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Comparison of Public Private Partnerships in Airports and Seaports in Low and Middle Income Countries

ABSTRACT

The paper examines similarities and differences in public private partnership (PPP) structures between airports and seaports in low and middle income countries using data from the World Bank's Private Participation in Infrastructure (PPIAF) database, and puts forward some hypotheses about the reasons for the differences. Qualification of the results is also made with available literature on airport and seaport PPPs.

It uses eight granules – the eight 'Ws' - as the basis for the analysis, comparing PPPs in terms of 'What', 'When', 'Where', 'Why', 'Whole', 'Who', 'Whom', and 'Which way'.

Although the similarities between port and airport PPPs generally outweigh their differences, there are several areas in which they diverge. These are the characteristics of private sector partner, the PPP models used, the use made of competitive tendering, and the bundling of facilities. Airport investors tend to attract a wider array of investor types than seaports, where the focus is more on specialized operators in BOT agreements.

These differences have their roots in four main structural variations between the two industries: the level of integration of infrastructure and services, economies of scale, public service obligations, and the differing roles of competition and regulation.

KEY WORDS

PPPs; partnership, seaport; airport; terminal.

Comparison of Public Private Partnerships in Seaports and Airports

1. Introduction: Background, Objectives and Setting

Seaports and airports both act as nodes in transport networks, the former handling mainly freight and the latter mainly passengers. Their functions are broadly similar, but their economic and institutional structures are often significantly different.

As governments have withdrawn from financing new capacity, more private sector involvement has been required. One way of achieving this has been through public-private partnerships (PPPs), which can take many different forms. This paper tries to explain similarities and differences between seaport and airport PPPs, using a large set of data drawn from the World Bank PPIAF database.

After the literature review, Section 3 describes the approach used in the empirical analysis. Sections 4-6 discuss similarities and differences between seaport and airport PPPs in terms of a series of different attributes, putting forward some hypotheses about how these might relate to their economic structure and market environments. Section 7 highlights the main differences found between seaports and airports, whilst Section 8 draws conclusions about the need for further research.

2. Literature Review

Even though the first documented PPP applications date back to Greek and Roman times, the first modern PPP contracts were implemented in SE Asia in the mid-1980s. Subsequently, PPP usage spread to Europe, Australia, Canada, South Africa and large numbers of low and middle income countries (Perrier et al., 2014).

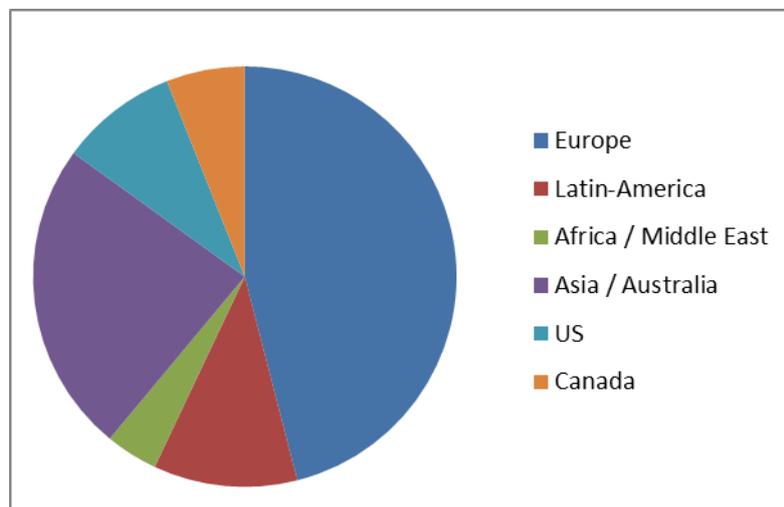


Figure 1. Proportion of PPP Projects by Region (Project Value, 1985-2011)

Source: Perrier et al. (2014)

PPPs have been applied in various fields, including public health, education, utilities, mining and agriculture, as well as transport. In many of these areas PPPs are primarily used as a mechanism for financing construction; consequently the academic literature concentrates on procurement issues. But in transport, PPPs have also been used to address wider policy

issues such as improving quality of service, opening up markets to new entrants, and achieving more transparent pricing (Estache & De Rus 2003).

In transport, Siemiaticky (2011) studies the extent to which stable relations favour the increased use of PPPs. He concludes that repeated partnerships contribute to reduced transaction costs, innovation, and continuous exploitation of a learning curve. On the other hand, frequent collaborative relationships may reduce competition, leading to higher costs and lower quality of projects.

Cruz & Marques (2013) list the benefits and pitfalls in PPPs in general. Among the former, they identify (i) the satisfaction of overall needs through a life-cycle approach, (ii) the development of long-term relationships, (iii) the scope for flexible financing (iv) orientation towards results, (v) opportunities for bundling, (vi) the potential for innovation, (vii) the re-focusing of government on its core tasks, and (viii) the enabling of large infrastructure investments. The latter include (i) higher capital and transaction costs, (ii) the risk of contractual incompleteness, (iii) long-term forecasting problems, and (iv) regulatory capture.

In relation to pitfalls (ii), Engel and Fischer (2013) refer to the need for revenue guarantees and caps, safeguarding a good balance between demand risk and government budget. Grimsey and Lewis (2007) deal with pitfalls (i) and (ii) through integration, value for money and discount rate issues.

Relatively few comparisons have been made between seaport and airport PPPs. Dion, Slack & Comtois (2002) look at seaport and airport divestiture in Canada and conclude that although the policy goals are similar, airport transfers have been able to proceed faster, partly because of more favourable local conditions and attitudes.

Cruz & Marques (2010) point out that the United States has developed a governance model for airports which is remarkably similar to the landlord port model which dominates seaport PPPs. The airside infrastructure (runways, taxiways and parking stands) is regarded as a natural monopoly with public service obligations, whilst the land side infrastructure (terminals, car parking, shopping facilities, etc.) is seen to be delivered more efficiently under a market competition model.

