



Land values and land conversions in city port interfaces: the case of Tarragona

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Abstract:

City-Port interfaces are administrative and physical limits on continuous process of conversion. Interests and power capacity emerge from both sides of the border on the definition of the fringe and the land transformation process towards new uses. The Port of Tarragona, among the five biggest Spanish ports by total cargo (Puertos del Estado, 2015) is in a comfortable market and administrative position. His surface, trading capacity and finance turnover provides the Port a privilege scenario to negotiate with its urban counterpart.

Different from Barcelona, the urban demand for taking possession of the waterfront do not represent an apparent risk for port operations in the interface. The absence of urban natural boundaries inland, the limited urban scale (Tarragona, 135.954 hab. in 2012) and the low urban density (2.316,60 hab/km² in 2012) are relevant factors that could determine the low real estate prices along the city-port fringe (IDESCAT, 2012). Contrary to what could be expected, land prices within the Port of Tarragona urban part are not the higher within the maritime domains. Different from its biggest competitor, the Port of Barcelona, this fact is foreseen as the main cause to stand the historical urban waterfront plans.

This study aims to analyze the process of land conversions to urban uses along the Tarragona city-port interface through the study of land prices. By withstanding land values from administrative landscapes, market forces and dynamics emerge to emphasize hiding interests. Focusing on the recent period of port and urban growth (1982-2014) the sequence of land transformation will be evaluated. Significance is on finding the stage when land conversions take place, providing valuable information to urban and port boards about the management and improvement of declining, segregated urban areas and port inoperative zones. The goal is to improve their condition by enhancing common trust and collaboration among the multiple stakeholders involved.

Keywords: Tarragona; City-port interface; Land market; Land conversion; Port expansion; Urban regeneration

JEL codes: H79; R31;R52

1. Introduction:

This paper is consequence of a broader study focusing on the city-port interfaces in the Euro Mediterranean context. The focus was on the land conversion processes from industrial to urban activities within the port domains. Land values were the line of argument driving the assessment of the interest in the land conversion process at both sides of the port administrative border.

Barcelona was selected as the first case of study. The reasons were *i)* the international relevance of the port urban area, *the Port Vell*; *ii)* the urban limitation to growth corseted within a well delimited natural boundaries; *iii)* the sound interest of the municipal administration for the closest port land through the announcement of the *Blau@Ictinea* project¹ (Angulo, Aroca 2012); *iv)* the relevance of the Port of Barcelona in the global freight market²; and *v)* the easy access to information sources and data³.

Likewise, Barcelona have been a reference in the process of port opening to new urban activities for Europe since the *Port Vell* master plan was approved in 1988. Started under the influence of the American waterfront development model initiated by J. Rouse in Baltimore and Boston some decades before, opened with a total surface of 55.6ha., though the Barcelona port urban development continue growing in subsequent years up to the current 62.90ha (see figure 1).

¹ During April of 2012, the new Barcelona major Xavier Trias from *Convergència i Unió* a conservative Catalan party, new in municipal power after 20 years of socialist government, presents a plan for *El Morrot*, a long and narrow strip limiting with the Port of Barcelona border. The interest of the plan was the visualization of the local interest for making use of the city-port interface land. However, despite the new of the plan, a sound political opposition regret major's plans taking advantage of his fragile position in the plenary.

² The Port of Barcelona was among the three most relevant Spanish ports by TEU's (containers units) and total freight trade in 2012 (Puertos del Estado 2012) In the same line, those three ports were the top 20 European Ports, with Barcelona ranking 16th (Port of Rotterdam Authority 2011).

³ A field work analysis was realized during July of 2012. More than 20 interviews were realized in a semi-structured format, including a vast group of city-port stakeholder: port authority representatives, tenants in and out of the port, administration managers at local and regional level, real estate consultants and technical experts. Likewise the most relevant data was provided by the Barcelona Port Authority, the CPSV, Land Policies and Appraisal Centre.



Figure 1, Port of Barcelona growth
 Source, Port of Barcelona memories and Archive cartographies. Own elaboration.

In the case of the growth process of the Port of Barcelona related to urban land conversions toward urban uses, three phases can be identified. The first phase is characterized by the risk aversion and the short term perspective of the plan. Initiated in the early 60's with a housing development plan that never began, plans were not taking into consideration the urban environment at the other side of the port border until the conclusion of the Maremagnum shopping center in 1996. The result is a group of unconnected big

buildings focusing on leisure activities which are now presenting difficulties to adapt to current demand. The second phase is consequence of success. The Port is taking advantage of the good results to enlarge its urban activity with the aim of increasing density and land occupation, improving the financial results. The development of the W hotel, initiated in 2003⁴, is considered the end of the second phase which resulted in important confrontations with the city council of Barcelona and the local population. By last, the third phase is identified as the consequence of the bad popular reputation of the Port. During this time, after 2007, the Port of Barcelona has striven to modify its urban strategy with the aim

⁴ The Hotel W, was conceived in year 1999 by the Barcelona Port Authority, however construction did not begin until 2003 and was opened to the public in 2007.



of gaining the people's support, necessary to continue operating in the city-port interface (Lorenzo-Almeida, Casanova et al. 2012).

