on these two stakeholder groups. We seek to understand how truckers and trucking companies responded to the opportunity to make a gate appointment (starting with whether or not they actually used them) and whether they saw themselves as the beneficiaries of improved operations at the terminal gates. From the terminal operator perspective, we are interested in how and why operators chose to comply with the legislation. In both cases, we ask if original perceptions of the legislation proved to be accurate.

We are also interested in whether the goals of the bill were met. AB 2650 sought to improve air quality by minimizing truck idling and queuing outside the terminal gates; therefore, our evaluation is concerned with measuring reductions in queuing at the terminals and any subsequent reduction in diesel emissions. We understand these to be the stated goals.

We also believe there are unstated goals. For the terminals, avoiding fines meant either adopting appointments or extending gate hours. This suggests that the sponsors of the legislation had an interest in reducing road congestion by reducing gate congestion during peak hours, and encouraging changes in the ways in which terminals operate. Because terminal operators have historically been resistant to external pressures, AB 2650 sent a signal that the State would not hesitate to use regulatory measures to effectuate change when the industry would not take the initiative. Our research approach therefore seeks to determine whether in fact Lowenthal's bill resulted in operational changes which could potentially spread out truck traffic both throughout the day and during off-peak hours.

Both appointments and extended gate operations have the potential for increasing the efficiency of gate operations. If terminal operators know in advance which containers are being picked up or dropped off, they can better manage truck flows and container moves within the

terminals. This information is particularly useful during the evening and on weekends when labor costs are higher. The ability to predict gate moves allows for the more efficient ordering and use of longshore labor.

Appointment use may also translate to shorter transaction times for truckers, as less time would be spent waiting for a container to be available. Without appointments, cargo may be picked up as soon as it is available (taken off the ship, passed through customs, and stored on the dock). Appointments could also be used to meter truck arrivals to prevent congestion on the dock. Truck drivers themselves would have an incentive to use appointments if appointments assured a load was ready and available.

It is also important to consider the role of gate entry within the process of picking up or delivering container cargo (including empties). It is possible that the terminal gate serves as a metering point, allowing a rate of entry based on the rate at which each truck can be serviced. If appointments increase the rate of entry, the rate of servicing must also increase, or queuing will result inside the terminal. The terminal operators potentially have two conflicting objectives. On the one hand, they seek to optimize their own productivity, and so would use appointments only to the extent that they improve throughput. On the other hand, the Lowenthal bill specifically targeted queuing outside the gates, and one obvious response is to shift those delays to inside the gates. This is particularly the case where appointments are viewed only as a means of complying with the legislation and are therefore a cost to be minimized. Productivity benefits may be realized but only in the long term; and because of the competitive nature of port operations, it is possible that terminal operators would prefer not to bear the cost (and uncertainty) of being the first to broadly adopt appointments (Mallon and Magaddino, 2000).

In order to determine how both terminal operators and truckers responded and if both stated and unstated goals were met, we monitored the appointment system over a 16 month period from January 2004, 6 months after its operational inception, through June 2005. In order to assess the terminal response, we conducted interviews, collected data on gate and appointment practices and on appointment use where possible. We were able to obtain input from eight of the thirteen terminal operators at the two ports either by in-person interview or questionnaire. Our questions were designed to determine the level of interest in using appointments as a means of complying with AB 2650 and the ways in which appointments affected operations, if at all. Our questionnaire can be found in Appendix B.

Although the legislation did not require terminals to report on the percentage of total gate moves that involved appointments, we obtained appointment data for three terminals and observed changes in time over the course of our study period. We requested data on appointments made, modified and deleted for a total of six months during the appointment period: September and October 2003 and March, July, August and September of 2004. For the remainder of the terminals, we relied upon information voluntarily reported to the AB 2650 Working Group and the South Coast Air Quality Management District.

Conducting a survey of individual truckers was not feasible given the scope of the project. A trucker survey was also not likely to result in the most accurate information on use of terminal gate appointments at the Ports of LA and Long Beach. Many of the truckers moving

cargo into and out of the ports are independent owner operators who contract with one or more drayage companies. These larger companies, and not the truckers themselves, subscribe to the various web-based cargo information and appointment systems and make the decision to dispatch drivers with or without appointments.

There are four types of truck transactions: pickup of import container, pickup of empty container, drop off of export, and drop off of empty container. Combinations, or dual transactions, are also possible. Typically, import pickups are the most complicated, as the container must be cleared with all fees paid before it is released. The container must be moved from a stack and deposited on the truck chassis. If a container is in a stack, the trucker must go to the stack and wait until the container crane operator locates and moves the container. There is somewhat more flexibility with export drop-offs and with empty container moves. Thus, appointments are most likely to be made for import pickups.

It was decided to conduct a survey of drayage companies. This survey is available in Appendix C. There is no readily available database of owner operators or drayage firms. While many companies dray from multiple terminals, some are affiliated with a single terminal or a single shipper. Individual terminal trucking lists, if even available, would therefore be incomplete. Instead, the decision was made to reach trucking companies through the local regional unit of the California Trucking Association, 1 of 13 such units in California. CTA members are not likely to be representative of the drayage industry, but rather larger, more stable companies. CTA members do however transport 85% of the shipments made in all of the State and, as stated, are more likely to be in a position to make appointments than independent owner operators.

If truckers did respond to AB 2650 by using gate appointments, then it is possible that the legislation met its goal of minimizing truck idling and queuing outside the terminal gates (with a subsequent reduction in diesel emissions). We are interested, however, in the possibility that queues outside of the gate might be moved inside the gate in an attempt to avoid AB 2650 fines. The Air Quality District had only one inspector assigned to the two ports assessing queue length, and the responsibility of the District was to monitor activity outside of the gates. The terminals were not required to report on inside-the-gate lines or on the percentage of moves involving appointments.

We therefore conducted truck counts and measured queue times at two separate terminals. The purpose of the field data collection was to obtain information on queue times and transaction times, as well as to compare total turn time (queue plus transaction) for transactions with and without appointments. This required collecting field data that could be merged with terminal operator records. This was our only option since we lack data that allow us to measure both truck volume and turn time before AB 2650.

Measuring queue times allows us to better understand where possible delays are in the system. If queue time is minimal but total turn time from entry to exit gate is considerably longer, then it is likely that the delay is in the transaction, the time from the pedestal to the exit gate. i.e., when the truck is on the docks dropping-off or picking up a container or both. At one of the two terminals, students were placed at vantage points that allowed us to identify the length

of the queue from the AQMD gate at the entrance to the property to the pedestals where truckers receive transaction slips. At the second terminal, we were able to observe trucks as they entered the property (but not at the pedestal) and at the exit gate. We then matched our data with data provided by the terminal in order to estimate queuing times; and because we lacked port-wide figures, simulated potential time savings from the appointment system. We also submitted a request to the AQMD to receive all inspection and compliance reports in order to determine the number of AB 2650 violations and average queue length observed.

All of the data from our field collections and from our surveys and interviews contribute to our understanding of the bill's unstated goal: bringing about operational changes that are embraced by terminal operators. We also attended all of the AB 2650 Taskforce meetings to receive verbal reports from the AQMD inspector and to observe the exchanges between the air district, terminal operators and truckers. In the absence of institutionalized change, there is little likelihood that a single policy measure will bring about desired changes in truck traffic patterns throughout the day and during off-peak hours.

5. Implementation and Enforcement of AB 2650

This chapter presents the findings from our analysis of the implementation and enforcement of AB 2650. We begin with data from the terminals themselves. This includes self-reported progress in implementing AB 2650, including appointments. We then turn to the enforcement efforts of the South Coast Air Quality Management District. The AQMD inspector's quarterly reports offer insight into the difficulties in overseeing queues at 13 different terminals at two ports.

The appointment system, as it appears in the legislation modified and subsequently enacted into law, was intended to improve truck congestion and thereby air quality by reducing wait time at the terminal gates. The systems are voluntary; consequently, not all terminal operators offer appointments, not all trucking companies use the system, and not all system users are regular users. Without an appointment system, trucks arriving at the gates are served on a first come, first served basis. Truckers arrive early at the gates in order to get a place near the head of the line. In general, the focus of an appointment system is on imports, although under the bill terminals that accepted appointments had to do so for all for gate moves. AB2650 also mandated that appointments be at least 60 minutes in length and continuously staggered throughout the day.

5.1 Terminal Compliance with AB 2650

Given the voluntary nature of the appointment system, it is not surprising that it was implemented differently across terminals (Table 3). Terminal operators responded to AB 2650 by doing what would have the least impact on operations inside the gates, whether it involved extending gate hours, implementing appointments, or simply attempting to keep truck queues to a minimum without making any operational changes.

One terminal chose to simply comply with the 30 minute queue limit. Two of the three terminals whose only means of compliance was extended gates had already incorporated them into new operations after changing terminal locations. These are state of the art facilities with numerous entry and exit gates, and with enough space to keep most cargo on chassis ("on wheels"). When containers are stored on chassis, truckers attach the chassis to the truck, eliminating the need for longshore labor in container moves. This greatly reduces the costs of extended gate hours and improves turn time.

Two terminals chose to comply with AB 2650 with both a 70-hour gate and appointments. In one case, the terminal already operated extended gates on a limited basis, but full service were required by the legislation. In this case, appointments were adopted because it was simpler and cheaper than modifying already existing off-peak gates to accommodate grounded containers. In the second case, appointments were part of a broader company plan to improve operations. All of the 5 terminals that have extended gate hours (i.e. with or without appointments) operated these hours before July 2003. That is, no terminal chose to comply by implementing extended gate hours.

Table 3: Implementation of AB 2650

Terminal	Compliance method	Extended hours	Appt system provider	Same day appts?	Phone appts?	Gate procedures
WBCT	Appointments	Saturday, Sunday – limited hrs	MTC Voyager	Yes	Yes	
Yusen	Appointments	Day shift 7 days/week	Navis (no fee)	Yes, to 3:30 PM	Yes	3 appt lanes; all 9 at AM opening
APL	70 hr gate operation	Yes, for specific moves, shipping lines	N/A	N/A	N/A	
APM Maersk	70 hr gate operation	Yes, 7 AM – 2:30 AM 7 days/week	N/A	N/A	N/A	
Evergreen	Appointments	T-W-Th early AM gates as needed	MTC Voyager	Yes	Yes	1 of 4 lanes for appts
Trapac	70 hr gate + appointments	Night gate by appt, wheeled loads only	e-Modal	No	No	
CUT	Direct	No	N/A	N/A	N/A	
ITS	Appointments	Sunday gate for special cargo	e-Modal	Yes	No	Trucks with appts pulled from queue if wait time near 30 min.
LBCTI	Appointments	Sat, Sun 7 AM – 6 PM	e-Modal	No	No	Trucks with appts pulled if wait time over 20 min.
PCT	Appointments	No	e-Modal	Yes	Unk	Appt trucks to main gate
SSA – A	Appointments	No	e-Modal	Unk	Unk	Appt trucks to main gate
SSA – C	70 hr gate operation	Full night gate 4 days/week	N/A	N/A	N/A	
TTI	70 hr gate + appts	M-F early AM, limited; full Sat; limited Sun	MTC Voyager	Yes	Yes	

Eight of the fourteen container terminals at the two ports complied with AB 2650 by developing appointment systems only. Two of these belonged to the Voyager system. A third had a different proprietary system. In each of these three cases, appointments were seen to be an integral part of changing operations on the docks that were in development prior to the onset of the Lowenthal bill. It is important to note that Voyager terminals also accommodate phone appointments, adding flexibility to the process. Why they do not also operate off-peak gates appears to be a function of terminal size (not enough land to run wheeled operations), and nature of the client base in addition to cost. Space constraints would motivate efforts to increase efficiency. In the five remaining cases, it appears that appointments were viewed simply as a cheaper alternative to extending gate hours.

Among those who did implement an appointment system, operating policies differ regarding appointment availability, rules for making appointments, etc. Some participating terminals now operate two lines, one for appointments and one for standard pickups; most however maintain a single queue. There was no requirement that the container be ready and available to the trucker, however. The on-dock process remains unchanged by the appointment system.

It should be noted that this voluntary approach to scheduling pick-ups and deliveries at the docks is the same approach used by the retailers themselves when coordinating pick-ups at their own facilities. At least one survey of private Fortune 500 retailers and grocers found varying use of automation despite the fact that unloading delays at the receiver end can equal 8% of the total transportation budget (Nemecek, 2001; Mercer Management Consulting, 2000).

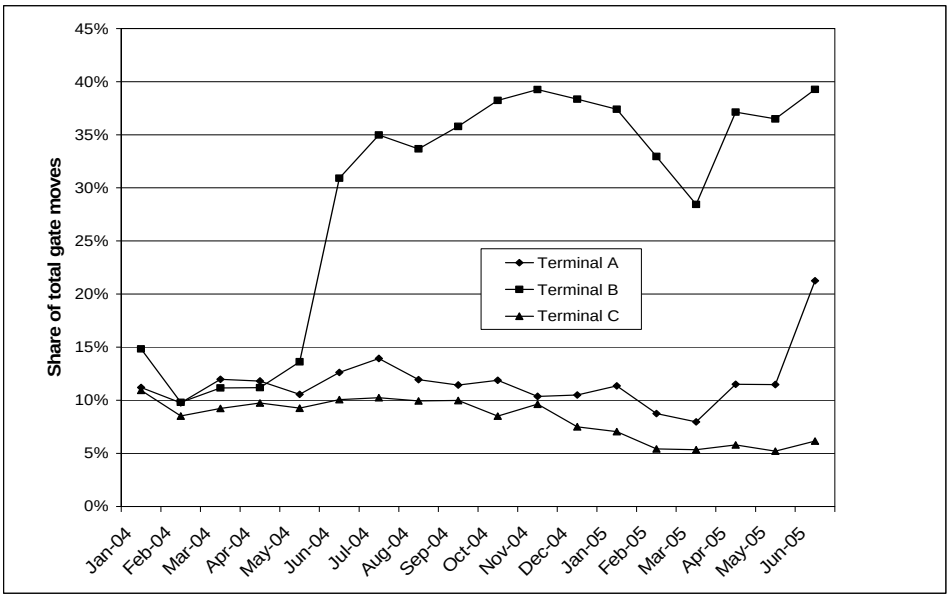
5.2 Terminal Operator Assessment of AB 2650

We were able to interview representatives from 8 of the 13 terminals at the two ports. When asked of their assessment of the appointment system, terminal operators had differing responses. Those who did not see appointments as a useful strategy made the following observations. First, terminals must be flexible and organize their operations based on the nature of their business. There is great variety in type of product, number of ships served, customer requirements, and dock space. When extended hours are warranted, they are offered. Second, the web-based container information systems were already providing data on container availability; hence, it was unclear what additional benefit appointments would add. Third, the most promising option for improving productivity is technology, such as efficient use of OCRs, using GPS to track container movers, and streamlined cargo tracking. Fourth, an appointment system adds to the data burden of terminal operators. Finally, there is an incentive to discourage appointments, since the greater the proportion of appointments, the more likely it will be that a truck with an appointment will be present in a long queue, and hence the greater risk of being fined.