At the same time they highlight differences in the way in which services are organised. In many airports, ground handling operations were traditionally undertaken by the airlines themselves, although sometimes outsourced or sold on to allow the airlines to focus on their core business. This has resulted in the emergence of global handling firms such as Servisair (175 airports), Swissport (174 airports), Worldwide (120 airports), and Menzies (112 airports). However unlike their global counterparts in container terminals, such as Hutchison Port Holdings, DP World and PSA Corp, service companies in airports are not involved in large-scale investments and so do not feature prominently in PPPs.

Unlike seaports, terminal infrastructure in airports is often provided by different companies to those providing the services, which simply rent space or purchase operating licenses. This increases the attractiveness of airport terminal concessions to institutional investors, who do not require extensive operating experience. Another difference between seaports and airports highlighted in Cruz & Marques (2010) is the high proportion of revenues that many airports obtain from non-aeronautical activities. Because of the regulation of aeronautical charges and

pressure from airlines to keep prices low, commercial franchises now account for over 50% of revenues at most large airports. This again is different from the seaport environment.

Academic articles on PPPs in transport are often in the form of case studies of individual projects, or describe the evolution of policy for one mode of transport in one particular country (e.g. Castillo-Manzano & Ascencio-Flores, 2012; Lipovich, 2008; Marques & Fonseca, 2010) or continent (e.g. Chin & Waldron, 2014; Farrell, 2014; Theofanis & Boilé, 2014; Verhoeven, 2014). The international Civil Aviation Organisation (2013) has produced a particularly useful series of 26 country studies for airports. The nearest equivalent to this for seaports is Organisation for Economic Co-operation and Development (2011), which examines member countries' seaports from a competition and regulatory perspective.

Sector-wide studies for seaports (e.g. Meersman, Van de Voorde & Vanelslander, 2014; De Langen & Heij, 2014; Pigna, 2014; Meersman, Pauwels, Notteboom, Pallis & Farrell, 2012; Van de Voorde, & Vanelslander, 2010) and airports (e.g. Graham, 2011; Oum, Adler & Yu, 2006) are growing in number, but look inwards at variations in PPP practice within each mode, rather than relating them across the various modes of transport.

Books and reports about PPPs in transport also tend to deal separately with each mode (e.g. Asian Development Bank, 2001a & 2001b, Estache & De Rus, 2003) or discuss generic issues such as risk sharing, contract design and regulation using examples from different modes of transport (e.g. Guasch, 2004; Macário, 2014). If any conclusion can be drawn it is that differences between countries are likely to be at least as important as differences between modes in explaining variations in PPP structures.

The literature on seaport and airport economics sometimes glosses over the differences between them, concentrating on similarities such as their role as transfer nodes within networks where flows need to be consolidated to improve service frequency (Button, 2010), and the lack of any supporting fixed track infrastructure (Rodrigue, Comtois, & Slack, 2013).

Nevertheless the operating environment for sea transport has historically been more liberal and competitive than for air transport, not only because of the need to limit access to airports for safety reasons, but also because of bilaterally-negotiated landing rights and their use to protect national airlines (Braithwaite & Drahos, 2000). This seems likely to be one of the most important explanatory variables for differences in port and airport PPPs, together with contrasts in the underlying organisational structures of the two modes of transport.

3. Empirical Analysis: Approach and Data Manipulation

3.1 Research approach

Section 2 suggests that there is no uniform methodology for making structural comparisons between seaport and airport PPPs, partly because of the difficulty of obtaining comprehensive sets of comparable data.

One recent approach is that proposed by Vanelslander, Chomat, Roumboutsos & Bonnet (2013), who present a methodology for comparing concessions in different transport sub-sectors, and test it using three case studies that are very different in nature: a road development project, a city tramway project, and a port lock construction initiative.

This study uses a pre-fuzzy logic methodology based on a mixture of linguistic and numeric variables which are used to analyse PPP structures in terms of discrete granules. Each granule is a set of attributes characterised by indistinguishability, similarity, proximity or functionality (Zadeh, 2008). The development and application of the relevant parameters is explained in Rouboutsos & Liyanage (2013, 2013b). Granulation is achieved by employing a Contextual Risk Analysis Framework, based on eight “Ws”: ‘What’, ‘When’, ‘Where’, ‘Why’, ‘Whole’ ‘Who’, ‘Whom’, and ‘Which way’

‘What’ refers to the nature of the project to be developed. ‘When’ designates the timeframe in which it was set up. ‘Where’ refers to the geographical location of the project. “Why” indicates the reasons for the project being developed as a PPP, the two extremes being either quality of service improvements or financing. “Whole” considers the wider environment and macro-economic conditions within which the project develops. Although some differences between seaports and airports can be found in these granules, it is generally the similarities which are more striking. These are described in Section 4.

‘Who’ identifies the public authority behind the project, whilst ‘Whom’ analyses the private sector participants. This is one of the areas where differences between seaport and airport PPPs are most pronounced, as set out in Section 5.

In Section 6 ‘Which Way’ deals with the characteristics of the contractual agreements, including the financing and funding structure, contract duration and the tendering and award process. This is once more an area where the similarities are more striking than the differences.

3.2 Sample and data

Data for the linguistic variables are taken from the World Bank’s PPIAF database for 144 low- and middle-income countries (World Bank Public Private Infrastructure Advisory Facility, 2012). This is the only large transport PPP database available in the public domain, with data for the relevant variables, allowing the analysis to be taken beyond the individual case study level.

The paper examines the data for all 141 airport and 372 seaport PPP transactions that were available in the PPIAF database in November 2012. The breakdown of projects by region is shown in Table 1. The largest single country is China, with 16 recorded airport PPPs and 65 recorded seaport PPPs (16% of the combined total).

In terms of timing, 11% of the projects date from 1990-94, 28% from 1995-99, 23% from 2000-04 and 38% from 2005-11. The airport PPPs are slightly more recent, with 68% finalized since 2000 compared with 59% for seaports.