Port opening to urban activities opens a new land market dependent of port land supplies through land conversions. Since Port Authorities are in charge of the land within its domains, they have the only key on the land market in the most privilege waterfront areas.

Land market studies developed along the Barcelona City-Port interface reveals huge differences among urban and port land. Thus, it is observe that port land presents in any case higher prices than urban land price in average. Moreover, it is detected that port urban land holds the highest land price within the Port of Barcelona (Lorenzo-Almeida, Ferré et al. 2015).

Likewise, it is detected that contrary to what it was expected, the cost of port enlargement reveals lower than the land rents capitalized by m². By taking into consideration the port power to increase its surface foreland, it could be presume that the institution could speculate by taking advantage of its privilege to grow in locations where land is a scarce and expensive resource.

Port Corporatization backs the land highest and best use, calling for the enlargement of urban activities as long as the logistic-industrial activities are warranted by the enough provision of land over time. Likewise, nevertheless the interest in more land intense activities, mixture of activities are not seen as a port objective. In the same way, port operators and tenants⁵ did not support in the most of the cases new mixed urban-port models which consider could disturb port operations. The city closeness and good transport and mobility services replace the demand for urban activities in the port and logistic areas.

⁵ During one month, during July 2012 urban and port stakeholders were interviewed to test the interface land market and the tenants and port managers' interest in mixed city-port urban models.



Once the case of Barcelona was explored, another complementary case had to be selected to complement the findings and compare the results. Tarragona was chosen taking into consideration that: *i*) it is the 6th port within the Port Spanish System by total cargo traded (Puertos del Estado 2013) and it has a size which is competitive with the urban scale; *ii*) contrary to Barcelona, Tarragona has not limits to grow inland; *iii*) the Port competes with Barcelona for the same market offering more advantageous operational costs; *iv*) there is a social interest on opening the Port and the waterfront to the city⁶; *v*) and, finally, data sources were accessible.

In both cases, the focus of the analysis was on land values, considered a powerful and useful urban tool that allows highlighting shadow economic interests in the city-port interface. The objective of the PhD in which this paper is included is to generate valuable information to improve urban and port management, in a complex and traditionally non-collaborative urban environment.

2. The City-Port Interface

Confronted interests at both sides of the port border have turned the city-port interface in a battle camp where success is measured based on the land conquered at the others' field. Therefore, the fence dividing port and urban properties has become a defence line between two different administrative systems.

Many are the attempts to provide a comprehensive definition of city-port interface from administrative and management focus to those centred in its condition of border or a sort of social considerations. In this sense, governance issues are of extreme importance in order to ensure welfare for all agents involved in the area between the port and the city. With attention to the spatial conditions, Tom

⁶ This common agreement do exist even if considering that the land conversion process started some years after the Barcelona experience and, in any case, the process cannot be considered as being fully successful.

Daamen and Isabelle Vries considered the City-Port interface, areas where the geography of the city and the port meets, areas moreover of high value due that they are city gates to the waterfront (Daamen, Vries 2012). Similarly the Association Internationale Villes Ports (aivp) points towards the interface strategic urban condition adding the connotation of place of opportunity when considers it not as a “*frontier but a place for innovation to undertake new and productive partnerships*” (FNAU 2011). Differently, Giordano highlights the interface inseparably and necessary relationship among the two main stakeholders, city and port that make impossible to distinguish each other identity, unless links broken reason of isolation and social hardship (Giordano 2010).