The three terminals that had already developed an appointment system see it as an essential means for managing dock operations. Appointment slots can be determined for each yard area so that traffic on the docks is smoothed across the day, and so that high demand areas can be rationed.

The terminals gave broad estimates of appointments as a share of total gate moves as part of their reports to the Air Quality Management District. These ranged from 5 to 30 %, with most appointments made for import pickups. Findings from three terminals which provided us with data directly are shown in Figure 7, which represents appointments made by month as a share of total gate moves, from January 2004 through June 2005. Patterns for the three terminals are quite different, and reflect different practices with regard to appointments. Terminal B has pursued a strategy of increasing appointments as a way of managing truck moves on the dock. Once almost exclusively made for import pickups, appointments are being made for an increasing share of export drop-offs. Terminal A has recently decided to promote appointments; Terminal C has not aggressively promoted appointments. Appointments are promoted by encouraging trucking companies to make appointments, making sure cargo is ready for pickup, and minimizing trucker wait time. Truckers are paid by the load, not by the hour. Hence, if appointments reduce trip times, truckers have every incentive to make them.

Figure 7: Appointments as Share of Total Gate Moves



5.3 AQMD Enforcement of AB 2650

The South Coast Air Quality Management District (and the Bay Area Air Quality Management District in Northern California) assigned one full-time inspector to monitor truck queuing as part of the AB 2650 compliance effort. The inspector was at the ports at least four days a week and moved from terminal to terminal timing queues to see if trucks were waiting longer than 30 minutes. His observations were made from outside of the terminal gates although it was deemed a violation of the law for terminals to move trucks inside the gate for the purposes of avoiding a citation. Until January 1, 2005, before the law was clarified, only trucks that were idling (and not merely queuing) for more than 30 minutes or more were subject to AB 2650.

There were four types of inspections made. The first was a discrete observation, labeled by the District as a surveillance, and designed to determine if further investigation were warranted. Surveillances ranged from five minute checks to extended observations of queues. If further investigation was in fact warranted, then an "inspection" occurred. This was an interaction with terminal management to determine the cause of any possible delays. A "targeted inspection" was one with cause, when a violation appeared imminent. Conditions existed where the inspector actively searched for a violation to document.

Apart from the inspector's own observations, he took complaints from outside parties, in most cases truckers. Complaints often included concerns about waits "inside the gates." The inspector communicated with truckers in a number of ways. The roadways leading up to the terminal gates are not pedestrian friendly and so the inspector installed a CB radio in the car to identify appointment trucks more quickly and safely. He also advised drivers to use their flashers when they were in line and had an appointment. Any driver that had an appointment and appeared to be waiting in line for more than 30 minutes was asked to fill out a "Declaration of Truck Waiting and Engine Operation Time at Marine Terminal." This is a document in both English and Spanish that asked, among other questions, when the engine was turned off and turned back on while in line. These declaration forms were voluntary; drivers were asked for their names although they were promised anonymity unless a matter became the subject of legal action. Drivers could not be fined as a result of an AB 2650 investigation, only the terminal operators. There was however regular discussion at the quarterly AB 2650 taskforce meetings about the willingness of the trucking community to interact with a representative of the AQMD. The agency is responsible for monitoring emissions from vehicles, including trucks. Many of the vehicles involved in port drayage are older and among the targets of AQMD efforts to remove gross polluters from the road.

From October 2003 through June 2005, the SCAQMD inspector conducted over 4000 surveillances, or an average of 12 per day. For the July 2004 through June 2005 period, average observed queue length at the terminals ranged from 5 to 26 minutes. Observations where no trucks were queuing did not factor into the average. Maximum observed queues ranged from 5 to 122 minutes. The one terminal that opted for direct compliance (i.e. it neither extended operating hours nor implemented an appointment system) had a maximum queue of 24 minutes. Over all reporting periods between August 2003 and July 2005, 103 complaints were received.

At Los Angeles and Long Beach, there were no Notices of Violation (fines) over the life of the regulation although the inspector did issue three Notices to Comply. Four Notices of Violation (fines) were imposed at Oakland (Table 4). The Air District states that AB 2650 has contributed to a 30% annual overall reduction of emissions (1000 tons of emissions per year) in the region (SCAQMD, 2004). However, the fact that no fines were imposed means only that no truck with an appointment was observed and documented to be waiting for more than 30 minutes. This could be due to the fact that any observed queue was less than 30 minutes, a longer queue resulted from "an unavoidable or unforeseeable event" which is not subject to fines, trucks with appointments were being pulled out of long queues by terminals, or there was no surveillance by SCAQMD at the time of the occurrence.

Table 4: AB2650 Violation Summary

Quarter	Southern California	Northern California
2003 Quarter 3	0	0
2003 Quarter 4	1 Notice to Comply	0
2004 Quarter 1	1 Notice to Comply	1 Notice of Violation
2004 Quarter 2	1 Notice to Comply	0
2004 Quarter 3	0	0
2004 Quarter 4	0	1 Notice of Violation
2005 Quarter 1	0	1 Notice of Violation
2005 Quarter 2	0	1 Notice of Violation

There is anecdotal evidence that queues were reduced between July 2003 and June 2004. We have no empirical evidence, as there is no source of systematic data on queue length at the ports for a period before and after the implementation of AB 2650. Computerization of some processing tasks and installation of OCR (Optical Character Recognition) equipment at terminal gates was permitted under the new ILWU contract, and conversions were largely complete by summer 2003. Terminal operators attributed shorter queues to the new technology which sped up the process of gate entry. Impacts of the Lowenthal bill on queues and turn times are discussed in Chapter 7.

6. Response of the Trucking Industry to AB 2650

This chapter presents our findings from survey responses on use of appointments by the trucking industry. The survey was first administered at a September 21, 2004, meeting of the local regional unit of the California Trucking Association. The meeting agenda included a discussion of appointments and time for survey completion. Approximately 30 people were in attendance, although fewer individual firms were represented. Those present were asked to fill out the survey and, during the aforementioned discussion, offered verbal responses to open ended questions on the effectiveness of the appointment system. Anyone unable to complete the survey because information was unknown was asked to submit the survey by mail or fax. Approximately 18 surveys were received by the end of the meeting; follow-up calls were made to those who asked to submit them at a later date.

In order to increase the sample size, a survey covering the same time period as the Sep. 2004 survey was administered at a January 28, 2005 local meeting of the CTA. The meeting also included an agendized discussion of appointments. This allowed drivers and trucking companies an opportunity to comment on any changes in appointment use and turn times since the implementation of Assembly Bill 1971. This piece of legislation went into effect on January 1, 2005, and modified the original appointment legislation by limiting queuing and not merely idling outside of the marine terminal gates. Those present saw no discernible impact as a result of AB 1971. Between September and January, individual surveys were also distributed at meetings of other associations where drayage companies were represented, including the Harbor Transportation Club.

We collected a total of 33 completed surveys. Survey respondents were typically managers or company owners. Upon review, we found that in six cases, two persons from the same company completed the survey. Since the survey was intended to obtain responses from firms, we eliminated duplicate surveys. Follow-up calls were made to correct inconsistent information. Our descriptive analysis is based on 27 completed surveys.

6.1 Trucking Company Profiles

Respondents to our trucking company survey represented a wide variety of firms with respect to longevity and size. The average firm has been in existence for 29 years, with a median of 22 years. The average is affected by a few very old firms: the oldest has been in existence more than 100 years, having started out as a horse-drawn drayage service company. Most firms utilize owner-drivers, rather than owning their own vehicles and hiring drivers. Some firms use a combination of both, but in all cases the number of owner-drivers is larger than company drivers. Only 2 of the 27 firms have unionized drivers. The firms are modest in size; the average truck fleet is 76 (median of 50), and average number of drivers is 70. The truck fleet ranges from 13 to 365 (including both company owned and driver owned vehicles). Table 5 gives the size distribution of firms measured in total number of trucks.

Table 5: Size Distribution of Firms

Number of trucks	Frequency
Up to 25	4
26 – 50	9
51 – 75	8
Over 75	5

Service areas typically include several counties: nearly 2/3 serve five or more of the six Los Angeles region counties. Firms typically serve all terminals (21 serve all terminals, 3 serve fewer than 10 of the 13). They operate an average of 15 hours/day on weekdays; about half also operate on weekends. Six companies operate 24/7, and the average number of hours of operation per week is 87. Operating hours of these firms are more extensive than terminal gate hours. This is reasonable, given that 1) trucks queue at the gates before 8 AM in order to get into the terminals as early as possible, 2) trucks are driving loads to destinations after the 5 PM close of a terminal gates, 3) exceptions are made to gate hours for specific customers at some terminals.

We asked one question on use of technology as an indicator of operational efficiency, whether vehicles are equipped with tracking devices. Only 10 of the 27 firms use tracking devices. Those using tracking devices tend to be the larger firms. Limited use of technology such as tracking devices is consistent with the low profit nature of the drayage business.

6.2 Use of the Appointment System by Trucking Companies

All but three firms reported that they use the appointment system, but the extent to which it is used varies greatly. Respondents were asked what percentage of total transactions was made by appointments. The average is 42 percent; the range is 1 to 90 percent. Appointments are used selectively. First, they are used primarily for pick-up of import containers; all of those who use the appointment system use it for import pick-ups. About 1/3 also use appointments for export drop off, and pick-up and drop off of empty containers. Second, they are generally made for a particular time of day and for certain terminals (Table 6). Frequencies are given in numbers. Appointments are scheduled either 24 hours in advance or on the same day; few firms schedule more than 24 hours in advance.

Table 6: Appointment Scheduling Practices

	Yes	No
Particular time of day	16	7
Particular day of week	4	19
Particular time of year	4	19
Certain terminals	15	8

Respondents were also asked about keeping appointments. The average percentage of appointments kept is 63, with a range of 6 to 100 percent. Since there is no penalty for missing or canceling appointments, the incentive is to keep them only when convenient to do so. When asked whether appointments were cancelled, missed, or a combination of both, 70 percent said a combination of both. Reasons for missing appointments are shown in Table 7. Respondents could give multiple reasons. The most common reason is delays at the marine terminal. For those who gave more than one reason, only one did not give delays at the marine terminal as one of the reasons. As noted earlier, our survey was conducted during a period of unexpectedly high volume, and delays at the terminals were increasing.

Table 7: Reasons for Missing Appointments

	Yes	No
Freeway congestion	8	12
Delays on the customer end	6	14
Delays at marine terminal	18	2
Other	4	16

The extent to which appointments are used is significantly correlated with the percentage of customers that require appointments ($R = 0.60$), suggesting that appointment use is motivated by external factors. One might also expect that larger firms, or firms more inclined to use technology, are more likely to use appointments. There is no correlation between firm size and extent of appointment use. Those firms with vehicle tracking systems use appointments more extensively (52 vs. 34% of all transactions), but the difference between groups is not quite statistically significant (Sig. of $F = 0.128$).

There is an overall perception that the appointment system has not improved conditions for truckers. Table 8 gives responses to questions regarding overall effectiveness of the appointment system. The majority stated that it did not improve their ability to meet customer demands, or in reducing turn times. Turn time is the amount of time required to complete a terminal transaction, from arriving at the terminal to completing the transaction and exiting the terminal. No firm gave an unequivocally positive response.

Table 8: Effectiveness of the Appointment System

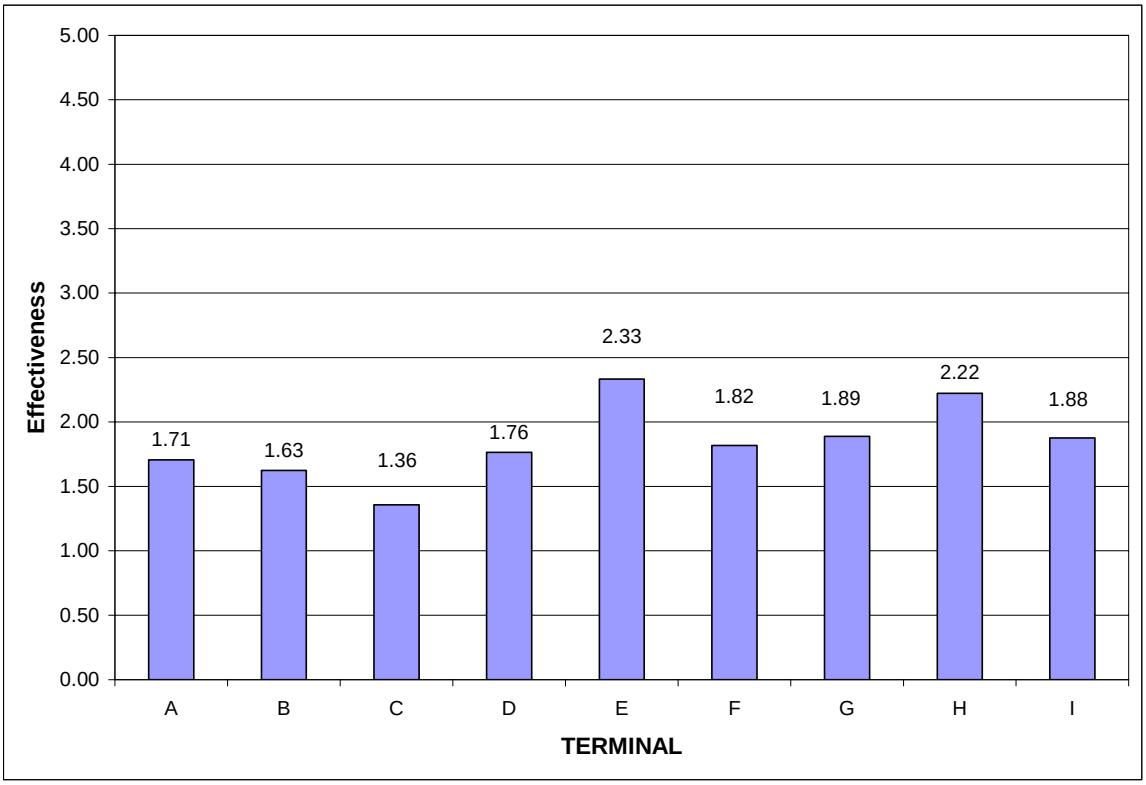
Has the appointment system….	Yes	Somewhat	No
Improved your ability to meet customer demands?	0	10	15
Had any impact on reducing turn times?	0	8	17

Respondents were also asked to rate the effectiveness of the appointment system at each terminal in reducing turn times on a scale of one to five, with 1 = not effective, 2 = marginally effective, 3 = effective, 4 = very effective and 5 = exceptionally effective. We asked about turn times explicitly, because the intent of AB 2650 was to reduce queuing at the terminal gates, which should in turn lead to shorter turn times. However, it was also possible that the appointment system would simply shift the queue to inside the terminal if the rate of processing transactions did not change. Mean scores for each terminal that offers appointments are given in Figure 8. Terminals are assigned arbitrary letters so as to preserve anonymity. Terminals are not given high marks. The highest scores are 2.3 and 2.2 (terminals "E" and "H"); the lowest is 1.36 (terminal "C").