Table 1. Geographical Basis for Analysis (No. of Projects)

	Airport PPPs	Seaport PPPs	Total
Latin America	52	125	177
East Asia & Pacific	27	112	139
South Asia	10	44	54
Central Asia & Eastern Europe	29	26	55
Middle East & North Africa	11	20	31

Sub-Saharan Africa	12	45	57
Total	141	372	513

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

The next three sections deal with empirical results of the project characteristics of the mentioned database.).

4. Empirical Findings: What, Where,When, Why and Whole

This section consecutively deals with the 'contextual' PPP project characteristics ('What', 'Where and When', 'Why' and 'Whole'). For each of them, a comparison is made between seaports and airports.

4.1 What?

The 'What' variable describes the nature of the project to be undertaken by the PPP, in terms of its physical characteristics, functions and size. Evenhuis & Vickerman (2010) suggest that another important characteristic relating to this variable is its exclusivity i.e. the level of temporary monopoly that it is able to exercise.

In the PPIAF dataset, whole airport transactions involving the runway as well as the terminal(s) are more common than whole seaport transactions which add basic infrastructure such as breakwaters, channels and basins to the operating terminals (Table 2). Of the 141 airport PPPs, around three quarters included the runway as well as the terminal(s), but "whole seaport" PPPs accounted for only 10-15% of the port transactions.

Private investment in basic infrastructure alone is rare in both airports and seaports because of monopoly issues and long payback periods.

Table 2. Types of Transaction

	Whole port/airport	Terminals		Basic infrastructure (runways, channels etc)	Total
		Passengers	Cargo		
Airports	107	24	9	1	141
Seaports	49 ^a	1	320	2	372

Note: (a) authors' estimate. The precise number is difficult to determine because of lack of information about the scope of some agreements.

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

Seaports normally have a larger number of terminals than airports, and seaport terminals are more diversified. In the 372 transactions examined, container terminals formed the largest single group of terminal PPP projects (51%), followed by multi-purpose and whole port PPPs (22%) and dry bulk terminals (21%). Only 6% of terminal PPPs were for the handling of liquid bulks.

Container terminals have been very popular with private investors because they are profitable, have good growth prospects and can be easily ring-fenced. The contractual arrangements for container terminal concessions have become fairly standardised, and a small

group of international terminal operators (ITOs) has emerged (Van de Voorde & Vanelslander, 2014).

Multi-purpose PPPs include single terminals designed to handle a wide range of cargoes, whole ports, and master concessions covering more than one type of terminal, some of which may be sub-leased.

Dry bulk terminals fall into two main categories:

- Captive user terminals which handle large volumes of minerals or agricultural commodities for a single company. These are often controlled by the cargo owner, and vertically integrated with its other operations.
- Common user terminals which deal with smaller volumes of cargo and a wider range of commodities, often for several different customers. These are usually less capital-intensive, and tend to attract independent third-party operators.

Liquid bulk terminals are relatively rare, reflecting the slow growth of world oil trade in the period since PPPs became popular, and the large amount of capacity provided by a single terminal, which is often well in excess of national or local needs. The majority of oil terminals are still controlled by oil companies or public port authorities (Van de Voorde & Vanelslander, 2014).

Within the sample of transactions reviewed, average investment requirements for airports were slightly higher than for seaports, at US\$ 240m and US\$ 165m respectively. However, the difference is almost entirely due to the existence of four very large transactions in the airports sector at Istanbul, Antalya, New Delhi and St Petersburg, and two “bundled” transactions involving 33 airports in Argentina and 12 airports in Mexico. Excluding these projects, the size distribution of investment requirements for seaports and airports appears remarkably similar (Table 3).

Table 3. Distribution of Investment Requirements for Port and Airport PPPs (US\$ m)

US\$m	< 100	100- 250	250- 500	500- 750	750- 1,000	1,000- 1,500	1,500- 2,000	2,000- 2,550	Total
Airports ^a	51%	21%	14%	6%	2%	1%	3%	3%	100%
Seaports	53%	28%	11%	5%	4%	0%	0%	0%	100%

Note: (a) includes the six large projects mentioned in text

Source: authors’ processing of World Bank Public-Private Advisory Facility (2012) data

However, considerable care is required in the interpretation of investment requirements, not only because of suspected under-reporting of smaller seaport projects but also because the full extent of the investment programme may not be clear when the contract is signed.

Airports generally enjoy a higher degree of exclusivity than seaports. Although there is some inter-airport competition in densely populated regions, most urban areas have only one airport. If this has more than one terminal, they usually fulfill different functions (passenger/cargo or domestic/international), are operated jointly, or have airlines assigned to them by the airport owner or civil aviation authority rather than competing for business.

Seaports, in contrast, often serve quite distant inland markets as well as the cities in which they are located, and compete against each other in terms of alternative supply chains to these markets

(Robinson, 2002). Seaport concessions sometimes include exclusivity clauses where demand is weak and commercial viability is uncertain, but these seem to have become less common in recent years.

4.2 *When and Where?*

The current wave of interest in airport and seaport PPPs began in the mid-1980s. Seaport PPPs were slightly more prominent to begin with as a result of seaport privatization programmes in Latin America, including Argentina (1992-4), Brazil (1994-6), Chile (1993-5), Colombia (1993) and Mexico (1995-7).

Reasons for choosing to start with seaports include the existence of successful landlord seaport models in North America and North West Europe, and the ease with which seaports can be sub-divided into terminals. Overmanning and low productivity were widespread, but could not be tackled directly by governments dependent on union support, whilst many seaports in developing countries had large legacies of obsolete assets, providing a quality of service that would not have been tolerated in the more safety-conscious air transport sector.