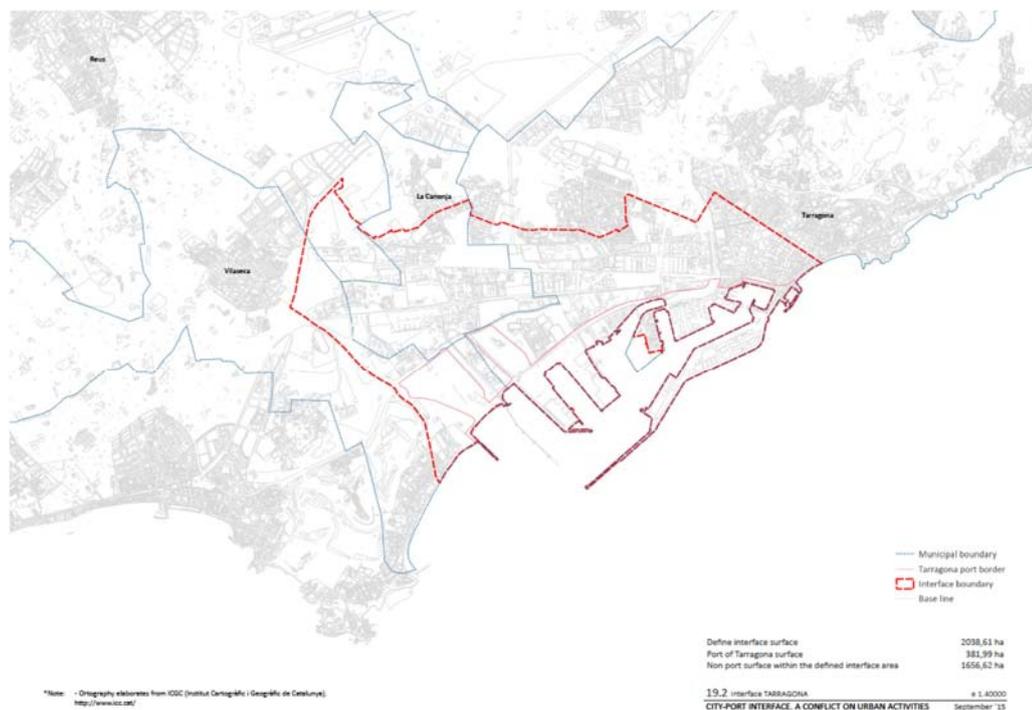


Figure 2, Tarragona's City-Port Interface
 Source, Catalan Cartography Institute, ICC; own elaboration

However, under our knowledge there is no literature focusing on the definition and delimitation of the physical and particular boundaries of city-port interfaces. In this matter, it has been decided to state a functional definition related to the use. The objective is to define bounded areas of study which contribute the reliability

and feasibility of the study. By doing this, physical limitations have been defined around the Port of Barcelona and the Port of Tarragona taking into consideration: distance, infrastructure connections, logistic parks and housing developments in the proximities that are closely link to the port activities.

Thus, the city-port interface is from the perspective of this study: a space of mutual influence with potential for innovation and necessary collaboration. The spatial definition of the Tarragona City-Port interface is therefore resulting from the attempt to mark those influences on the layout plan. Despite the risk on setting a frame, this study assumes a physical boundary which includes the port and the immediate non-port area inland, taking into consideration logistic and urban areas which due physical closeness are considered to be influence by the port activity, operations and developments. The total surface referred 2.038ha, which includes the port area, 382ha, representing the 18,75% of the total studied area (see figure 2). Likewise, by taking this interface definition into consideration, the local administrations involved include two more members, La Canonja and Reus, from the initial two with representation in the Port of Tarragona representative board: Tarragona and Vila-seca.

3. The European Context

European ports have growth in surface backed by the global increment in consumption. In Spain, the Strategic Plans on Infrastructures and Transport (PEIT) support the ports expansion by growth forecasts of 75% between 2005 and 2020 (Ministerio de Fomento 2005). Under this process of continue expansion, the Bird Anyport Model⁷ remained solid, since land for industrial and logistic purposes was guaranteed over time. However, more restrictive environmental

⁷ The Bird Model interprets the continuous enlargement of ports in response of the maritime technical improvement in vessels and logistics. This continuous foreland port expansion drives to the city-port division. The reason is the port interest in operative areas adequate to new vessel requirements: water deepness, widener logistic surfaces and larger operative docks.

regulations in Europe like the Birds and Habitat Directives⁸ have drove to an immobilization of the port enlargement process and the port land conversion toward urban activities (Wiegmans, Louw 2011). The fact that land conversion to new urban activities is a no return process, make necessary the port authorities evaluation since transformations can determine the future of the port (Charlier 1992). The added risk of the operation is a key factor that could be affecting port policies for land conversion.



Image 7



Image 8



*Note: - Photographies taken 26/02/2015



Image 9

15.2 City-port panoramics TARRAGONA
 CITY-PORT INTERFACE. A CONFLICT ON URBAN ACTIVITIES September '15

Figure 3, Port of Tarragona border, La Pineda Beach, Vila-seca
 Source, Daniel Lorenzo photography, April 2015.

⁸ *The Birds and Habitat Directives* (European Commission., Directorate-General for the Environment., Sundseth, Kerstin., EcoSystems Ltd.,, 2014) are also complemented with specific guidance documents with respect to *The implementation of the Birds and Habitats Directives in estuaries and coastal zones*, which restrict the enlargement of maritime infrastructures (European Commission., Directorate-General for the Environment., 2011).