Written comments, as well as the open-ended discussion conducted with respondents after completion of the survey, provide some explanations for their negative assessment. First, there was an expectation on the part of truckers that appointments would reduce transaction time by assuring that containers and/or chassis were ready and available for pick-up. However, this was not the case; practices "inside the gate" did not change as a result of the appointment system. Respondents commented that those with appointments still must wait in line for container moves, may find that the container is in fact not available, or that a chassis is not in working order. Second, some respondents noted that the real constraints are limited gate hours and limited dock labor. If container volumes are increasing and the container processing rate remains constant, transaction time will increase, with or without appointments. Third, several respondents noted the difficulty of using several different appointment systems, rather than having one system for all terminals and all appointments. Finally, respondents cited the difficulties of making and keeping sequential appointments, because any delay with an earlier transaction cascades to all other later transactions.

The survey also included an open-ended question regarding the advantages of using the appointment system. Of the 16 respondents who answered, 7 said there were no advantages. Others stated that the appointment system could work better if containers and equipment were ready (e.g., if terminal operators kept appointments), on-dock transaction times were reduced, or those with appointments did not have to wait in line at the terminal gates or on the dock.

Figure 8: Effectiveness of Appointment System in Reducing Turn Times



Another way of evaluating the effectiveness of the appointment system is to compare turn times with and without appointments. We asked respondents to give the average turn time for a dual transaction (empty in/load out). These are only rough estimates of turn times; and since dual transactions take longer than single transactions, these are upper end estimates. The mean is 2.8 hours. Since only one respondent does not use appointments at all, we cannot make any "with/without" comparisons. Instead we compare averages between those who used appointments for 35% or less of all transactions (the median value), and for more than 35%. Average turn time for the first group is 2.4 hours and for the second group is 3 hours. That is, firms using appointments for a greater share of total transactions have longer average turn times than those who use appointments less extensively. The difference between groups is not significant (Sig. of F = .242), but the differences are consistent with negative perceptions of appointment system effectiveness. It bears noting that it is also possible that appointments are used more when there is more congestion on the docks; hence turn times alone are not an indicator of appointment system effectiveness.

Our ability to conduct any statistical analysis of our results is limited by small sample size. We wanted to examine whether perceptions of the appointment system are related to how it is used, or to firm characteristics. For example, we would expect that firms would use the appointment system more if they considered it effective, or that firms who used the system more actively (schedule at certain times or terminals) would consider it more effective. We found no

correlation between extent of appointment system use and perceived effectiveness.

We conducted difference of means tests to determine whether those who schedule appointments at certain times of the day, or at certain terminals, have more positive assessments of the appointment system. Results are given in Table 9. The upper panel gives the group mean ratings for the effectiveness of the appointment system in meeting customer demand; the lower panel gives the group means for effect on turn times. There is a significant and positive difference between assessment on turn times and making appointments at particular times of the day, as expected. There is a negative and borderline significant difference between making appointments at certain terminals and meeting customer demand. This may indicate problems at particular terminals. No other group mean differences are significant.

Table 9: Use of Appointment System vs. Assessments

	Group mean – yes	**Group mean – no**	**Sig. of F**
Ability to meet customer demands			
Schedule appointments at certain time of day	.219	.143	.515
Schedule at certain terminals	.133	.313	.102
Impact reducing turn times			
Schedule appointments at certain time of day	.250	.000	.020**
Schedule at certain terminals	.167	.188	.850

We also compared perceptions of appointment system effectiveness with firm size and average reported turn times. As expected, more negative assessments of the appointment system's impacts on turn times are associated with longer average turn times (Sig. of F = .067), but assessment of the impacts on ability to serve customer demands do not. Finally, larger firms tend to have a more positive assessment of the appointment system, but the trend is not statistically significant.

The drayage firm survey shows that while the vast majority of firms use the appointment system, they see little benefit in doing so. Respondents reveal a consistently negative assessment of the appointment system, both on its operation at the terminals, and on its overall impacts on serving customer demand and on transaction turn times. From the perspective of drayage firms, there is no evidence that drayage has become more efficient as a result of the appointment system.

7. Queues, Turn Times, and Potential Savings from the Appointment System

This chapter summarizes our efforts in assessing the impacts of AB 2650 on truck queues and turn times, as well the potential savings from an appointment system. Our analysis is based on truck counts and measured queue times at two separate terminals, one at the Port of Long Beach and the other at the Port of Los Angeles, conducted in the summer of 2004. The purpose of the field data collection was to obtain information on queue times and transaction times, as well as to compare total turn time (queue plus transaction) for transactions with and without appointments. We analyze transaction time and turn time for each of the terminals. We conclude with our estimations of potential savings to the supply chain from use of the appointment system.

The field collection was designed to assure the safety of the student data collectors as well as to accommodate the unique circumstances of each terminal, including the physical layout and the contents and structure of in-house transaction data. Data collection conditions were such that workdays were divided into three-hour shifts: 8:00 to 11:00 a.m. (shift 1), 11:00 a.m. to 2:00 p.m. (shift 2), and 2:00 to 5:00 p.m. (shift 3). Because the number of data collectors available was inadequate to staff more than one shift each day, data collection was performed for shift 1 on July 29 and August 5, for shift 2 on July 27, and for shift 3 on July 28, all in 2004.

Our contacts at the terminals told us that mornings were the busiest time; hence we started with the least busy part of the day so that students could develop some expertise and routines before recording the busiest period. With the exception of July 27, those collectors stationed at terminal exits staggered their shifts to account for the time lag between a truck's entry into and exit from the terminal, arriving and leaving 30 minutes after those at the entry and pedestal observation points. At both terminals, data collectors were usually deployed in teams of two: one would read the identification information aloud, allowing the second person to record the data on a form.

We chose to collect observations over a period of several consecutive days in order to keep the sample as representative of normal conditions as possible. It was assumed that Monday and Friday traffic tends to be atypical, so those days were avoided for data collection. At each observation point, some unique identifier of each vehicle, other information, and time to the nearest minute was recorded. Students timed all watches at the beginning of each shift.

Data on turn times and wait times resulting from the on-site data collection were analyzed. All of the data were entered twice by different people, then checked for input errors. Students were instructed to enter data as it appeared on the forms, and to make no attempt to correct or change the data in any way.

7.1 Analysis from Terminal A, Port of Los Angeles

Our primary objective at each of the two terminals was to obtain queuing and transaction times, so we needed to identity vehicles based on a unique attribute of the tractor. At our Los

Angeles terminal, our choices were the vehicle license plate number, or the California registration number, which comprises the letters "CA" followed by a series of six numbers, affixed to the side of the truck cab. On a preliminary field visit, we found that the vehicle license plate was often obscured from the possible vantage points we could use. We therefore chose to use the CA number. By recording this number and the color of the vehicle, we were able to match trucks as they passed by one of five collection points at this terminal. It was discovered during the data collection process that this number was not unique, as we had thought; instead, an identical number was often used on several trucks owned by the same company, which reduced the number of positive matches we were able to find. We also recorded the load type for each truck at each post: possibilities were container, chassis, and bobtail (cab only). In this way, we were able to identify a general transaction type (bobtail in/container out, container in/container out, etc) for each match. We were not, however, able to identify specific transaction types, because we had no way to distinguish empty containers from full containers.

There are two lanes at the official SCAQMD entry point. All trucks with chassis or containers enter through this point. Two observers were stationed on the sidewalk beside the entry lane. Trucks did not have to stop upon entering, but the 90-degree turn and the two -lane entrance provided the team with adequate observation opportunity. However, when arrivals occurred at close intervals, it was difficult for the observers to record full information on all vehicles.

Once on the terminal property, the lanes expand to four. Trucks proceed to pedestals as they become available. There are a total of ten pedestals, one of which is reserved for bobtails. There are two lanes at the exit approach. Trucks turn right to the exit, which has one lane.

There is a separate entrance for bobtails that bypasses the main entry gate queue and allows bobtails to proceed directly to the pedestal and terminal entry. Two people were stationed on the sidewalk directly adjacent to the bobtail entry gate, a single lane entrance. Although trucks did not stop upon entering, the gate required a 90-degree turn, thus allowing the team ample time for observation of truck identification numbers.

Two people were stationed in the middle of the sidewalk between the bobtail and main entrance with the goal of capturing wait times for trucks not able to enter the main gate immediately upon arrival. However, as no such backups were observed outside the gate during our field observations, this team instead recorded trucks waiting in line to approach the pedestals.

At the pedestal, the roadway expands to a width of ten lanes. Drivers stop at the pedestal to confirm the transaction with clerks and print a transaction slip. Observations were recorded as trucks left the pedestal after printing the transaction slip. A team of three was stationed behind a chain link fence in a parking lot adjacent to the pedestal area due to the difficulty of recording data from ten lanes of traffic. Because of the distance between the observers and the furthest lanes of traffic, the team used binoculars to ensure that identification numbers were recorded correctly. Occasionally two or more trucks would leave the pedestal simultaneously, causing the identification numbers of the more distant trucks to be obscured by those in lanes nearer to the observation team. Trucks obscured in this manner are omitted from the observation data. Due to a lack of available personnel, only two people manned this post on August 5.

All trucks exit through the same gate adjacent to the main entrance (i.e. non-bobtail) gate. The exit gate was staffed by a team of two stationed on the sidewalk just to the side of the exit lane. Before leaving, drivers must verify the transaction completed with a clerk and then stop before making a left onto the street, allowing the team ample time to record truck identification information.

At Terminal A, the data collection yielded a total of 6890 observations, as shown in Table 10. The distribution across vantage points is similar across the days. Each shift was about 180 – 200 minutes; hence the observers were recorded at an average rate of 2.8 per minute.

Table 10: Observations by day, vantage point

DAY	27-Jul	28-Jul	29-Jul	5-Aug	all days
TIME	11AM - 2 PM	2 PM - 5 PM	8 AM - 11 AM	8 AM - 11 AM	
Vantage point					
Bobtail gate	127	139	107	146	519
Sidewalk	322	286	324	291	1223
SCAQMD entry	311	278	365	354	1308
Exit	334	465	561	531	1891
Pedestal	431	494	500	524	1949
Total	1525	1662	1857	1846	6890

Table 11 gives two indicators of how well the observers did in capturing the required data. In order to be able to match observations, we need the CA number. About 23% of all the observations recorded had no CA number. The proportion was highest on the first day, as expected. We obtained data on total gate transactions for our survey days from this terminal. If we assume that gate transactions are approximately equally distributed across the day, then about a third of the transactions would have occurred during the observation shifts. Using all of the pedestal entry observations, we find that the observers did an increasingly better job of recording; on the last day we estimate that about 70% of all entries were recorded.

Table 11: Observations vs. Actual Gate Moves

Day	**July 27**	**July 28**	**July 29**	**August 5**
Time	**11 AM – 2 PM**	**2 PM – 5 PM**	**8 – 11 AM**	**8 – 11 AM**
No CA number	399	410	399	404
Share	26.2%	24.7%	21.5%	21.9%
Total gate moves*	2412	2627	2439	2244
3 hr shift est.	804	876	813	748
VP 5 obs. as share	53.6%	56.4%	61.5%	70.1%

* From terminal reports

We matched observations to identify queue time and transaction time. At Terminal A there is a bobtail entry and a regular entry. The bobtail entry is Vantage Point (VP) 1, so the bobtail queue time is the elapsed time from VP 1 to VP5, the pedestal. The regular entry, VP 3,

is the gate outside of which the AQMD measures queues. Queue time for trucks with chassis or container is the elapsed time from VP 3 to VP 5. Transaction time is the elapsed time from entry at the pedestal (VP 5) to exit gate (VP4). Table 12 gives basic information on the match rates for each of these combinations by survey day. In a few cases there is more than one match for the same truck; we use all possible matches, including multiples for the same truck. We eliminated matches that were obviously wrong (e.g. with elapsed time of zero), that had logically inconsistent time sequences (e.g. time at VP1 must be earlier than time at VP 5).

The probability of a match depends on the accuracy of the recorded CA numbers as well as the total number. The increased number of entry/exit matches after the first day is likely the result of staggering the exit observation shift. Why the match share for bobtail queues on August 5 and for SCAQMD gate entry queues on July 28 is relatively low is unclear.

Our data are biased in at least two ways. First, observers were more likely to miss observations at high traffic times. There are 10 pedestals at this terminal; and when several trucks approached the pedestals at the same time, the CA numbers of some of them were not visible. At other points there were at least 2 lanes of traffic; with trucks moving in multiple lanes it was difficult to record full information. At high traffic times, queues should be longer, so it is likely that our queue data is biased downward.

Second, because we conducted observations in three hour periods, we were more likely to capture a short transaction than a longer one. Any very long transaction would have been impossible to observe. Longer transactions that started in the first hour of observation would have been more likely to be captured than longer transactions that started in the second hour. For these reasons our transaction times are biased downward.