With the notable exception of Brazil, which embarked on airport concessioning only in 2011 in order to meet the needs of the 2014 World Cup and the 2016 Olympic Games, the first wave of seaport privatisations in Latin America was followed shortly afterwards by similar programmes for airports covering an even larger number of Latin American countries. One of the triggers for airport PPPs was the Latin American financial crisis of 1997-99, which led to sales of public assets to pay off public sector debts. The political atmosphere in Latin America was also moving in favour of private investment, particularly when it could be undertaken nationally rather than by foreign companies, a trait confirmed by Galilea and Medda (2010).

China has been another early adopter of the PPP model for both seaports and airports, whereas interest in private investment in India and Eastern Europe has been more recent, with around half of their PPP projects taking place since 2005. According to Aviliani et al. (2014), China and India are in the so-called middle-income trap, and see PPPs as a way of developing growth centres which will allow them to move forward.

4.3 *Why?*

Various reasons for embarking on PPPs are mentioned in the literature (McQuaid & Scherrer, 2010). These include budgetary constraints on public investment, cash flows to government, risk sharing, innovation, efficiency improvements, increased consumer choice, the various benefits of increased competition, and the broadening of asset ownership. A review of the award criteria used for selecting private partners suggests, however, that returns to government are by far the most important.

Information on award criteria is available for 46 airport and 67 seaport transactions within the 513 projects analysed. Financial returns to government were the most important criteria in 70% of airport and 67% of seaport transactions, although the way these are measured differs slightly by mode (Table 4).

Table 4. PPP Award Criteria

Criterion	Airports	Seaports
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Highest price paid to government	35%	51%
Highest percentage of revenue transfer to government	26%	16%
Lowest government payments	9%	-
Highest new investment	11%	12%
Lowest cost of construction or operation	4%	1%
Minimum revenue requirement	9%	-
Lowest tariff	2%	8%
Other	4%	12%
Total	100%	100%

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

Revenue sharing is quite common in the case of airports, but has developed only recently in the ports sector, mainly in the Indian Sub-Continent. It can result in conflicts of interest when the public sector partner is also the body responsible for authorizing tariff increases; this is less of a problem in the airport sector, where more use is made of independent regulators.

'Lowest government payments' and 'minimum total revenue requirements' – effectively a measure of subsidy or revenue guarantee requirements for airports which are not commercially viable – have no counterparts in the seaports sector where almost all PPP projects to date have been profitable.

Although private sector participation is normally expected to improve efficiency and drive down costs (Gordon, 2012), very few award procedures have focused on passing on these benefits through lower tariffs (Farrell, 2011). In the case of airports, the low level of interest in tariff reductions may be due to the perception of airline passengers as relatively rich. In the case of seaports it is often due to a desire to minimise privatisation risks, and an element of government greed as concession fees –closely linked to tariffs –make an increasing contribution to public finances.

At the same time, research has also been conducted as to why PPPs often are banned as an option for transport projects. Widén et al. (2011) for transport PPPs in general in four developed countries (Austria, Denmark, Estonia and Sweden) find the most important factor to be that governments historically have always wanted to control transport, and that PPPs tend to take away part of that control.

Carbonara et al. (2011) find in a study for Italy that on the administrative side, four reasons slow down the uptake of PPP projects: (i) administrative complexity, (ii) competitive distortion through the right of pre-emption, (iii) the civil law system which does not favor contractual regulation of risk allocation, and (iv) administrative risk in adjudicating procedures. There is also a financial reason, namely the type of funding used: in most cases, banks rather than capital markets provide the capital.

4.4 *Whole?*

Some PPP transactions are initiated individually, whilst others form part of a comprehensive privatisation programme.

Of the 141 airport transactions examined, 24 (17%) included more than one airport. This type of bundling is virtually unknown in the seaports sector, where bundling occurs mainly in

transactions giving investors the right to operate an existing terminal whilst building a new one nearby.

Four of the multiple airport transactions were share divestitures in which the government floated minority stakes in national airport systems on the local Stock Exchange or sold them to strategic investors. The remainder were conventional concessions involving up to 33 airports.

Some countries, such as Argentina, Cameroon and Madagascar, have chosen to concession almost the whole of the national airport network in a single transaction. There are three main reasons for doing this:

- Continuation of cross-subsidies from profitable to unprofitable airports. In Argentina, for example, only eight of the original 38 airports included in the transaction (later reduced to 33) were profitable (International Civil Aviation Organisation, 2013).
- Network efficiencies and economies of scope. Unlike national seaports, which apart from satellite and feeder ports are generally competitive, national airports tend to be complementary, with improvements at one generating ‘club’ effects at others.
- Minimisation of transaction costs, including management time. This is particularly important in countries which have limited resources for implementing PPPs, or which would have difficulty finding enough investors to support multiple transactions.

Elsewhere, some of the larger Latin American countries such as Colombia, Mexico and Peru have split their national airport networks into two or three concessions of between 6-12 airports each. Egypt and India have concessioned groups of smaller regional airports as single transactions, whilst Bulgaria, Macedonia and Tunisia have each concessioned their two main airports as a pair.

National port privatization programmes have been common in low and middle income countries, but with one or two exceptions (for example Cristobal and Balboa in Panama) it has been rare for more than one port to be included in a single transaction.

5. Empirical Findings: Who and Whom

‘Who’ describes the initiating public authority, whilst ‘Whom’ describes the private entity undertaking the project.

5.1 Public sector partners.

The linguistic variable used to describe “Who” is normally the level of government involved - central, provincial or local – although a deeper understanding of PPP structures would be achieved by introducing a fourth type of organisation, the airport or seaport authority, which are not shown separately in the World Bank PPIAF database. In practice, the decision to implement a PPP may involve more than one public sector institution, with the initiative often coming from a different body to the one signing the contract.

The World Bank PPIAF database records the awarding authority for 55% of airport transactions and 53% of seaport transactions. Central government plays a larger role in the award of airport PPPs than it does for seaport PPPs (Table 5), reflecting different levels of decentralisation.