Ports and linked infrastructures have been soundly disrupted by environmental European Regulations. The Maasvlakte 2 is a well-known case that contributed to market the significance of the Directives. Extra cost, delays in construction and the cancelation of specific developments are among the soundest consequences. The strict of the regulation send out the message that the economic development is conditioned by the environmental protection (Van-Hooydonk 2006) adding uncertainty to the developers and port managers. Consequently the continuous expansion detected by the Bird's Anyport model has been reviewed and adapted to accommodate the system to new trends including the renewal of city-port links in the interface (Hoyle 1989).

4. Tarragona growth

Traditionally port expansion tends to collide to similar growth processes carried out by the whole city where ports are located as available land usually is scarce and both agents (ports and cities) compete for it. Nevertheless, Tarragona is a particular case as there are very few physical limits to expand the city and the port.

Concretely, current network of transport infrastructures and land used for agricultural, urban or manufacturing processes represent a small amount of total area of Tarragona metropolitan region, which implies that there is available land for further development. Additionally, most of this area has slopes lower than 20%, which is appropriate for urban development⁹. The resulting picture is a vast territory to expand as showed in Figure 4 where black areas indicate available urban land. It is important to notice that both the city and the Port have available

⁹ Urban planning regulations in Catalonia states the limitation to develop land above 20% slope. *DECRET 305/2006*, July 18th, when is approved the *Reglament de la Llei d'urbanisme (Urbanism Law Regulation)*, Article 7: Directive for the preservation of high slope grounds.

7.1 With reference to the directive included in the article 9.4 of the Urban Law:

a) Land classification cannot be modified from no urbanizing land if the slope is upper 20%, despite there is not any other option to grow for the municipality.

7.2 The detection of the ground with slopes over 20% will be realized following the official cartography of the Catalonia Cartographic Institute.

areas to expand beyond their boundaries. Obviously, inland areas have the majority of available urban land as urban sprawl has concentrated at sea side, but there are still some unoccupied areas especially at the Eastern part of Tarragona.

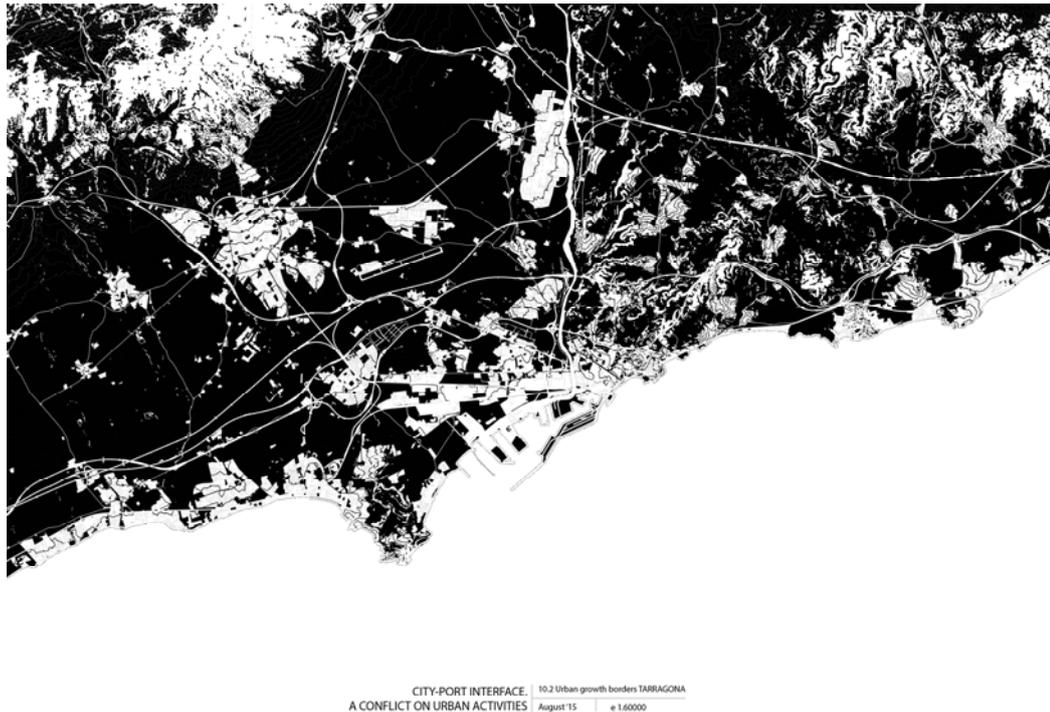


Figure 4, Tarragona urban growth borders
 Source, Catalan Cartography Institute, ICC; Urbanistic Catalan Map, MUC; Land Cover Map of Catalunya, Creaf