Table 12: Matches for Queues, Transactions

Day	July 27	July 28	July 29	Aug 5	Total
Bobtail to entry queue					
Bobtail entries	127	139	107	146	519
Share matched	55.9%	61.9%	67.3%	47.3%	57.4%
SCAQMD gate to entry queue					
Non-bobtail entry est.*	304	355	393	378	1430
Share matched	47.0%	38.0%	50.6%	48.7%	46.2%
Entry to exit transaction					
Exits	334	465	561	531	1891
Share matched	37.4%	51.6%	52.8%	51.4%	49.4%

*Estimated as total arrivals at VP 5 with CA number less bobtail entry matches

We have a total of 298 observations at the bobtail gate. We conducted several tests of alternative distributions of queue time, including normal, log-normal, Weibull, Gamma and uniform. The natural log form comes closest to a normal distribution. Using the natural log of queue time, the average is about four 4½ minutes with standard deviation of 2 minutes.

At no time did field observers see a queue at the bobtail gate, so the only variation in bobtail queue time comes from the speed at which bobtails travel from the gate to the pedestal, and the time taken to gain permission to enter the terminal. Figure 9 gives the non-transformed frequency distribution; it can be seen that most observations fall within three to six minutes. We conducted a difference of means test to determine whether queue time varies by shift (morning, midday, afternoon); there is no significant difference in average bobtail queue time by shift (F-stat = 0.943).

The SCAQMD gate to pedestal entry is longer and more complicated. As with bobtail queue time, we tested for various distributions, and again the natural log form came closest to a normal distribution. The natural log form is used in the data analysis. Descriptive statistics for entry queue time are given in Table 13, and the frequency distribution is shown in Figure 10. The values in Table 13 are converted from the natural log values. The average queue time is about 10 minutes, with the median about one minute more. The modal value is 8 minutes. The log form distribution is slightly skewed by a few very small values. We show the non-transformed distribution to give some idea of the actual distribution of queue times. It can be seen that the numeric distribution is skewed by a few large values. Our field observations suggest that longer queue times are the result of delays at the pedestal; if transactions at the pedestal require extra time, trucks waiting in line are delayed.

Figure 9: Bobtail to Entry Queue Time

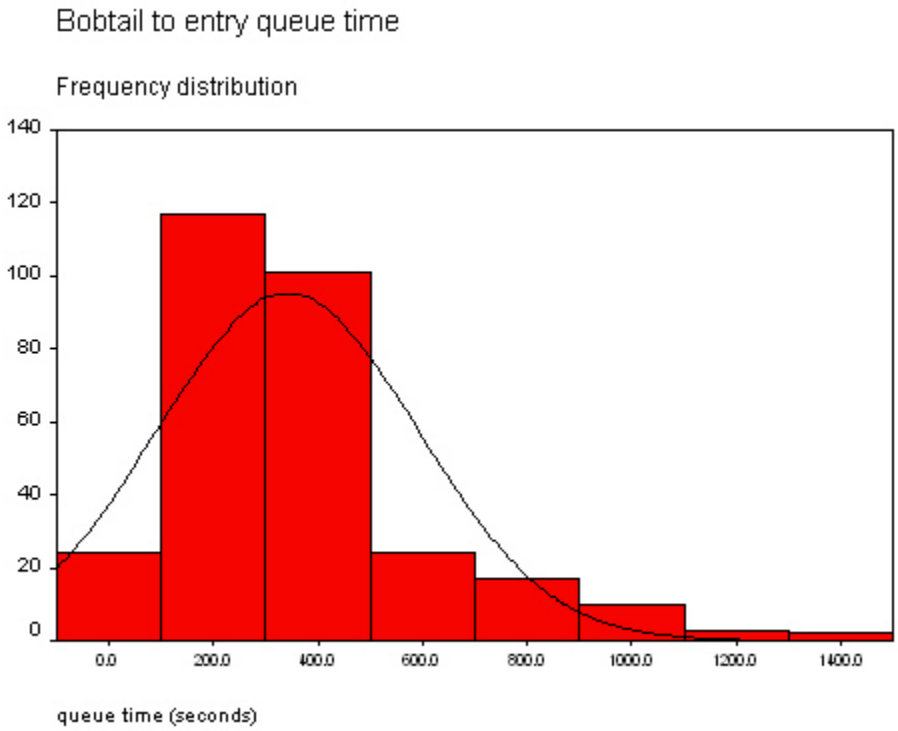


Table 13: Entry queue time descriptive statistics (minutes)

Mean	10.19
Standard deviation	0.03
Median	11.00
Mode	8.00
Minimum	1.00
Maximum	61.91

We conducted a difference of means test to determine whether queue time varies by shift. Results are given in Table 14. Queue time in the afternoon (2 – 5 PM) is significantly longer than queue in the morning or midday. Difference between groups for morning and midday is not statistically significant (group comparisons not shown in table).

Figure 10: Entry to Pedestal Queue Time

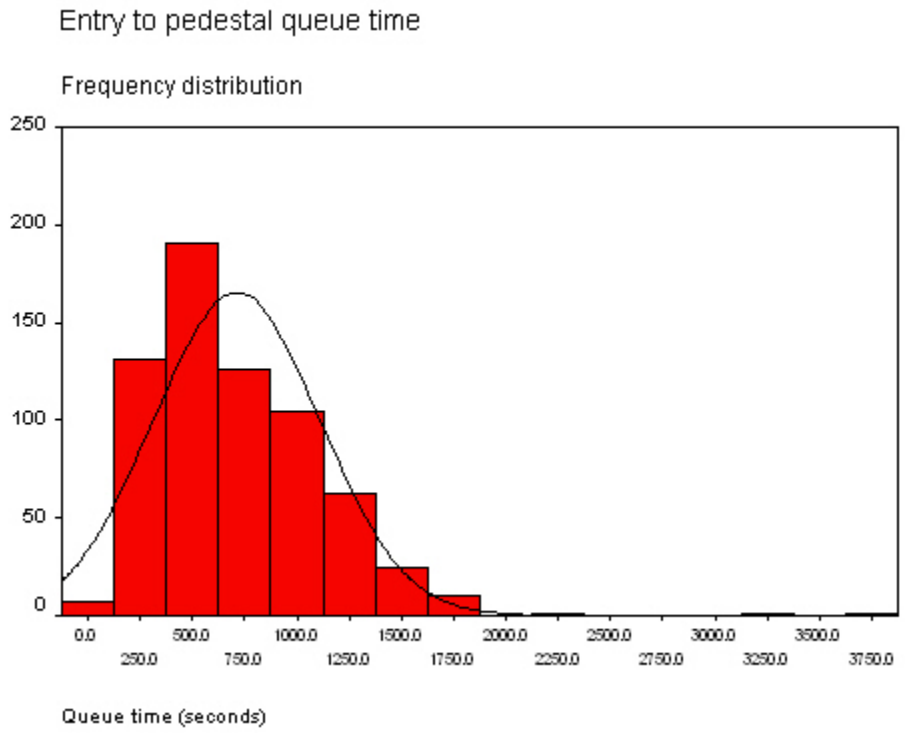


Table 14: Queue time by time of day

Dependent variable: ln (queue time)

Time of day	Mean (minutes)
8 AM – 11 AM	9.36
11 AM – 2 PM	9.23
2 PM – 5 PM	14.46
Total	10.20
F	34.179
Sig	.000

7.1.1 Terminal A: Analysis of Transaction Times

We used all of the available matches between Vantage Point 5 (the pedestal) and Vantage Point 4 (the exit gate) to calculate transaction time within the terminal. Because we did not have access to detailed terminal data, we could only track what was visible: whether the truck had a container, a chassis without container, or no container or chassis. We have no information on

whether containers are empty or full. We also have no information on whether container transactions in the terminal are on wheels or on ground, so the transaction times are very approximate. We have a total of 922 transaction matches with full information. The distribution across the possible load combinations is given in Table 15. As expected, the most common transactions are bobtail in/container out, container in/bobtail out, and container in/container out. We are puzzled by the large number of bobtail-bobtail trips; it is possible that these represent failed trips (intended to pick up container, but for some reason could not do so).

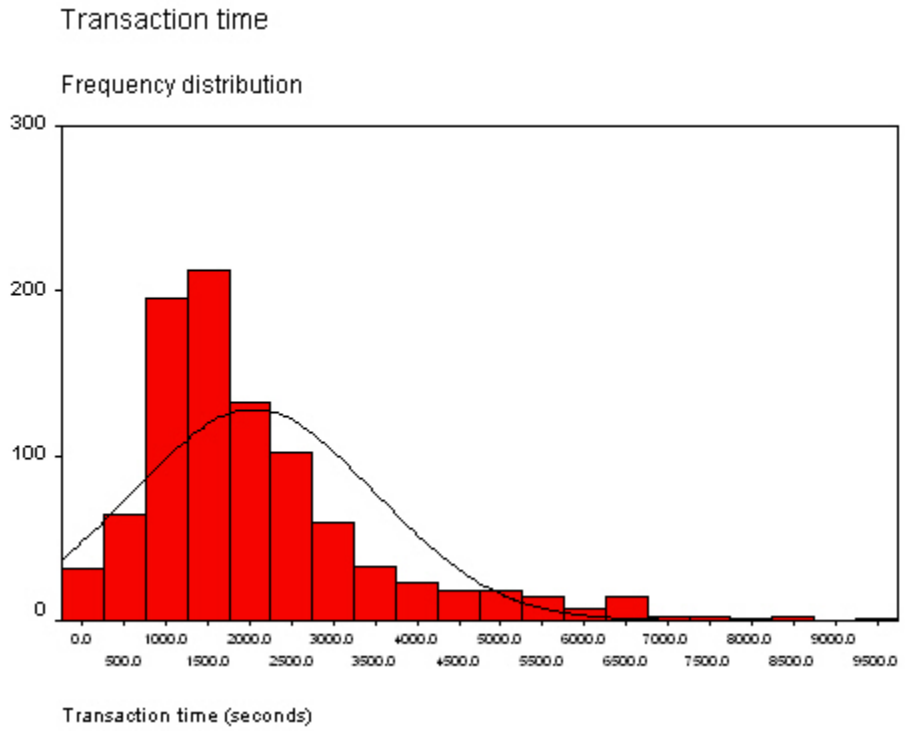
As with queue time, we used several different distributional forms of transaction time, and again the natural log form was found to be closest to a normal distribution. The average transaction time for the entire sample is almost 39 minutes (based on the natural log distribution). The non-transformed frequency distribution is shown in Figure 11. It can be seen that the distribution is skewed by a tail of long transactions. The median transaction time is 27 minutes, and the mode is 16 minutes. Transaction time varies both by time of day and by transaction type. Average transaction time by transaction type is also given in Table 15.

Table 15: Transactions by Type

Transaction Type	Frequency	Percent	Avg transaction time (min)*
Bobtail – bobtail	46	5.0	7.2
Bobtail – chassis	0	0	n/a
Bobtail – container	248	26.9	30.4
Chassis – bobtail	19	2.1	7.8
Chassis – chassis	1	0.1	n/a
Chassis – container	33	3.6	36.3
Container – bobtail	313	33.9	22.5
Container – chassis	12	1.3	19.8
Container -- container	250	27.1	38.8

*Transformed from ln(transaction time)

Figure 11: Transaction Time



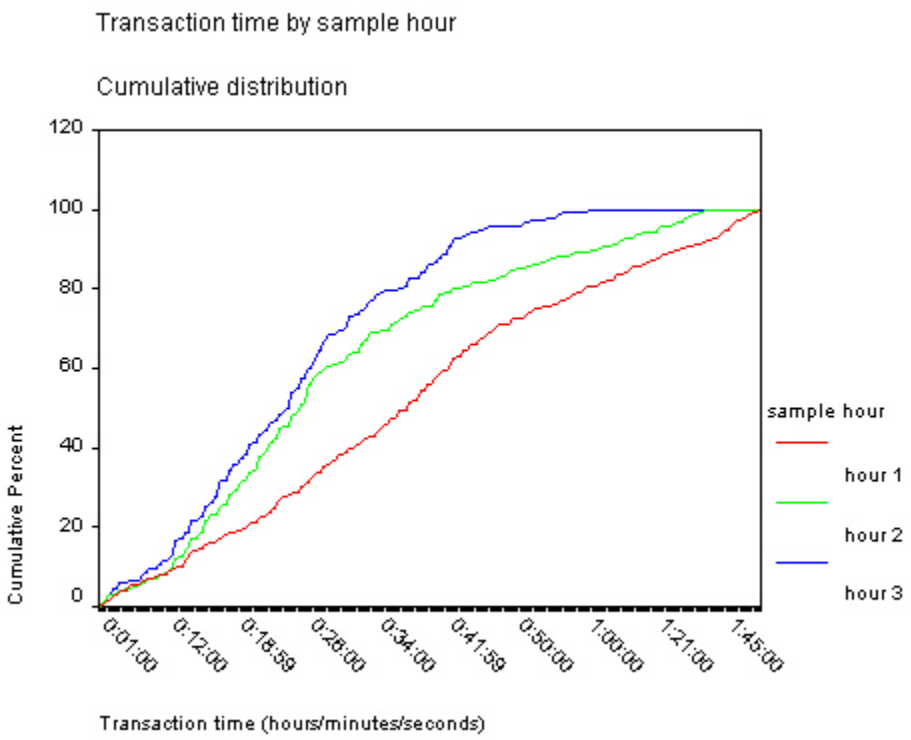
We noted earlier that our field survey schedule of 3 hour shifts on different days could bias our transaction time data, as we were most likely to capture the longest transactions in the first hour, and only transactions of less than 1 hour could possibly be captured in the last hour. We tested for this bias by comparing transaction times by sample hour, and found that there are significant differences between hours, as shown in Table 16 and Figure 12. Mean values in Table 16 are converted from the natural log values. In our scenarios of appointment time savings, we use the transaction times of the first sample hour as the best estimate of actual transaction times.

Table 16: Transaction Time by Sample Hour

Dependent variable: ln(transaction time)

Sample hour	Mean (minutes)
Hour 1	33.3
Hour 2	25.0
Hour 3	21.2
Total	26.61
F	30.324
Sig	.000

Figure 12: Transaction Time by Sample Hour



We know that transaction time depends on type of transaction, and we expect that transaction time also depends on time of day. We estimate a simple multiple analysis of variance model to test these relationships, while controlling for sample hour. We use a simplified categorization of transaction: load in, load out, and dual transaction. Load in is sum of container in/bobtail out and container in/chassis out. Load out is the sum of bobtail in/container out and chassis in/container out. A dual transaction is container in/container out. All other transactions are omitted. Model results are given in Table 17. It can be seen that all main effects and all interaction effects are significant. All group by group mean differences are significant, with the exception of AM vs. PM time of day differences.