Table 5. Awarding Authority for PPPs

Government body	Airports	Seaports
Federal	77%	52%
State/province	13%	32%
Local	10%	16%
Total	100%	100%

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

The differences between the two modes are even stronger when considering the private partners in PPP contracts, as shown in section 5.2.

5.2 *Private investors in airport PPPs.*

Airport investors in low and middle income countries fall into several distinct groups:

- Airport operating companies from more developed countries (19%);
- Airlines (6%);
- Construction and infrastructure management companies (31%);
- Financial institutions (12%);
- Industrial conglomerates (11%);
- Others (21%).

Many of the Special Purpose Vehicles (SPV's) set up to own and operate PPP concessions, have multiple ownership. Companies are recorded each time they have shares in an SPV, so the total number of participating companies is much larger than the number of PPPs. There are also seven airport PPPs where private investment was via flotations, and a small number of PPPs whose investors could not be traced.

Established airport operators. Three companies – Fraport (Germany), AENA (Spain) and Aeroports de Paris (France) - accounted for over half of all PPP transactions involving an established airport operator. Whilst Fraport has entered into PPPs in several quite different countries, AENA and ADP have focused on markets with strong linguistic and cultural ties to their home countries. The other 11 operators have acquired PPP concessions more opportunistically, often through a competitive bidding process.

Established airport operators are often minority shareholders in PPPs, having been brought in by other participants for their technical expertise. They hold over 90% of the equity in only 10 of the 38 PPPs in which they are involved

Airlines. PPPs involving airlines fall into two main groups: cargo terminals (five), and national airlines bidding for regional airport concessions in order to support their domestic air service network (five, of which three are in Chile). In Chile the national airline LAN Chile has teamed up with construction companies and institutional investors. Elsewhere local airport services companies or forwarders have been the airlines' preferred partners.

Airlines are less involved in airports than shipping lines are in container terminals, largely because of market size and competition issues. Routes in most low and middle income countries are still dominated by national carriers, either because the air transport market has not yet been liberalized or because traffic volumes are too low to attract other airlines. If the national carrier is unable to become involved for financial or competition policy reasons, then there are few other airlines with sufficient traffic to be interested.

The container shipping industry, in contrast, is characterized by a small number of large lines and consortia which operate globally and have an automatic right to carry cargo between countries other than their own. A new container terminal can quickly be filled up by their own business, particularly if the location is suitable for transshipment. Higher profit levels in terminal operations compared with shipping have also encouraged some lines to set up terminal operating subsidiaries intended to handle third party business as well as their own traffic.

Construction & infrastructure management. The distinction between construction and infrastructure management companies is becoming blurred, as some construction companies provide airport financing and management services in order to win large construction contracts. Typical examples include Vinci, Ferrovial and Abertis Infraestructuras. Other infrastructure management companies have moved into the airports sector from real estate (NWS Holdings in Hong Kong) or finance (GMR Group in India).

Infrastructure management companies tend to be international in scope, whereas conventional construction companies are more likely to be involved in PPPs in their home countries.

Financial institutions hold relatively little equity in airport concessions, preferring to provide debt finance; this is similar to the situation found in seaports. Investment funds that have taken equity stakes in airport PPPs have normally done so as minority shareholders.

Financial institutions have acquired larger stakes in airports and seaports in the United States and Europe (Momberger, 2012) but this has been done selectively, with acquisition activity slowing considerably since the start of the 2008 recession

Industrial conglomerates. Companies with large balance sheets and a reputation for good management elsewhere in the economy have become involved in airport PPPs mainly in Egypt, Turkey, India, Malaysia, Argentina and the Dominican Republic. These are countries where "national champions" have also been prominent in seaport PPPs, reflecting a political culture characterised by close relationships between government and leading businessmen.

Industrial conglomerates whose main interests lie outside of the construction and transport sectors rarely invest overseas. One of the exceptions has been Corporación América, an Argentine holding company which has built on its successful involvement in the 1998

concession for 33 airports in Argentina to develop a portfolio of 16 other airport PPP projects in Latin America and Europe.

Other private investors include aviation service providers (8), seaport service providers (6), private individuals or groups of local businessmen (7), and other manufacturing & service companies (20).

Companies from other parts of the aviation industry which have invested in airport PPPs include an airport catering company from Singapore, a provider of air traffic management technology from Canada, air freight forwarders, and a consortium of airport service companies from Argentina.

Large international seaport operators have not moved across into the airports sector, apart from DP World which manages the airport at Djibouti where it also has seaport concessions. However the Chilean seaport services company Agunsa has a 47% stake in the international terminal at Santiago Airport and operates three small airports elsewhere in Chile, whilst the Argentine company London Supply, which started life as a ship chandlery business, now operates three small airports in Argentina.

Local businessmen have sometimes offered to fund airport development through PPPs when government financing has not been available. The best-known example of this is Cochin International Airport in India. There are also airport PPPs, mainly in Russia, whose ownership structure is dominated by private individuals close to the government.

Other manufacturing and service companies include trading companies, energy companies, agro-business and resort operators, an IT services provider, and metal and concrete manufacturers. In most cases their involvement in airport PPPs has been largely opportunistic.

5.3 *Private investors in seaport PPPs.*

Seaports attract a much higher proportion of specialist investors, such as terminal operators, cargo owners, stevedores and other maritime/aviation service providers with direct experience of port operations (Table 6). The nature of these investors varies by cargo type, as shown in Table 7.