Nevertheless previous considerations in terms of land availability, it is important to take into account that there are some heterogeneous activities competing for the same area, mainly at Eastern part of the city. Concretely, this area concentrates tourism activities, manufacturing activities and residential activities. Even if land is properly allocated for every one of these alternative activities, as they have some negative externalities it is not always easy to combine them in the same region (see Figure 3). In this sense, main concerns are about port and manufacturing activities in terms of pollution or just visual pollution. Although pollution can be easily measured and quantified and, therefore, controlled, effects of visual pollution are difficult to measure as they are aesthetic. Besides, visual

pollution has strong negative externalities over touristic activities, as threaten landscapes and hurts visual attractiveness of an area as a touristic destination. This is a key point, as competition for land implies not only an interest to develop some areas for specific purposes (e.g., touristic or residential) but also to keep neighbour areas from carrying out previous potentially polluting activities in order to avoid these negative externalities.

Previous concerns are quite important for this area as the metropolitan region of Reus - Tarragona is the second largest metropolitan area in Catalonia and one of the most dynamic, although economic downturn has been quite important in recent years. In this sense, population has grown in a more expansive way than for the whole Catalonia until 2010 (see Table 1), being that whilst in 1990 population of the metropolitan area weighted 4,22% of Catalan population in 2014 this percentage raised to 5,06%. This gain was possible as population growth rates that were more than twice Catalan rates between 1990 and 2014.

Table 1: Population growth at Camp de Tarragona and Catalonia

	Reus-Tarragona	Catalonia	RT / Cat
2014	380.758	7.518.903	5,06%
2010	381.562	7.512.381	5,08%
2006	347.636	7.134.697	4,87%
2002	299.788	6.506.440	4,61%
1998	278.196	6.147.610	4,53%
1994	272.988	6.208.581	4,40%
1990	260.107	6.165.632	4,22%
Growth 1990-2002	15,26%	5,53%	
Growth 2002-2014	27,01%	15,56%	
Growth 1990-2014	46,39%	21,95%	

Source: IDESCAT

This metropolitan region is quite balanced as its centre includes two cities of similar sizes (Tarragona and Reus) separated only from 12 km as well as other 14 smaller villages¹⁰. Previous population potential has expanded urban areas around the metropolitan region, both for residential and for economic purposes, but without collapsing availability to land to be developed for the Ports' activities.

5. Port development and land conversions

The Port of Tarragona like most of the Spanish State Ports has grown enormously during the last decades fostered by a booming trade market and logistic expectations. Considering the beginning of the democracy the study starting point¹¹, in 1980 the Port of Tarragona made use of approximately 153ha. In 2013, 33 years later, the Port is using 382ha. This increment of 229ha. has multiplied the total port surface by 2.5 times (see figure 5). In the other hand, the *citizen port*¹² rise did not take place since 2003, when the Tarragona Port Authority decided to organize a public tender for the now Marina Port Tarraco. This area was finished and opened to the public in 2007. Some years later, in 2011, Marina Port Tarraco was bought by a Qatari company by 65M€ (J.S 2011) taking advantage of the difficulties to make the project profitable. Despite the Serrallo neighbourhood is considered part of the Port, this area is outside the port domains, and it cannot be considered a citizen port experience¹³.

¹⁰ Rest of metropolitan region include following municipalities: Cambrils, Salou, Vila-seca, Torredembarra, Constantí, Riudoms, La Canonja, La Selva del Camp, Altafulla, Els Pallaresos, El Catllar, La Pobla de Mafumet, Castellvell del Camp, and Vinyols i els Arcs.

¹¹ We have used 1979 as the beginning of this study. The main reasons are the observed ports expansion after the end of the dictatorship period in Spain and the emergence of reliable data and information consequence of the beginning of the new political opening.

¹² Citizen Port is the designation given to the urban area within the Port of Barcelona that coincides with the Port Vell. For this study and consistent with the Barcelona port urban development, it has considered appropriated this terminology to refer port areas where port authorities considered the option of opening the port to *citizen's* use.