Table 17: Multiple Analysis of Variance

Dependent variable: ln(transaction time)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	111.653(a)	25	4.466	15.784	.000	.322
Intercept	21737.571	1	21737.571	76825.267	.000	.989
Time of day	9.112	2	4.556	16.102	.000	.037
Transaction type	14.940	2	7.470	26.400	.000	.060
Sample hour	5.308	2	2.654	9.380	.000	.022
Time of day*transaction type	7.109	4	1.777	6.282	.000	.029
Time of day*sample hour	7.265	4	1.816	6.419	.000	.030
Transaction type*sample hour	3.128	4	.782	2.764	.027	.013
3-way interaction	7.520	7	1.074	3.797	.000	.031
Error	234.564	829	.283			
Total	**48057.176**	**855**				
Corrected Total	**346.217**	**854**				

a R Squared = .322 (Adjusted R Squared = .302)

7.1.2 Terminal A: Analysis of Turn Times

We define turn time as the total time required to complete a transaction at the terminal. This includes queue time plus transaction time. In order to estimate turn times for various transactions, we use the first sample hour data for mean transaction times, and then add the mean values of queue time, all based on the log transformed values. For this exercise, we use only the 3 most common transactions: bobtail in/container out, container in/bobtail out, and container in/container out, which together account for about 85% of all transactions. Results are shown in Table 18. Average turn time ranges from about 38 minutes to one hour.

Table 18: Estimated Turn Times by Transaction Type (Minutes) Based on Mean Values

Transaction Type	Queue Time	Transaction Time	Turn Time
Bobtail in/container out	4.6	35.6	40.2
Container in/bobtail out	10.2	27.7	37.9
Container in/container out	10.2	50.3	60.5

Another way of estimating turn times is to use the median and percentile values for transaction time and queue time, as shown in Table 19. Here again we use the transaction times only from the first sample hour. The median values yield turn times equivalent to the mean values of Table 18. The 75th and 90th percentiles give estimates for the longest turn times; that is, about 25% of all turn times are longer than one hour, and about 10% are longer than 1.5 hours for bobtail in/contain out, and about 2 hours for the other transactions.

Table 19: Estimated Turn Times by Transaction Type, Median, 75th and 90th Percentiles (Minutes)

Transaction Type	Queue Time	Transaction Time	Turn Time
Median Values			
Bobtail in/container out	6	36	42
Container in/bobtail out	11	27	38
Container in/container out	11	50	61
75th Percentile Values			
Bobtail in/container out	8	52	60
Container in/bobtail out	16	42	58
Container in/container out	16	70	86
90th Percentile Values			
Bobtail in/container out	12	78	90
Container in/bobtail out	20	92	112
Container in/container out	20	106	126

It may be noted that these estimates are much lower than the average turn times reported by truckers in our survey discussed below, and notably lower than the turn times reported in Monaco and Grobar (2004). It is reasonable to assume that reported turn times are biased towards longer trips, as the long trips are more costly to truckers and are most likely to cause problems with subsequent transactions. Some of the Monaco and Grobar data were drawn from drayage company records, however, and should be more comparable to our field data. They report mean turn time of 72 minutes, with median of 44 minutes, suggesting a tail of very long turn times. The longest transaction time we observed was 2 hours 37 minutes, and only 8 transactions were longer than 2 hours. Possible explanations for differences include 1) our three hour survey period truncated the transaction time distribution, eliminating some number of very long transaction times that would have increased the numeric mean; 2) this terminal has shorter turn times than other terminals, including those represented in the Monaco and Grobar study; 3) turn times have declined since 2002 and 2003, when the Monaco and Grobar data were collected; 4) the data were drawn from different seasons. In any case, it is clear that our data cannot be considered representative of all terminals.

7.2 Analysis from Terminal B, Port of Long Beach: Transaction Time/Use of Appointments

A second terminal, this time at the Port of Long Beach, offered to provide us with complete transaction data including appointment data. Transactions are identified by driver (driver's license number), chassis number, and container number. Since we had no way to record a driver's license number, this meant that bobtails could not be linked with transaction file data. We did however record CA numbers of bobtails, primarily to obtain data on vehicle arrivals. For trucks with containers, we recorded the container number; for trucks with chassis, we recorded the chassis number. It was not possible for data collectors to record both container and chassis number due to limited viewing time of each vehicle.

At this second terminal, it was more difficult to locate safe observation points, and we were limited to only three observation posts. Unfortunately, posts at the pedestal and at the entry point were not possible at this terminal. The SCAQMD entry point is located just beyond a stop sign and has two lanes. From this point trucks turn right into two lanes equipped with OCR readers that record container ID numbers. Once past the OCR, trucks proceed to eight pedestals; two on the left are primarily used by bobtails. There are two exit lanes directly opposite the entry lanes. During our observation days, and due to heavy demand, the terminal opened another entry at a recently acquired pier. Some trucks, primarily bobtails, were re-routed to this entry.

Two people were situated behind jersey barriers adjacent to the stop sign near the AQMD "gate." Additionally, this site was chosen for its safety and ease of observation. The fact that trucks had to stop at the sign allowed the data collection team to see the truck and chassis identification numbers more easily. Given three lanes of traffic, however, it was still difficult to record all numbers for all vehicles.

The new secondary entry gate has a maximum seven lanes. Two people were positioned on to the south as trucks approached the gate. If trucks came in clusters, it was difficult to record numbers. On August 5, 2004, this position was monitored by only one person, instead of the usual two due to a shortage of data collectors.

Exits at this terminal take place at the AQMD gate. The position for the observation crew was at the stop sign of a T-intersection some distance from the exit point, diagonally across from the jersey barrier used to record data on trucks entering the facility. This was the most exposed position (there was no sidewalk), and security moved the crew back on several occasions. In addition, trucks were traveling at higher speeds, so the observation time for any given vehicle was only a few seconds. At Terminal B, the data collection yielded a total of 2898 observations, as shown in Table 20.

Table 20: Observations by Day, Vantage Point

DAY	27-Jul	28-Jul	29-Jul	5-Aug	all days
TIME	11AM - 2 PM	2 PM - 5 PM	8 AM - 11 AM	8 AM - 11 AM	
Vantage point					
SCAQMD entry	268	245	251	330	1094
Secondary entry	262	171	324	260	1017
Exit	260	192	161	174	787
Total	790	608	736	764	2898

Table 21 provides an indicator of how well the observers did in capturing the required data at terminal B. In order to be able to match observations with terminal data, we recorded chassis or container number; in order to maximize the number of observations made, we also recorded the CA number where possible. As was the case with Terminal A, we assume that gate transactions are approximately equally distributed across the day, so that about a third of the transactions would have occurred during the observation shifts. We find that a greater proportion of trucks were recorded at this terminal than at Terminal A. We surmise this to be the case because it is easier to read chassis and container numbers than CA numbers, and because observations were made at the AQMD gate where trucks formed a single line. At the Terminal A pedestals, trucks formed ten different lines. The distance between the observer and the furthest pedestals made it difficult to read information on some truck cabs.

Table 21: Observations vs. Actual Entries

Day	**July 27**	**July 28**	**July 29**	**August 5**
Total observed Entries	790	608	736	764
Total Observed entries, excluding bobtails	573	382	496	571
Total entries*	1425	2959	1315	1544
3 hr shift est.	261	201	243	252
Observations as % all entries (excludes bobtails)	40%	13%	38%	37%

* From terminal reports, excludes bobtails

Unlike Terminal A, Terminal B provided us with its own transaction data for the four observation days. However, the data record transaction time from the pedestal to the out gate. Because we were unable to safely observe queues between the AQMD gate and the pedestals, or from the out gate back to the AQMD gate, we were unable to measure either queue time or total turn time at this terminal.

The data do, however, contribute to our understanding of variability between the two terminals and across transaction types. Like Terminal A, the majority of transactions occurring during our observation days involve the release of import containers to a truck leaving the port. The next most common type of transaction involves "empties in" or the delivery by truck of an empty container to be loaded on to a ship. The third most common transaction involves the receipt of a full container for export. The least common type of gate move is the release of an empty container to be loaded on to a truck (Table 22). It should be noted that these on-terminal transaction times are considerably longer than at Terminal A and more closely approximate the Monaco and Grobar figures.

Table 22: Terminal B Transactions by Type

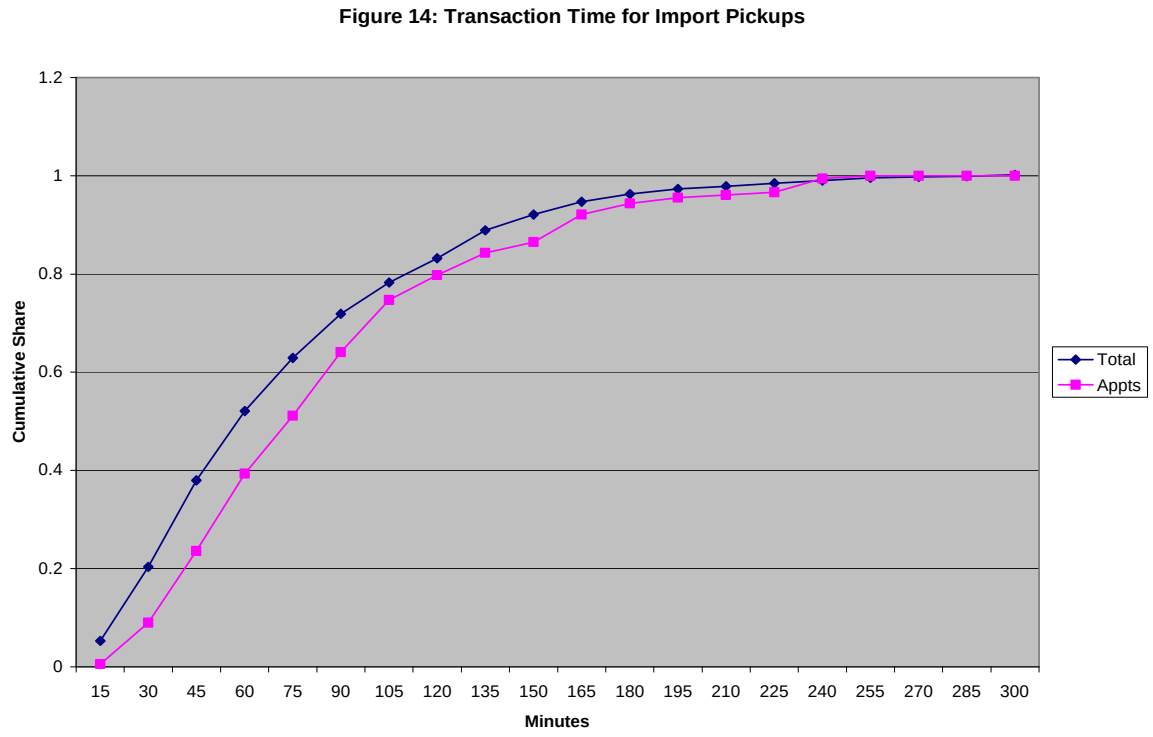
Transaction Type	**7/27**		**7/28**		**7/29**		**8/5**	
	Total Observ.	Avg. Trans. Time (Min)	Total Observ.	Avg. Trans. Time (Min)	Total Observ.	Avg. Trans. Time (Min)	Total Observ.	Avg. Trans. Time (Min)
Import Out	997	67.4	1004	75.4	893	73.0	924	71.4
Export In	207	11.6	201	15.9	188	17.2	194	17.6
Empty Out	86	44.1	100	33.9	59	57.9	61	50.0
Empty In	523	15.5	15	30.8	640	16.6	771	23.3

The data provided by Terminal B also allow us to make some rudimentary comparisons of transactions with and without appointments. The figures are for imports out only; but our experience is that the greatest share of appointment use at any terminal is for this type of transaction (Table 23). Appointments represent a relatively small percentage of import pick-ups and therefore an even smaller share of total gate moves. Figure 13 gives the cumulative distribution of transaction times for all import pickup transactions, and for import pickup with appointment transactions. Transactions with appointments are longer than transactions without appointments. The group means are 52.6 minutes for all transactions and 84.60 minutes for transactions with appointments, That is, appointment transactions are longer than those without appointments. As we noted earlier, this could mean that appointments are more likely to be used for the most complex transactions. Our conservative conclusion is that we have no evidence from our small sample that appointments are associated with time savings (Figure 14).

Table 23: Terminal B "Import Out" Transactions Involving Appointments

	7/27	7/28	7/29	8/04
Total Appointments	66	41	94	63
Total imports Out	1080	2292	1074	1180
Total Transactions	2680	5613	2549	2953
Appt. share imports	6.1%	1.8%	8.8%	5.3%
Appt. share transactions	2.5%	0.7%	3.7%	2.1%

Figure 13: Transaction Time for Import Pickups



7.3 Savings from the Appointment System

Because we were unable to obtain sufficiently detailed transaction data from the terminal to match our field data with appointments, we cannot empirically test whether transactions with appointments take less time than transactions without appointments. If trucks with appointments do not have priority access (and hence must wait in the entry queue with all others), and if no

special arrangements are made to have cargo ready for those with appointments, there is no reason to expect that transactions with appointments would take less time. Our interviews revealed that most terminals do not have special arrangements for appointments. Our interviews and other data gathering indicate that queue times have decreased at the terminals, but this has been attributed to the implementation of information technology under the new ILWU labor contract that streamlines processing of paperwork at the gate entries, as well as expansions and reconfigurations at some terminals.

What if terminal operators did offer priority access to trucks with appointments? What if cargo was confirmed available and ready for pickup during the appointment time window? We use our field data to estimate potential time savings. Using data from Terminal A appointment records, we find that in summer 2004 nearly all appointments were for import pickups. Kept appointments as a share of all import moves was 16% in July 2004 and 14% in August 2004. We use 15% import appointments as Scenario 1, 30% for Scenario 2, and 50% for Scenario 3. Within each scenario, we consider

a) queue time reduced five minutes;
b) queue time reduced plus transaction time reduced five minutes;
c) queue time reduced plus transaction time reduced ten minutes.