Table 6. Proportion of Specialist Investors in Airport and Seaport PPPs

Sector/segment	Specialist investors
Airports	25%
Seaports:	
Container terminals	77%
Dry bulk terminals	67%
Liquid bulk terminals	69%
Multi-purpose terminals	51%

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

Table 7. Investors in Different Types of Seaport Terminal

Type of investor	Containers	Dry bulk	Liquid bulk	Multi-purpose
Seaport-related				
Large international terminal operators (ITOs)	33%	-	17%	12%
Smaller terminal operators, stevedores & maritime service providers	15%	11%	-	13%
Shipping lines	21%	-	17%	3%
Cargo interests	-	46%	26%	11%
Logistics services providers	8%	10%	9%	12%
Total: seaport-related	77%	67%	69%	51%
Non seaport-related				
Construction, infrastructure management & equipment manufacturing	6%	13%	5%	15%
Financial institutions	5%	5%	13%	7%
Industrial conglomerates	3%	13%	-	14%
Other	9%	2%	13%	13%
Total: non seaport-related	23%	33%	31%	49%
No. of projects	226	93	23	151
No of investors	156	66	17	105

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

Containers. Four large international terminal operators (ITOs) - Hutchison Port Holdings, DP World, PSA Corp and ICTSI – make up roughly one third of all investors in the container terminal PPPs in our sample. A fifth company – APM Terminals - accounts for a further 10%. This is sometimes regarded as an ITO but has been treated as a shipping line in Table 7 because of its corporate affiliation with Maersk Line, which provides around half of its traffic.

The dominant position of the ITOs has arisen from a reputation for expertise and their access to finance. Their good credit ratings reflect a long track-record of managing such facilities, and large and stable traffic volumes in their home ports (Notteboom & Rodrigue, 2010). They are proactively seeking new opportunities in all parts of the world

The smaller terminal operators – companies like TCB, SSA, and MTL – also have well-established terminals in their base ports, but these are smaller than the equivalent facilities controlled by ITOs. They invest more selectively and usually work in consortia with local partners, whereas the four ITOs are the sole private investor in around four fifths of the PPPs they are involved in.

Stevedores - traditionally the suppliers of labour for on-board handling of general cargo - have fewer capital resources and are more focused on their home ports, whilst other maritime service providers, for example Swire Pacific, may be looking for diversification opportunities or synergies with their existing businesses.

Shipping line participation in terminals is dominated by Maersk, MSC and CMA-CGM, all of which have associated terminal operating companies providing a mixture of dedicated and third party services. Several of the Asian container lines are also involved in terminal PPPs, but tend to be more focused on handling their own cargo.

Logistics services providers are a significant group of investors that is largely absent from airport PPPs because of their focus on passengers rather than cargo.

Construction and infrastructure management companies (6%) are much less prominent than in the case of airports (31%) because seaport PPP partners are normally selected for their operational expertise rather than their asset management expertise. Seaport construction is a niche market in engineering compared with roads and airports, and one in which the ITOs have considerable expertise; if design and project management is not undertaken in-house, it is sub-contracted rather than secured as an investment “in kind” from other PPP partners.

Financial institutions are less common in container terminal PPPs (5% of investors) than in airports (12%) because of the financial strength of the other equity investors, and the importance of corporate finance – where risks can be spread over a relatively large portfolio of projects – rather than project finance.

Large industrial conglomerates are less important in container terminals (3%) than airports (11%). They lack the technical expertise to build and operate container terminals on their own, and are included in container terminal consortia mainly for political reasons.

Non port-related companies are able to buy into container terminal PPPs at various stages during the project life cycle, as there is a strong secondary market for stakes in container

terminal PPPs once the start-up period has been completed. This provides an exit route for construction companies, and allows institutional investors such as banks, private equity and pension funds to enter the market once the project has been de-risked.

However institutional investors have shown a strong preference for container terminals in developed countries where the political risks are lower and they are less exposed to corruption. Galilea & Medda (2010) found that perceptions of corruption and lack of democratic responsibility influence attitudes towards private investment in transport. Chan et al. (2011) identify corruption in China as a major risk factor, next to public intervention and bad decision-making processes, making high-income markets a more natural choice for compliance-conscious financial institutions. Trujillo et al. (2013), in a study of African ports, also refer to corruption as one of the main factors complicating port reform and discouraging high profile private stakeholders.

Dry bulks. Table 7 shows that the types of investors associated with dry bulk PPPs are very different. Shipping lines and large international terminal operators are largely absent. This is because dry bulk terminals do not normally attract regular scheduled shipping services, relying instead on chartered tonnage. It also reflects low profit margins and low barriers to entry for small-scale quayside operations on the quay, and the need for back-to-back contracts with large users to recover costs of more highly-mechanised operations with dedicated storage facilities.

Instead, almost half of the investors in dry bulk terminals were associated in some way with the cargo. These included grain importers and exporters, mining companies, cement manufacturers, and sugar and timber exporters.

Liquid bulks. Cargo interests are also strongly represented in liquid bulk terminal PPPs, where they are evenly split between oil and petrochemicals even though global trade in oil is many times larger than trade in petrochemicals.

However liquid bulk terminal PPPs show more similarities to container terminal PPPs than to dry bulks, with the emergence of a small group of international terminal operators led by the Dutch company Vopak and the involvement of shipping lines specializing in chemicals and petroleum products. Even the main financial institution involved, GATX Terminals Corporation, has considerable expertise in the management of liquid bulk storage facilities.

Multi-purpose terminals. Private investors in multi-purpose terminals (including whole seaport concessions) are more difficult to analyse because of the lower level of publicity given to such transactions and the higher proportion of small, local investors who are often difficult to trace.

No single type of investor predominates (Table 7). Large container terminal operators appear mainly in whole port PPPs with a large container terminal component, such as Mersin (PSA), Djibouti (DP World) and Guayaquil (ICTSI). Smaller terminal operators include a higher representation of local stevedoring companies and shipping agents, as capital requirements are smaller and competition is less fierce.

6. Empirical Findings: Which Way:

This section looks at the structure of PPP contracts (type and duration) and the way in which private sector participants are selected.

6.1 *The nature of PPP contracts*

The World Bank uses four main categories for classifying PPPs:

- Management contracts and leases, where ownership and investment decisions remain in the public sector. Very little private investment is generally required.
- Concessions, where the private sector is responsible for financing new investment as well as operating and maintaining public sector assets.
- Greenfield projects, where the private sector invests in new assets which are to be operated on behalf of the public sector as a common user facility, then transferred back to it at the end of the concession period.
- Divestitures, where a private entity buys an equity stake in a state-owned enterprise.