¹³ The Serrallo neighborhood emerges consequence of the eviction of 600 people, mostly fishermen families that were located in the port proximities in 1856 (Escoda Múrrria 2002). Those families moved to the Lazareto beach where new wood shelter were built and recognized by the administration in 1865. The regularization of the new development was the origin of the neighborhood since motivated its upgrade

Similar to other cases, both developments, industrial-logistic enlargement and urban land conversions, followed the model defined by Bird in the Anyport model. Industrial areas has been moved foreland in opposite direction to urban growth, while the initiatic port urban developments have taken advantage of the less productive port areas which also match with city closeness. Today, despite the

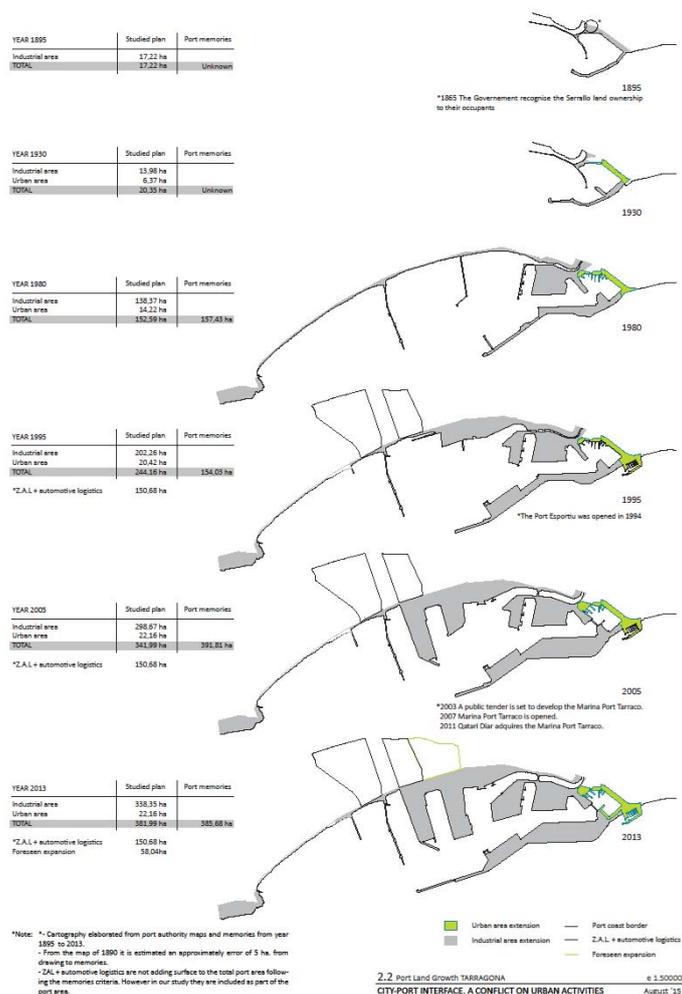


Figure 5, Port of Tarragona's growth
 Source, Port of Tarragona memories and Port Archive cartographies.

land reserve of the Port in the ZAL area in the proximities of the beach of La Pineda, the Port of Tarragona can be considered bounded by other urban and logistic activities, which is likely to represent a handicap for future expansions. Different from 30 years before, the port border is now an urban continue development with principal stakeholder competing by the land use: tourism, industry and urban activities coincide along the port and condition its expansion. The port seems bounded on both sides and inland by current developments.

and urbanization. Land was assigned to the occupants in return of the 1.5% of the property value. Thus, the Serrallo neighborhood instead it is inside of the Port location, between the rail tracks and the sea, is not a Port property. Despite this, the Port Authority has carried out recent urbanization public works and upgrades.

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Figure 6, Tarragona's interface development
 Source, ICC orthophotos

Port activities have represented an incentive for the industry location as well as logistic activities in the port proximities, which grow in correspondence with port expansion (see Figure 6). A sort of logistic parks, industry developments, infrastructures and housing developments coincide in an area of 2038 ha., 3-4 km inland from the waterfront. The Entrevias Logistic Park, the Francolí Logistic Park, the Bonavista neighbourhood, la Secuita are among the spaces and activities that can be found behind the port. They shape the Tarragona's City-Port interface.

The interface definition makes possible the analysis of a specific area that considers the Port its most important infrastructure and activity. Ports are considered gates for prosperity and development with positive social and economic externalities. Likewise, logistic activities consider time a valuable asset, inducing port related activities to locate near to the port's infrastructures. Time and distance to the port are two of the most relevant indicators for companies that require maritime infrastructures to operate. This requirement is reflected in higher land price and real estate rents along port borders¹⁴. In the same line, land

¹⁴ Real Estate Consultancies consider radial zones around the ports. In the case of Barcelona Jones Lang LaSalle differentiates three zones: First ring, the Metropolitan Area; Second Ring, the Vallès and Baix Llobregat; and third Ring including Manresa, 50km far from the Port (Jones Lang LaSalle 2012).

occupation is observed by real estate agents higher in those logistic parks located in the first ring around urban conurbations like Barcelona¹⁵ (Jones Lang LaSalle 2015). First Ring is also found the area with a higher properties transaction rates hosting also the biggest investments and developments in the Barcelona market (Jones Lang LaSalle 2015). Thus, although there are not specific market analyses related to the Port of Tarragona influence area, it has been expected to find similar results. That is, a high market demand for close port industrial and logistic locations and high occupation rates along the interface.