The reduced queue time assumes priority gate entry equivalent to the current bobtail gate. Reduced transaction time represents a lower and upper bound of savings due to cargo being ready for pickup. Using the three major transaction types, our transaction data from the first sample hour, and the mean queue time and transaction time values, we calculate total minutes of turn time for each of the transaction types. Results on a per turn basis are given in Table 24. We omit the container/bobtail transactions, as these are not affected by appointments (by assumption). If only queue time is reduced, there are no savings for bobtail entries, but a 9.3% savings for container entries. If we add average five-minute reduction in transaction time, savings increase to 12.4 and 17.5% respectively. If we reduce transaction time even further, savings of about 25% are generated. Time savings in this range would likely motivate truckers to use appointments more frequently.

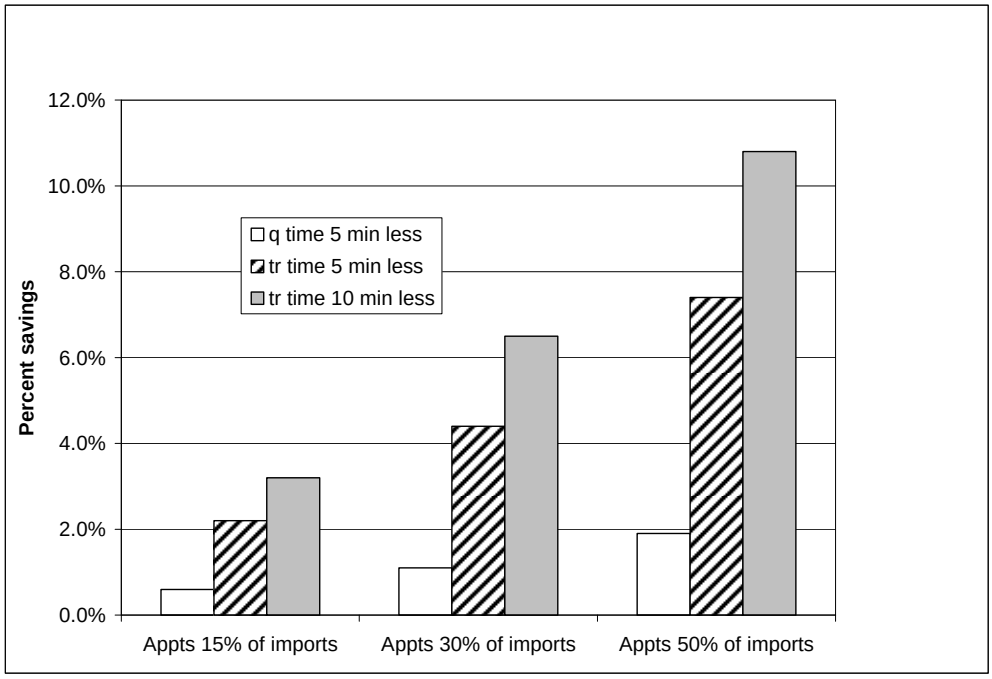
Table 24: Per turn savings from appointment scenarios (minutes)

	Base	**“a”**	**% saved**	**“b”**	**% saved**	**“c”**	**% saved**
Bt/ct	40	40	0	35	12.4	30	24.9
Ct/ct	61	55	9.3	50	17.5	45	25.8

We estimate savings as a share of all transactions by weighting transactions according to their shares in the data: 30/40/30 for bobtail/container, container/bobtail, container/container. Since all appointments are for import pickups, only bobtail/container and container/container moves are affected. Also, the bobtail/container moves realize no savings from reduced queue times, as bobtails already have a priority entry. Results are summarized in Figure 14, and indicate the following. First, 15% of imports equals about 6% of all gate moves, so time savings

are small relative to total turn time of all moves. Second, reduced queue time has less impact than reduced transaction time, because queue time savings accrue only to the 30% share of container/container transactions. Third, it would take a large increase in appointment use, as well as operating practices that save substantial time for truckers to significantly reduce total turn time.

Figure 14: Savings from Import Appointments



8. Conclusions and Policy Implications

This chapter presents our conclusions from the AB 2650 evaluation and raises some important implications for future goods movement policy. We begin by summarizing the legislation, what it was intended to do, and why it was a unique approach to regulating harmful emissions. We then assess whether or not the legislation's objectives were met by summarizing our research findings. Finally we consider the implications for future policy with a focus on the PierPass off-peak gate program.

AB 2650 was the result of policy makers' frustration with an industry that had undergone rapid growth but was both resistant to internal change and not always subject to external control. The 2002 west coast port lockout and various environmental studies raised the profile of port operations. Freeway congestion and poor air quality were understood to be the result of growth in container traffic. Changes in operating practices at the ports appeared to be the logical short-term response to these problems. One such operational change advocated by elected officials and community groups was to shift truck trips out of the peak period. This necessitated changes in the hours of terminal operations.

AB 2650 regulated truck queuing at terminal gates to reduce vehicle emissions. The legislation provided that terminal operators have the option of either extending gate operating hours from the typical 45 hours per week to 70 hours, or offering appointments for specific cargo pickups or drop-offs, in order to reduce truck queuing at terminal gates. Under the regulation, terminal operators were subject to fines of $250 for each truck idling in queue for more than 30 minutes.

This legislation marked a turning point in trade-related regulatory policy; it targeted port terminal operations for air quality objectives, rather than targeting emissions directly. Terminal operations are part of a broader supply chain that involves both stationary and mobile sources of pollution. Emissions from single point, stationary sources are more easily measured and therefore more easily regulated. The supply chain is much more complicated. The single largest polluter, the ship, is beyond the control of local air quality regulators. Railroads are also difficult to control because of exemptions enjoyed under interstate commerce regulations.

Port authorities are likely targets for regulatory efforts; but these authorities enjoy a quasi-independent status. Both state and city charter allow them to operate as landlords, somewhat insulated from the pressures of City Hall where community opposition to freight traffic is heard the loudest. The ports have required operational changes from their tenants as part of the lease (re)negotiation process, but these negotiations occur on a terminal-by-terminal basis. With long term leases of 30 years on average, using the ports as a vehicle to bring about change at the terminals is not a short-term solution.

Trucks are the most visible polluter and as such a regular reminder of the cost of moving goods for communities and their elected officials. The trucking industry is subject to the regulatory control of the federal government (hours of service regulations, e.g.), the State (fuel standards), and local and regional government (loading and unloading zones, access route

restrictions). Trucks operate both inside and outside of the gates and as a result became an indirect means of controlling the negative impacts of goods movement which are directly linked to the ways in which terminals operate.

AB 2650 attempted to control inside-the-gate operations by indirectly regulating outside-the-gate procedures; targeted terminals and ships by monitoring trucks; sought to improve congestion and noise by improving air quality; attempted to get a handle on the entire supply chain by focusing on a single node. This approach relies upon sticks instead of carrots. The terminal operators are required to meet performance standards, in this case maximum queue and wait times, in order to avoid a fine.

Our research leads us to conclude that this particular piece of legislation had limited impact, at least in the short term. With legislation that was so difficult to enforce and impacts so difficult to measure, the risk of non-compliance was minimal. It is not surprising then that terminal operators responded differently to the mandates of the regulation, despite the fact that it was designed to modify operating procedures and extend hours of operation. No terminal chose to implement extended gates in direct response to the bill.

Our research seeks to understand how truckers and trucking companies responded to the opportunity to make a gate appointment and how and why operators chose to comply with the legislation. In our survey, truckers reported that they kept 63% of appointments made but that the appointment system did not reduce turn time or make port operations more efficient. As a result, the trucking community did not have an overall favorable impression of the program.

With limited commitment on the part of both key stakeholders, AB 2650's goals proved elusive. The stated attempt to minimize queuing and therefore diesel emissions fell victim to two key factors: limited resources devoted to enforcement and an inability to quantify emissions reductions. In the case of AB 2650, the South Coast Air Quality Management District was unable to regulate idling trucks at all gates at all times. The inspector relied upon reports from truckers to supplement gate inspections. Language barriers and a certain reluctance to engage the representative of an enforcement agency seem to have limited the number of complaints. Furthermore, the AQMD's authority ended at the terminal gate. Limiting queues on public rights-of-way in no way guaranteed that queuing and idling would stop inside the gates. There was no way to verify that a shorter wait time outside translated into better air quality. There was also no way to determine the relationship between AB 2650 and congestion. The legislation did not regulate other points along the supply chain where waits can occur. This includes potential choke points on the docks and at warehouses and distribution centers.

The unstated goal of fostering behavioral change on the part of terminal operators also proved difficult to achieve The majority of terminal operators adopted appointments as a means of complying with the legislation, but made no inside-the-gate changes (hours of operation, percentage of containers placed on wheeled chassis) which might have made appointments effective.

Analysis of the data from AQMD reports, terminal interviews, queuing and wait time observations at the terminals, and trucker surveys leads us to the following conclusions with

regard to AB 2650: 1) use of the appointment system varies greatly and depends upon operating policies of individual terminals; 2) perceptions of the appointment system's effectiveness differ across user groups; 3) there is no evidence that the appointment system has affected queuing at marine terminal gates; 4) while a majority of the terminals who did not already offer extended gate hours implemented an appointment system in response to the legislation, most did so in order to avoid paying the high labor costs associated with extending operations to off-peak hours. The reasons are explored below.

The regulation was imposed from the outside, not as an industry response to a perceived problem.

We noted earlier that scale economies in shipping and a large local consumer market make these ports very attractive to Pacific Rim trade. The San Pedro complex is one of a few in the world that can receive 8,000 TEU ships and has close proximity to a market of 20 million consumers. Terminal operators have established long-term relationships with major international steamship lines that bring with them a built-in and preferred customer base. In turn, terminal operators often offer special services, for example extended free storage time for containers, or special gate hours to process their cargo. Until very recently, these ports have not felt the threat of competition from other ports. Indeed, the threat from the port and terminal operator perspective is the lack of rail and highway capacity to handle increased cargo volumes, not port efficiency. The two ports have among the highest ratings in the US. This has made them less likely to feel the need to become more efficient.

There were other operational changes already underway that had a more dramatic impact on the ability of terminals to operate more efficiently.

The new labor agreement that followed the 2002 shutdown allowed for use of certain technologies, including OCRs, which enhanced the efficiency of terminal operations just inside the gate. Many marine terminal operators were beginning to adopt these new technologies as appointments were also being adopted. Trucks with or without appointments were able to get through the gates more quickly as a result, eliminating queues outside the gate. At the same time, the ports expanded by 700 acres and opened 120 new gates. This had a positive effect on the ability of LA and Long Beach to move a greater number of TEUs. The new and expanded terminals also had the luxury of organizing space to incorporate the new technology and wheeled operations and to maximize the number of gates, all of which contribute to more efficient operations and shorter queues.

Indirectly seeking to reduce truck emissions by changing the behavior of terminal operators is ineffective.

The regulation was imposed on terminal operators who have no incentive to respond to trucker concerns. AB 2650 allowed for flexibility in the ways in which appointments were offered. The result was actually multiple appointment systems using different web-based programs and with different rules and constraints. Terminal operators responded in ways that made sense for them. The goal of some appointment systems appeared to be avoiding fines by getting trucks inside the

gate, not limiting idling. Truckers' expectations that appointments would mean more cargo on wheels or that terminals would use the information from the appointment system to get containers ready for a driver to pick-up were not realized. This had a negative effect on truckers' willingness to make appointments in the first place and also served to limit the effectiveness of the legislation.

The costs and risks of not complying were low compared to the alternative of extended gate hours.

Full service extended gate hours require full labor gangs paid at off-peak rates, even if the volume of cargo moved warrants less labor. Those terminals that had already implemented off-peak gates prior to AB 2650 did so for the days and gates where container volume was predictable and/or where most of the containers could be placed on wheels. The other terminals found it easier to implement an appointment system (built upon an existing online cargo availability system) than to pay for extended gates when there was no guarantee that those gates would be sufficiently used. Even if the appointment system did not reduce truck queue time, a fine of $250 could be absorbed more easily than the costs of a regular 70-hour gate. The language of the regulation and the large size of the area to be covered by one inspector made enforcement difficult, so the risks of non-compliance were rather low.

AB 2650 Outcomes: A Postscript

The surge in trade through LA and Long Beach in 2004 had dramatic impacts on the operations of port facilities in Southern California. An inability to foresee the rapid rise in volumes resulted in additional transit times of 6-8 days for US shippers (Waterfront Coalition, 2005), including an additional 2-3 days on the intermodal rail network. The transportation industry planned for growth of 5% in 2004 when the actual figure was closer to 12%.

More than 100 vessels were diverted from San Pedro because of these problems and a lack of longshore labor to move cargo off the ships and out the terminal gates. During 2004, the terminals had to rely on part-time casual labor for a greater percentage of the work. There was also congestion on the road network in and around the ports.

The increase in the number of 8,000 TEU mega-ships calling at the ports also has major implications for port operations. An unloaded ship of this size requires 2,000 truck chassis or 6 double-stack container trains, along with up to 140 acres of dockside land to handle both imports and exports (Kyser and Huang, 2005). The ships can also cause scheduling conflicts. Their turn-around time in port can approach five days, three days longer than the average vessel.

The inability of the ports to handle the increased cargo sent a clear signal that productivity would have to improve if the ports were to remain competitive. At the same time, now Senator Lowenthal was threatening the ports with new legislation to require extended gate hours. Given the choice, the ports and terminal operators agreed to set up their own extended gate hours program. The program, PierPass, imposes a fee of $40 per TEU moved during peak hours. The program was launched in July 2005. Revenues from the fee are to be allocated to the

terminals to offset the added labor costs of extended hours. Because all terminals will be open at least 70 hours as part of the program, all will be in compliance with AB 2650. Appointment systems are no longer required; although there is some early indication that appointments are being used as one means of organizing after-hour pick-ups. This will help terminal operators better estimate the need for costly off-peak labor.

In general then, AB 2650 did not directly result in the kinds of operational changes that might have had a discernible impact on air quality. Because labor costs made extended gates untenable for those terminals not already operating them, the legislation offered only two solutions. Terminals could do nothing and accept the risk of a 30-minute queue; but this response would be seen as unnecessarily arrogant at a time when ports and terminals were trying to advertise the benefits of goods movement. The bill allowed only one other alternative: the development of an appointment system to accommodate truckers; but the regulation was imposed on terminal operators who have no incentive to respond to trucker concerns. The notion of a supply chain belies the fact that the chain is made up self-interested stakeholders.