Concessions are still the predominant model for both ports and airports in low and middle income countries, accounting for roughly half of all transactions (Table 8). However, there are significant differences between the two modes of transport in their use of other types of transaction. Management contracts and share divestitures are more common in airports than seaports, whilst seaports have a higher proportion of BOT projects.

Table 8. Types of PPP Transaction in Low and Middle Income Countries

	Airports	Seaports
Management contracts/leases	13%	6%
Concessions	50%	49%
Greenfield BOT projects	23%	40%
Divestitures	14%	5%
Total	100%	100%

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

Management contracts for airports have been more prestigious and financially rewarding than those in the seaports, partly because they tend to cover whole airports rather than just terminals. Seaport operators normally prefer leases to management contracts because they allow them to capture the financial awards arising from performance improvements. Except for commercial franchising, airport leases offer fewer opportunities for business turn-rounds because demand is less responsive to service quality and service quality is more strictly regulated.

The proportion of greenfield BOT projects is higher in the seaports sector, and has been increasing over time in response to capacity shortages, whereas the proportion of greenfield projects in the airports sector has been steadily falling as new airports have become more expensive and difficult to build. This is partly because of environmental and noise issues but also reflects the trend towards iconic buildings.

There have been sales of partial shareholdings in the national airport systems of South Africa, Malaysia and Thailand, but divestitures are still uncommon in the seaports sector,

where the waterfront is sometimes treated as a national asset which cannot be disposed of under any circumstances.

Patsiadis & Angelides (2011) in a study surveying Greece observe that the type of legal framework typically impacts on the way PPP contracts are structured, while Trujillo et al. (2011) refer to cultural factors that apply to African ports.

6.2 Contract durations

Contract durations are slightly longer for seaport PPPs than those found in airports, even for the same type of PPP model (Table 9).

Table 9. Average Contract Durations for Port and Airport PPPs (years)

	Management/lease	Concession	Greenfield	Average
Airports	11	24	30	24
Seaports	20	27	36	29

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

In both sectors the relationship between contract duration and initial investment is weak. The most commonly-encountered contract durations for both ports and airports are 20, 25, 30 and 50 years.

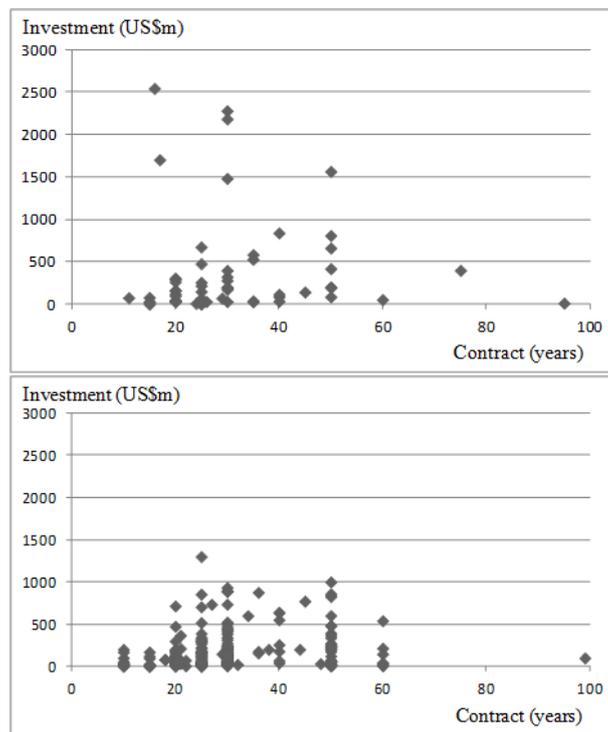


Figure 2. Relationship Between Initial Investment and Contract Duration for airport (left) and seaport (right) projects

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

6.3 Contract award process

Information about how contracts were awarded is available for roughly half of the PPPs extracted from the World Bank database. Of these, 82% of airport PPPs and 66% of port PPPs were awarded by competitive tendering; most of the remainder were the result of direct negotiation with a preferred partner (Table 10). However the database may have an in-built bias in favour of competitive tendering, as this is more likely to be reported.

Table 10. Percentage of PPPs Competitively Tendered

PPP model	Airports	Seaports
Management contract/lease	50%	78%
Concession	93%	73%
Greenfield	73%	51%
Divestiture	75%	86%
Total	82%	66%

Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

Several seaports projects – mainly in Nigeria - were awarded by “competitive negotiation”, where discussions with a single investor were influenced by independent estimates of the value of the contract, and the threat of competitive tendering if a negotiated agreement could not be reached. The proportion of transactions arising out of unsolicited bids was very small: only 4% for airports and 3% for seaports.

One explanation of the reduced importance of competitive tendering in seaports is the greater probability of an existing private sector incumbent, as landlord ports have a longer history of private operations. If the incumbent is already providing a good service and is willing to invest, competitive tendering may appear less necessary. Another possible explanation is the importance of captive user facilities in seaports, particularly in the dry bulks sector, although this was not supported by the evidence.

The relative importance of different types of PPP model also explains some of the difference in competitive tendering as greenfield BOT projects, which have a lower incidence of tendering, are more common in seaports than in airports.

The average number of bidders for airport projects (3.6 per project) was slightly higher than for seaport PPPs (3.0 per project), but the distribution shows some significant differences with a higher proportion of seaport projects receiving only 1-2 bids. The data in Figure 3 are based on 30 competitively tendered airport PPPs and 63 seaport PPPs.