*Figure 7, Tarragona's port boundaries
 Source, Daniel Lorenzo photography, April 2015.*

¹⁵ Tinsa, an appraisal firm and real estate consultancy, considers the area of Tarragona the fourth ring of Barcelona, since companies before located in the Barcelona proximities move to Tarragona looking for better rent conditions (Tinsa 2013) supported by a good provision of infrastructures, mainly highways like the AP2 and AP7 (Aguirre Newman 2010).

Differently, a fieldwork analysis realized in the Tarragona's City-Port interface has helped to emerge surprising results related to land occupation and abandoned areas (see Figure 8). The principal data is the low occupation rate of the area. From the 2.038 ha analysed, 1.320ha are developed and remain in use. But, 717,07ha, the 35% of the bounded grown is determined unproductive or without attached activity.

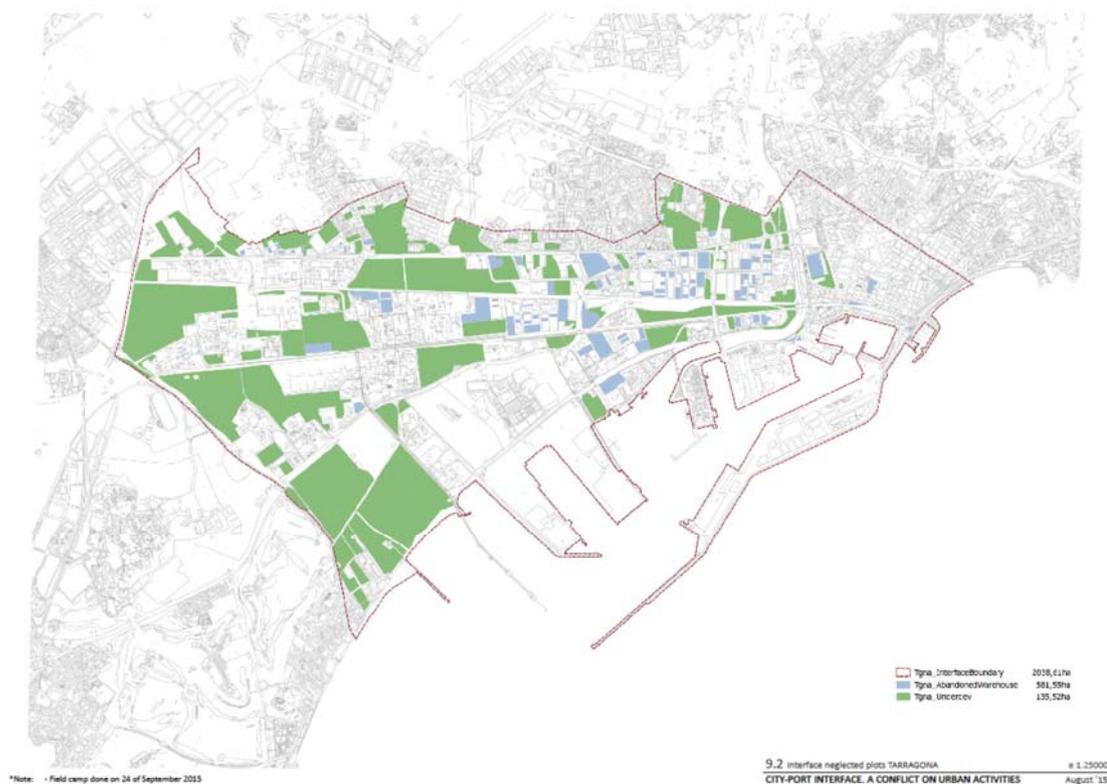


Figure 8, Derelict and underdeveloped areas in the Tarragona's City-Port interface
 Source, Authors field work, 24th September 2015

It has to be taken into consideration the wide land offer for specialized logistic parks, 310ha, from which the 35% is available, according to a Richard Ellis report from 2011 (CBRE 2011). Most recent reports from Jones Lang LaSalle showed occupation rates of 5% in the Barcelona Metropolitan Ring, while the rate rises to 30,50% in the considered the Logistics' Third Ring (Jones Lang LaSalle 2015).