AB 2650 however confirmed the seriousness with which elected officials in general, and Lowenthal in particular, viewed the impacts of goods movement. As a result, when Lowenthal introduced AB 2041 in February of 2004, it was not viewed as an idle threat. What was an option under 2650 was now required. Recognizing the political backlash against increased trade volumes, terminal operators could not risk another outside mandate. The result was PierPass.

With off-peak gates a reality, and because of the labor costs associated with running full service evening and weekend gates, terminal operators have an incentive to order the right number of labor gangs needed to meet the truckers' demand for these cargo moves. Appointments are one means of obtaining information on the projected use of off-peak gates. They offer valuable information that can help improve terminal efficiency while minimizing costs.

AB 2650 then did not bring about the extended gates it intended. However, by effectively forcing terminal operators to adopt appointment systems, it may have provided the tool that will allow those same operators to use extended gates to their advantage. Truckers may benefit from more efficient operations as well; and emissions may be reduced because terminal operators will have an incentive to limit queuing and idling inside as well as outside of the gates. What was once viewed as an unnecessary imposition may be what allows the terminals operators at LA and Long Beach and the trucking community to meet the demands of global trade. In the process, they may also establish the model for other ports in the US and abroad.

For policy makers, the lesson is that regulation (or the threat of legislation) can have a desirable effect; but efforts that indirectly target an industry are likely to be more difficult to enforce and thus less effective. PierPass shifts the enforcement burden to the terminals themselves since they effectively run the program and collect the fees. Unlike the various appointment systems adopted in response to AB 2650, extended gates under PierPass are uniform because there is an economic benefit to do so. PierPass is an industry response to a problem that both the public sector and the private sector now acknowledge.

Appendix A: Organizations Interviewed

Organization	Date Interviewed	Person Interviewed
Air Quality Management District (South Coast)	3/19/04	AB 2650 Compliance Inspector
Air Quality Management District (South Coast)	7/1//04	AB 2650 Compliance Inspector
APM Maersk Terminal	11/23/04	General Manager, Safety and Regulatory Affairs
Assembly Select Committee on Ports (CA)	11/1/04	Consultant to the Assembly Select Committee on Ports
Assembly Select Committee on Ports (CA)	10/27/03	State Assemblyman
California State University, Long Beach	2/4/04	Professor, Dept. of Economics and trucking specialist
California Trucking Association	9/10/03	Southern CA and Intermodal Conference Representative
California Trucking Association	9/23/03	Southern CA and Intermodal Conference Representative
Custom Brokers and Freight Forwarders Association (Los Angeles)	11/19/04	President
eModal	5/13/04	President
Evergreen Terminal/Seaside Transportation Services	5/5/04	Vice President
International Longshore and Warehouse Union (ILWU)	9/30/03	Senior Liaison
International Longshore and Warehouse Union (ILWU)	12/1/04	Senior Liaison
ITS Terminal	10/6/03	Director of Customer Service
ITS Terminal	2/9/04	Director of Customer Service
ITS Terminal	4/2/04	Director of Customer Service
Long Beach Container Terminal	5/24/04	Vice President, Operations and Marketing

Organization	Date Interviewed	Person Interviewed
Marine Terminals Corporation	5/5/04	Vice President
Pacific Merchant Shipping Association	9/13/03	Vice President
Pacific Merchant Shipping Association	11/16/04	Vice President
Port of Long Beach	11/10/04	Manager of Transportation Planning
Port of Long Beach	2/09/04	Marketing Manager
Port of Long Beach	3/30/04	Marketing Manager
Toys”R”Us	2/5/05	Logistics Manager

Appendix B: Proposed Questions for Terminal Operators

EVALUATION OF THE TERMINAL GATE APPOINTMENT SYSTEM AT THE LOS ANGELES/LONG BEACH PORTS

The purpose of this research is to conduct a comprehensive evaluation of the appointment system demonstration at the Los Angeles/Long Beach ports. The appointment system was implemented in response to California Assembly Bill (AB) 2650, which seeks to reduce truck queuing at the ports' terminal gates and associated vehicle emissions. Our goal is to move beyond anecdotal evidence and gather actual data that can objectively guide policy decisions and make them as effective as possible. We believe that, as METRANS-funded university researchers, we are in a unique position to objectively perform this evaluation.

Port-related truck movements tend to be concentrated in time, leading to high volumes of truck movements on the region's highways during peak daytime hours. A smoother distribution of truck movements throughout a 24-hour period should therefore reduce both delays at the port and on the highway system. The evaluation will include the following: 1) descriptive analysis of terminal gate hours in the context of the cargo movement process and labor regulations; 2) analysis of the use of the appointment system by terminal operators, trucking companies and their customers; 3) assessment of the impacts of the appointment system on cargo throughput and queuing; 4) institutional analysis of the implementation and results of the appointment system; 5) overall assessment. The research will include in-depth interviews of stakeholders, surveys of trucking companies, and extensive field data collection to document appointment system impacts.

Efficiency of port operations is of growing regional and national concern. Metropolitan areas with major ports or that serve as major transshipment centers have experienced large increases in truck traffic, congestion, and air pollution. The lack of transport system capacity, as well as local community opposition, have motivated a search for solutions to mitigate trade-related impacts through more efficient management of the supply chain, including port operations. Experiences at the Los Angeles/Long Beach ports will provide insight on whether terminal gate strategies are effective in solving goods movement related impacts in metropolitan areas.

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PROPOSED QUESTIONS FOR TERMINAL OPERATORS

Background Information

Contact information – name, address, phone

When did the terminal open and has it been expanded in the last 5 years? 10 years? Are there plans for future build-out?

Who leases the terminal? For how long?

What is the maximum number of gangs that can be run at the terminal?

Operational Procedures

Please describe the terminal capacity with regard to acreage, number of berths, cranes, transtainers, etc.

How many ships can be serviced at any one time (size and length)?

Do you have on-dock rail? If it is available and you are not using it, why not? Which rail company operates it? Which rail companies do you deal with? Do you make use of near-dock rail?

What is the annual volume of cargo? Can you provide any info on daily, weekly volumes and variation across seasons?

Is any non-containerized cargo handled?

Please describe the transaction process. How many gates/lanes/posts/points are in operation?

Does process differ for full/empty, full/full, empty/full, empty/truck no chassis, etc?

What technologies are used to check-in vehicles and record transactions (OCR, RFID, etc)? Include procedures for picking up chassis to load non-wheeled cargo. Are there contingency plans when OCR, etc. are not operating? How often does this occur?

What is the average turn time (by transaction type)?

What constitutes a turn?

How are averages generated (by sample, weekly)?

What is the extent of dockside operations that occur outside of 8 am-5pm (both weekdays and weekends)?

Is there off-hour pick ups for cargo on wheels?

Do you operate (full) gate hours outside of 8 am-5 pm?

What are hours for ship loading/unloading; for container pickup/delivery; for gate entry/exit, by day of week, season?

Are there limitations on the number of moves/transactions or type/source of cargo for night gates?

Which industry database and communications systems do you use (e-Modal, MTC Voyager)?

Appointment System

What AB 2650 compliance method is being used? If you are not using extended gate hours, why not? Were other compliance options considered?

If you are using an appointment system, when did you start, and were any changes made along the way?

Is there available documentation on the percentage of transactions performed, kept and/or rescheduled using appointments?

What kind of data are kept on transaction times for various transactions from gate entry to exit?

Is it possible to have access to a sample? (We do not need to know the name of the trucking firm or type of cargo, only type of transaction. We also would not reveal the source of the data, i.e. terminal.) We would like to have a sample by day and season for all transactions. It might be easier to do a data dump and provide us with data for four different months.

For what time period(s) are appointments available? Do these change by day of week, month of year?

What types of loads are eligible?

What controlled movements are outside of the appointment system?

How are appointments made? Which system is used for gate and schedule information (e-modal, etc.)? Can phone appointments be made?

Are same day appointments available?

Are there any restrictions on the number of appointments accepted during a given period?

Has the appointment system resulted in changes in on-dock operations (more cargo on wheels or changes in turn time)?

Appendix C: Trucking Company Survey

METRANS
Transportation Center
USC | CSULB

EVALUATION OF THE TERMINAL GATE APPOINTMENT SYSTEM AT THE LOS ANGELES/LONG BEACH PORTS

Thank you for taking the time to fill out the attached survey. Please be aware that all individual responses will be kept confidential. When completed, please return by fax or mail to the address below.

The purpose of this research is to conduct a comprehensive evaluation of the appointment system demonstration at the Los Angeles/Long Beach ports. The appointment system was implemented in response to California Assembly Bill (AB) 2650, which seeks to reduce truck queuing at the ports' terminal gates and associated vehicle emissions. Our goal is to move beyond anecdotal evidence and gather actual data that can objectively guide policy decisions and make them as effective as possible. We believe that, as university researchers, we are in a unique position to objectively perform this evaluation.

The evaluation will include the following: 1) descriptive analysis of terminal gate hours in the context of the cargo movement process and labor regulations; 2) analysis of the use of the appointment system by terminal operators, trucking companies and their customers; 3) assessment of the impacts of the appointment system on cargo throughput and queuing; 4) institutional analysis of the implementation and results of the appointment system; 5) overall assessment.

Efficiency of port operations is of growing regional and national concern. Metropolitan areas with major ports or that serve as major transshipment centers have experienced large increases in truck traffic, congestion, and air pollution. The lack of transport system capacity, as well as local community opposition, have motivated a search for solutions to mitigate trade-related impacts through more efficient management of the supply chain, including port operations. Experiences at the Los Angeles/Long Beach ports will provide insight on whether terminal gate strategies are effective in solving goods movement related impacts in metropolitan areas.

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EVALUATION OF THE TERMINAL GATE APPOINTMENT SYSTEM AT THE LOS ANGELES/LONG BEACH PORTS

Background Information

1. Name of Company:_____

Address: _____
_____
_____
_____

Phone: _____ Website (if any): _____

Your Name: _____ Your Title: _____

Email: _____

2. How long has your company been in the intermodal trucking business? _____years

3. Number of intermodal trucks:

Company owned _____ Driver-owned (owner operator)_____

4. Number of intermodal drivers:

Company drivers _____ Owner-operators _____

5. Are your company intermodal drivers union workers? Yes No

Are your owner/operator intermodal drivers union workers? Yes No

6. Which intermodal lanes do you service? (Check all that apply)

☐ Riverside ☐ San Bernardino

☐ Orange County ☐ Ventura County

☐ Imperial County ☐ Los Angeles

7. Is your company a land bridge carrier? Yes No

Is your company an in-house carrier for a steamship line(s)? Yes No

Does your company do store door billing to a steamship line? Yes No

8. Terminals you serve: (circle all that apply)

Pier A Berth 88 (Zim/MSC)	Pier C Berth C-60 (Matson)
Berth E-20 LB CUT	Berth F-10 LB LBCT
Berth 234 LB ITS	Berth 246 LB PCT
Berth T136 Hanjin	Berth 127 SP WBCT
Berth 136 TI TraPac	Berth 214 TI YTI
Berth 233 TI Evergreen	Berth 300 Global Gateway APL

Berth 400 Maersk

Operational Procedures

9. What are your operating hours for intermodal trucking?

Weekdays: _____ a.m. to _____ p.m.

Saturdays: _____ a.m. to _____ p.m.

Sundays: _____ a.m. to _____ p.m.

10. How many containers have you moved on average over the past six months?

weekly_____ monthly _____

11. Do you use a vehicle tracking system? Yes No

Manufacturer/Brand _____

Appointment System

12. Are you currently using the appointment system? Yes No

13. Over the past six months, what percentage of total transactions were made using appointments? _____

14. What percentage of appointments were you able to keep during the past six months? _____

Of the appointments you were not able to keep, did you:

☐ Cancel them out ☐ Miss them ☐ Combination of both

15. What usually causes you to miss an appointment?

☐ Freeway congestion ☐ Delays on the customer end

☐ Delays on the marine terminal side ☐ Other _____

16. Do you use appointment system for (check all that apply):

☐ pick-up of import container ☐ drop-off of export container

☐ pick-up of empty ☐ drop-off of empty

17. Do you tend to schedule appointments (check all those that apply and explain):

☐ At a particular time of day (1st transaction, after lunch, etc.)
_____

☐ On a particular day of the week _____

☐ During particular months in the year (peak season, etc.)
_____

☐ Only at certain terminals _____

18. How long in advance do you schedule appointments? (check all that apply)

☐ Same Day ☐ 24 hours in advance

☐ 48 hours in advance ☐ Other _____

19. What percentage of your customers/cargo receivers require appointments? _____

20. Do you impose a surcharge if appointments are required by

a customer/cargo receiver Yes No

a marine terminal Yes No

21. Has the appointment system improved your ability to meet customer demands?

Yes Somewhat No

22. Have appointments had any impact on reducing truck turn times (circle one)?

Yes Somewhat No

What are your average turn times for a dual transaction (empty in / load out)?

_____

If you have made appointments at any of the following marine terminals in the past 6 months, rank the **overall effectiveness of the appointment system** in improving truck turn times:

1= not effective 2 = marginally effective 3=effective
4 = very effective 5 = exceptionally effective

Pier A Berth 88 (Zim/MSC) _____
Pier C Berth C-60 (Matson) _____
Berth E-20 LB CUT _____
Berth F-10 LB LBCT _____
Berth 234 LB ITS _____
Berth 246 LB PCT _____
Berth T136 Hanjin _____
Berth 127 SP WBCT _____
Berth 136 TI TraPac _____
Berth 214 TI YTI _____
Berth 233 TI Evergreen _____
Berth 300 Global Gate Way _____
Berth 400 Maersk _____

23. Do you have records of turn time before/after the implementation of the appointment system that can be provided to us? Yes No

Comments:

The following are questions for discussion. Please feel free to provide any additional written comments you would like to add.