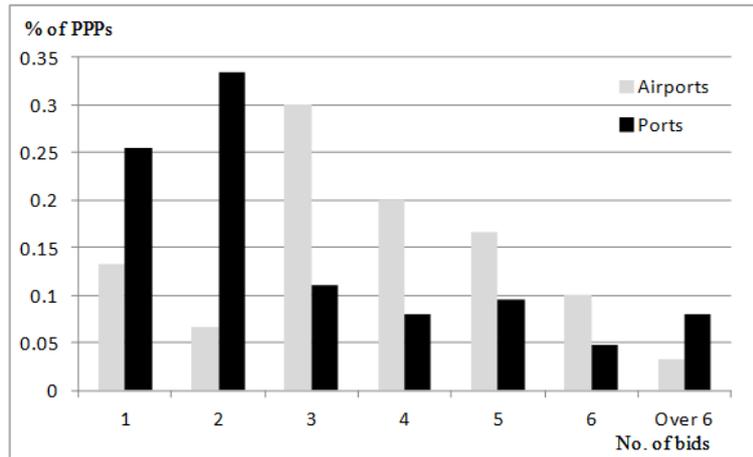


Figure 3. Number of Bidders for Competitively Tendered Port and Airport PPPs
Source: authors' processing of World Bank Public-Private Advisory Facility (2012) data

7. Conclusions on Differences in PPP Structures Between Airports and Seaports

The main differences between seaport and airport PPPs emerging from Sections 4-6 are in respect of 'Whom' (choice of private sector partner), 'Which Way' (PPP models, contract duration and contract award procedures) and 'Whole' (bundling of facilities). These have their roots in four main structural differences between the two industries: the level of integration of infrastructure and services, economies of scale, public service obligations, and the roles of competition and regulation.

Private partners. Because airport PPPs in low and middle income countries are mainly about asset management, and operate as natural monopolies exposed to very little competition, they have attracted a wide range of investors. Airport PPPs involve consortia more frequently than seaports (43% and 33% of projects respectively), and the structure of airport consortia – construction companies, financial institutions and operators – often bears a strong resemblance to that found in toll roads. It is no coincidence that some of the infrastructure management companies bidding for airport PPPs are also acquiring road concessions.

Seaport investors tend to be more specialized, and are selected on the basis of their operational skills and knowledge of the market, as well as their asset management experience. In this more competitive environment, choice of private partner can have a significant impact on the amount of traffic the PPP is able to capture.

Seaport and airport PPPs also differ in the level of carrier involvement, with shipping lines accounting for 21% of container terminal investors, but airlines making up only 6% of airport investors.

PPP models. Brownfield concessions account for around half of all PPP transactions for both seaports and airports. However airports make more use of management contracts and divestitures, whilst seaports have a higher proportion of greenfield BOT projects. The lower proportion of greenfield airport PPPs may be due to indivisibilities in airport investments, which are often politically controversial and have difficulty obtaining new sites.

Competitive tendering is more common for airport PPPs (82%) than for port PPPs (66%). This is partly a result of historical circumstances – incumbent stevedores seeking to convert historic terminal access rights into PPPs – but is also caused by the higher proportion of greenfield BOT projects in the ports sector. These are less likely to be competitively tendered than brownfield concessions, which involve the disposal of public assets.

Bundling. Airports are more likely than seaports to be packaged together into a single transaction. This is particularly the case for smaller regional airports dependent on cross-subsidies. Although public service obligations are the most common cause of loss-making airports, differences between airports and seaports in the balance between capital and operating costs may make small airports inherently more likely to be loss-making than small seaports.

There are also institutional reasons why airports are more likely to be bundled together. These relate to the operation of domestic airports as systems, controlled by national airport authorities. Seaports, in contrast have a more decentralized organizational structure, and are more likely to enter into PPPs independently of one another, on a terminal-by-terminal basis.

It is also easier to bundle facilities within airports than at seaports, because of the smaller number of terminals involved and the lack of competition between them. Economies of scale mean that most airports in low and middle income countries have only one terminal, or at most two (international and domestic) so there are relatively few concerns about who manages the runway. In seaports, terminal specialisation and a desire to promote intra-port competition by building more than one terminal of the same type results in a string of terminals for whom an independent, public sector provider of shared facilities and services – the landlord port authority – is normally seen as the best solution¹.

Whereas in seaports there is a tendency to leave the less profitable elements in the public sector and treat them as a public good, in airports the financing of basic infrastructure is often dealt with by bundling runways with terminals, which allows aeronautical activities to be cross-subsidised from commercial revenues.

8. Areas for Further Research

Although the economic fundamentals of ports and airports create significant differences in some aspects of PPPs, their similarities are generally more pronounced than the contrasts. This reflects their parallel roles as nodes within transport networks. However there are some respects in which airport PPPs resemble toll roads more than seaports, for example in their ownership structure, asset management functions and level of regulation. Differences in PPP structures between links and nodes in transport networks is therefore an area requiring further research.

Another interesting area for research would be to test whether the differences between airport and seaport PPPs found in low and middle income countries also occur in North America and Western Europe, where a consistent data series is more difficult to obtain

¹ All ports aspire to reach the throughput levels at which intra-port competition becomes commercially viable. This point can be reached at lower throughput levels in many low and middle income countries (particularly in Africa and Latin America) than in most developed countries because of the high tariffs which can be charged as a result of the lack of inter-port competition. In addition, regulatory structures are very weak in most low and middle income countries; consequently bringing in intra-port competition at relatively low throughputs is often the only tool available to control the private monopolies created by port PPPs.

The variability of PPP structures within each mode of transport, which is well-documented in the literature, suggests that the PPP policy of the host country may have the greatest influence over PPP arrangements. There is therefore a need for a similar exercise to the one described in this paper which controls for general differences between airport and seaport PPPs, looking at national differences as a residual.

Finally, the local circumstances surrounding each project need to be taken into account, which can only be done through case studies. More of these are now beginning to appear, but further work is needed to standardize their structure and findings before PPP experience in different modes of transport can really be compared. Measuring and controlling for PPP performance through its circumstantial factors would be a very relevant initiative.

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