24. Are there problems with using the appointment system? If so, please describe:

_____
_____
_____
_____
_____
_____
_____

25. What advantages do you see in using appointments?

_____
_____
_____
_____
_____
_____
_____

26. Do you have any other opinions about the appointment system you would like to share with us?

_____
_____
_____
_____
_____
_____
_____
_____
_____

THANK YOU

Appendix D: Timeline

Date	Event
1/2000	Assemblyman Alan Lowenthal authors legislation (AB 1775) requiring that coke piles and trucks that haul coke from port be covered by 1/01
8/2000	CA Assembly passes AB 1775
5/2001	Assembly passes AB 16x (Lowenthal and Oropeza) allowing City of Long Beach and oil operators to split profits of new natural gas deposits beneath city shoreline
7/2001	CA Senate passes AB 16x
7/2001	US Senate rejects effort to weaken proposed safety standards for Mexican trucks driven in US
11/2001	State Sen. Betty Karnette proposes cargo tariff
1/2002	Assemblyman Lowenthal proposes legislation (AB 2650) aimed at reducing idling time for trucks outside of marine terminals from 120 minutes to 30 minutes. Legislation would also permit trucks to conduct transactions at terminals in less than 15 minutes.
4/2002	Assembly Transportation Committee approves AB 2650; ILWU and Teamsters rally in support of legislation
5/2002	Contract negotiations begin between ILWU and PMA
5/2002	PMA offers amendments to AB 2650 removing turn time requirement among others; CA Assembly passes AB 2650
8/2002	Long Beach Board of Harbor Commissioners votes to oppose AB 2650 then reverses itself once bill is amended to remove turn time requirement and establish exemption for terminal operators for delays not the fault of MTOs
8/2002	Long Beach City Council votes to support AB 2650

Date	Event
8/2002	CA Senate passes AB 2650
9/2002	ILWU refuses to sign contract extension needed to authorize work while negotiations continue; Productivity reductions result from union “safety program”
9/27/2002	West Coast port shutdown begins
9/30/2002	Governor Gray Davis signs AB 2650 into law.
10/7/2002	President Bush creates Board of Inquiry under emergency provisions of Taft-Hartley Act. Board suspends negotiations and forces ports to re-open
10/8/2002	Ports re-open ending lock-out
11/23/2002	ILWU-PMA agreement reached. It is the first six-year agreement in west coast longshore history; and establishing framework allowing for phase-in of time-saving technology
1/1/2003	ILWU-PMA agreement activated
1/1/2003	LBCTI begins using an appointment system.
7/1/2003	AB 2650 takes effect.
7/2003	TTI (at POLB) implements appointment system.
7/2003	First violation reported; no fine imposed.
8/2003	At AB2650 Taskforce meeting, trucking companies report an occasional lack of appointments for certain periods during the day. Follow-up action items include suggestions on ways to assess the effectiveness of AB2650 efforts and a possible study of non-use of appointment system

Date	Event
9/8/2003	AQMD inspector addresses a driver meeting; he reports drivers enthusiastic about AB2650.
2/17/2004	Lowenthal introduces **AB 2041** (to establish a Port Congestion Management District), **AB 2042** (est. a baseline air quality for South Coast District; vetoed 9/29/04), **AB 2043** (requires California Marine and Intermodal Transportation System Advisory Council to study and submit findings; approved by Governor on 9/29/04, Chaptered 9/30/04).
3/22/2004	NRDC/Coalition for Clean Air release report grading environmental records of the 10 largest US ports. LA and LB get middle-of-pack scores of C-minus and C, respectively.
3/2004	First citation under AB 2650 is issued in Oakland, for 3 trucks.
4/5/2004	Study of cold-ironing and other pollution-reducing measures commissioned by POLB is released.
4/5/2004	Union Pacific asks customers to divert rail shipments to truck because of crew shortages and congestion.
4/6/2004	LB Harbor Commission passes $3 million plan to install radiation detectors, motion detectors and surveillance cameras throughout port as part of anti-terrorism efforts.
4/15/2004	Federal regulators approve technological enhancements to allow more thorough checks of cargo containers as part of anti-terrorism efforts.
4/2004	UP average velocity dropped from 25 mph in 1st quarter of 2003 to 21.5 mph in 1st quarter of 2004 (24.6 3/2003 to 21.4 3/2004).
4/2004	POLB Harbor Commissioners discuss rules requiring terminals to reduce onsite equipment emissions of NOx by 20% and particulate matter by 30%.
5/5/2004	AB 2650 working group meeting.
5/17/2004	China Shipping Terminal, equipped with cold-ironing facilities and alternative-fuel yard equipment, opens 17 months late.

Date	Event
5/21/2004	Operations launched by Allied Port Truckers: plan to use union labor, company-owned fleet, and low-sulfur fuel.
5/2004	Long Beach Harbor Commissioners approve hiring consultants for a truck trip-reduction program.
5/2004	New proposal for expansion of the 710 freeway released; required number of house condemnations fall from over 1,000 to about a dozen.
5/2004	California Trucking Association votes to ask the Federal Maritime Commission for anti-trust immunity so trucking companies can discuss common issues.
5/2004	AB 2042 mandating no increase of pollution levels from the ports passed by the California Assembly POLB pollution cap provision removed from measure.
5/2004	POLB moves 468,029 TEUs this month, surpassing the 2003 peak movements of 436,8924 in October.
6/4/2004	West Coast Terminal Operators Discussion Group files plans for collection of a fee for container moves performed during the day with the FMC.
6/7/2004	Truck drivers attempt to shut down port, demanding 43% raise in rates and a fuel surcharge to cover increased diesel costs. Little picketing, has no effect.
6/2004	Flyer distributed calling for trucker support of nationwide port shutdown.
6/2004	Los Angeles Harbor Commissioners vote down proposal requiring each port to dedicate 10% of yearly revenues to pollution reduction measures.
6/2004	The California Chamber of Commerce adds AB 2042 to its annual “job killer” list of pending legislation.
7/9/2004	PMA and ILWU reach agreement to hire new dockworkers due to threatening cargo backup.
7/24/2004	China Shipping ship CSCL Asia, the world’s largest container ship (at the time) arrives at POLB.

Date	Event
7/22/2004	CARB adopts measure prohibiting trucks from idling for more than 5 minutes while waiting for terminal gates to open.
7/2004	Planned 4th of July trucker walkout unsuccessful – few participants.
7/2004	POLB Harbor Commissioners approve port tariff to be charged to terminals which fail to reduce emissions by specified amounts.
7/2004	Diversion of ships to other West Coast ports begin as number of ships at anchor grows.
7/2004	UP announces it is operating at capacity and will not accept new business. BNSF begins limiting the number of containers it will accept each day.
7/2004	Statistics released show June container imports up 19.3% (Long Beach) and 13.1% (Los Angeles) over June, 2003.
7/2004	1,100 temporary longshore workers brought in to aid with most basic tasks.
7/2004	Terminals moving ahead with plan to begin night gates and day-use fee in November.
7/2004	TTI announces that appointments have grown from 30-40% of container pick-ups to 90%.
8/10/2004	60 ships in port; 20 waiting at anchor (beginning of Christmas busy season).
8/10/2004	NYK Atlas made its maiden stop in LA. It is NYK Line's first "Alternative Maritime Powered" vessel to plug in (cold ironing) while in a U.S. port.
8/16/2004	Ship turn times up to 5-6 days (normally 3-4 days); at least 14 ships diverted to U.S. and Mexican ports.
8/17/2004	71 ships in harbor; 22 of them at anchor. At least 17 vessels diverted since congestion begins.

Date	Event
8/19/2004	At AB 2650 Working Group, terminal operators report that four 8,000-TEU ships have docked at Port of Long Beach. One terminal reports success with multiple appointments for a company needing to pick-up 30 odd-sized containers.
8/19/2004	ILWU & PMA began hiring 3000 new casual workers from a pool of 300,000 to 700,000 names to deal with backlog of cargo at the ports and register 1,000 current casuals as Class B union members.
8/23/2004	PMSA announces plans for full service night and weekend truck gates as well as a daytime container move surcharge of $20.
8/24/2004	PierPass, a Marine Terminal Operations initiative, is unveiled at a press conference. Target date is November 2004.
8/28/2004	19 documented diversions of ships to other ports. Turnaround times rise to 6 to 7 days.
8/2004	POLA Harbor Commissioners form subcommittee to work on “no net increase” of port-related pollution.
8/2004	Los Angeles Mayor Jim Hahn orders feasibility study of inland port for cargo distribution.
8/2004	The Los Angeles Port Board approves the port’s first official Rail Policy which calls for an ICTF in Wilmington to be operated by BNSF.
8/2004	SB 348, aimed at changing way marine terminals relate to truckers and shippers, passed.
8/2004	SB 1397, which would have allowed SCAQMD to regulate locomotive emissions in the LA Basin, defeated.
8/2004	In response to PierPass proposal, Assemblyman Alan Lowenthal withdraws AB2041, which would have mandated night gates and day movement fees.

Date	Event
Late August, 2004	Some terminals began operating extended gate hours at their port facilities.
9/15/2004	The New England Journal of Medicine publishes Keck School study on the harmful effects of smog and small particulate matter on children's lungs.
9/30/2004	AB2043 signed into law: requires public hearings and data compilation on growth and congestion issues at California ports.
9/2004	No-Net-Increase board to include 2 harbor commissioners, 2 port staffers, 1 ILWU member, 1 CARB staffer, 2 Port Community Advisory Committee members, 1 lawyer for an environmental group, 1 medical professor, 1 economics expert, and 1 shipping representative.
9/2004	Cold-ironing deal between BP and POLB expected to cut 48 tons of diesel emissions yearly…just 1% of ship-related pollution from ports.
9/2004	PierPass general manager announces that port terminals are behind schedule on the plan to introduce extended gate hours; the program is now set to begin in early 2005, instead of November 1, 2004.
10/2/2004	COSCO adds two 8000 TEU vessels to its Long Beach route.
10/11/2004	50 ships at anchor in harbor. Ships are waiting 3-4 days just to get labor; turnaround times at a week.
10/2004	Governor Schwarzenegger vetoes AB2042 (no net increase) and SB348 (terminal/trucker relationships).
10/2004	23 confirmed diversions: 8 to Manzanillo; 8 to Oakland; 3 to Panama; 2 to Yokohama; 1 to Stockton; 1 to San Diego.
10/2004	40 confirmed diversions since July.
10/2004	Citing congestion, Hanjin sends larger vessels to Northwest ports, switches smaller ships to LA/LB.

Date	Event
10/2004	Study shows that extended gate hours are the single most effective way to get trucks off of the 710 freeway during weekday work hours.
11/1/2004	More than 20 ships diverted during October; at least 6 diversions for November already planned.
11/1/2004	LA Harbor Commission begins a one year study of airborne particulate matter at the port.
11/21/2004	11 ships at anchor in harbor.
11/2004	A second citation under AB 2650, for five trucks, is issued in Oakland. At 11/3/04 AB 2650 Taskforce meeting, AQMD Inspector in So. Cal. reports observing container ship traffic at historically high levels and several queues of 30 minutes or more. No violations documented due to a lack of information on actual engine idling times. Inspector also reports that he is starting to ask drivers to use flashers to let him know when they have an appointment. With the increase in truck traffic, getting out of the car to approach a truck has become more problematic and dangerous. Marine Terminal operators report that number of wheeled cargo pick-ups has dropped off due to a record number of movements and scarcity of chassis. Also announced at meeting: Terminal representatives warn of possible impact of security measures on turn times. This includes driver ID checks. New chassis safety inspections and roadability checks required pursuant to AB 1507 also may have an impact on turn times.
11/2004	Allied Port Transporters files for bankruptcy.
11/2004	Terminal operators announce that extended hours will be introduced simultaneously for all five weeknights, rather than phased in one night at a time as previously planned. No date is set for the implementation of the PierPass program.
11/2004	Marine Exchange predicts that total diversions from 7-12/2004 will reach 104.
12/4/2004	6 ships at anchor in harbor.

Date	Event
12/21/2004	Panama Canal Authority renews MOUs with East Coast ports to boost all-water Asian shipping.
12/2004	37 diversions in November.
1/1/2005	2650 to change as a result of AB 1971: queuing outside terminals will be limited to 30 minutes, whether or not truck is idling.
1/5/2005	Teamsters propose legislation to improve working conditions for truck drivers, which would include giving owner-operators the right to organize and the formation of a joint powers authority to improve efficiency and emissions.
1/27/2005	Los Angeles MTA approves plans to widen the 710 freeway, including 4 dedicated truck lanes.
1/2005	State Senator Richard Alarcon introduces SB 45, which aims to reduce demurrage and detention fees levied by terminal operators.
1/2005	Alameda Corridor Transportation Authority approves rail shuttle pilot program to test feasibility of short-haul container rail service between the ports and inland distribution centers.
1/2005	PierPass newsletter reports that fee for day movements will increase to $40 after the month long phase-in period. Implementation is scheduled for March.
1/2005	Early January storms force the closure of all 5 Union-Pacific rail lines leading out of Los Angeles.
2/2005	Negotiations between BNSF and Los Angeles port executives about construction of an intermodal facility just north of the ports. Facility is expected to remove up to 1 million truck trips yearly from the 710.
2/2005	PierPass administration announces that launch date is postponed to June 1due to problems with software development bids.
2/2005	Year-end statistics show that container traffic on the Alameda Corridor increased faster than container traffic entering through the ports.

Date	Event
2/2005	The San Pedro Bay Ports Container Vessel Forecast predicts that eleven 10,000 to 12,000-TEU ships will call at the ports weekly in 2020.
2/22/2005	Introduction of many port-related bills: • SB 45 prohibits chassis or container owners from imposing detention or demurrage fees under certain circumstances • SB 459 allows the SCAQMD to impose emission mitigation impact fee on railroads • SB 760 would charge a fee of $30/container to be spent on security, congestion, and pollution • SB 761 would require truck turn time be under 60 minutes, or the terminals would have to pay a fine • SB 762 would require trucks serving the ports to be licensed by a joint powers authority • SB 764 places cap on port-related pollution • SB 848 allows owner-operator truckers to bargain collectively • AB 888 authorizes the SCAQMD to establish a railyard equipment emission reduction program • AB 1101 defines diesel magnet areas (e.g. ports & distribution centers) and would require them to meet the same air quality standards as stationary sources AB 1406 charges $10/container to fund security gates • AB 1222 requires CARB to encourage testing, repair, or replacement of high-polluting locomotives
3/2005	Union Pacific to change near-dock operations so that all international containers will pass through its Carson ICTF instead of being drayed to Commerce. This should remove 500,000 truck trips yearly from highways. UP wants to expand its Carson yard.
4/2005	PierPass launch delayed from June 1 to July.
8/2005	MTC Terminals report 91% appointments across 3 Southern California terminals for import pick-ups and 40% for exports at 1 terminal. Voyager to include new module for empties-in.

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