Results obtained through fieldwork¹⁶ remain consistent with consultancy appraisal results if the Port of Tarragona will be not considered into the model. This result reduces the Port of Tarragona's relevance as a wealth inducer in relation to the municipalities in the closest proximities. Likewise, land use policies and plans have promote the development of new logistic areas inland distant from the Port, in an attempt of capitalizing the positive externalities generated by the region highways networks, leaving apart the opportunity to fill the vacant plots still underdeveloped in the port linked area. There are evidences of the demand of big logistic surfaces and the obsolescence of the first logistic developments in the area: the Francolí and the Entrevias Logistic Parks are clear examples. Plots and warehouses are of small dimension, accessibility is reduced and infrastructure connections are poor, reason for the big operators to avoid those parks. However, their nearness to the urban core is detected as a second opportunity for those parks. Therefore, the emergence of new urban activities have been detected mostly in the Francolí logistic park: gyms, kart circuits, restaurants and children's playgrounds are among the new activities that should contribute to the second life of those places at the same time that collaborate in the mixture of urban and industrial-activities in the area.

However, land conversion in the Tarragona's City Port interface are scarce and did not took place until the beginning of the new millennium, almost twenty years after the Barcelona Port Vell experience. A common argued vision is the lack of interest of the Tarragona Port Authority and the differential between the Port and the City of Tarragona, especially when the dimension and growth of the port is considered in the last 30 years. Following a similar analysis to the one realized from Ducruet to show the port and cities each other relevance (Ducruet, Lee 2006,

¹⁶ On 24th of September of 2015 the area was visited after a previous analysis through aerial cartography. A tour was made to check warehouses activity attending to the presence of workers, the existence of open or close doors or any other information that revealed activity inside the buildings. Likewise, fields were walked checking the existence or not of recent plantations.

Ducruet 2011)¹⁷, a growth analysis has been developed to contrast urban population and port revenues from 1979 to 2013.

Table 2: Port revenues vs Population growth

	Revenues		Population									
	Port of Tarragona 2013 currency	Annual increment considering inflation	Tarragona Annual Increment	Vila-Seca Annual Increment	La Canonja Annual Increment	Reus Annual Increment	City-Port Interface Municipalities Annual Increment					
1979	30.277.891,15 €		110.152	17.530		87.100	214.772					
1980	42.709.255,07 €	8,74%	110.152	0,00%	17.530	0,00%	214.772	0,00%				
1981	47.827.143,29 €	11,58%	100.112	-9,94%	16.428	-6,24%	79.245	-9,02%				
1982	41.137.356,25 €	-15,00%	110.501	1,27%	16.937	3,11%	80.638	1,76%				
1983	43.198.314,80 €	5,01%	112.238	1,57%	17.747	4,78%	81.182	0,67%				
1984	35.303.150,30 €	-18,28%	113.075	0,75%	18.123	2,12%	82.354	1,44%				
1985	36.077.354,06 €	2,19%	113.966	0,79%	18.750	2,47%	83.432	1,31%				
1986	42.640.772,80 €	18,22%	106.405	-6,58%	17.506	-5,73%	81.145	-2,74%				
1987	48.987.823,42 €	14,88%	107.356	0,91%	17.738	1,44%	81.835	0,83%				
1988	50.580.807,93 €	3,21%	109.586	2,03%	18.435	3,92%	83.000	2,42%				
1989	60.096.833,85 €	20,48%	110.947	1,24%	18.987	2,98%	85.143	2,60%				
1990	61.122.188,21 €	0,35%	112.380	1,27%	19.729	3,91%	86.407	1,48%				
1991	64.877.105,25 €	6,14%	110.153	-1,98%	11.528	-41,57%	87.670	1,48%				
1992	65.578.354,65 €	1,08%	112.283	1,93%	11.743	1,87%	88.219	0,62%				
1993	64.005.000,51 €	-2,40%	113.706	1,25%	12.184	3,76%	89.319	1,25%				
1994	61.750.839,28 €	-3,52%	114.630	0,79%	12.380	1,61%	90.059	0,83%				
1995	60.885.146,50 €	-1,40%	114.891	0,23%	12.620	1,96%	90.222	0,18%				
1996	51.088.178,43 €	-16,00%	112.176	-2,40%	12.124	-3,95%	90.993	0,86%				
1997	46.778.696,07 €	-8,44%	112.176	0,00%	12.124	0,00%	90.993	0,00%				
1998	46.565.306,18 €	-0,46%	112.705	0,55%	12.498	3,08%	89.284	-2,15%				
1999	52.829.262,76 €	13,32%	113.016	0,28%	12.755	2,05%	88.912	-0,44%				
2000	53.207.020,48 €	1,10%	114.007	0,88%	13.133	2,96%	89.179	0,30%				
2001	76.374.128,48 €	43,54%	115.153	0,99%	13.420	2,19%	90.056	0,98%				
2002	59.293.098,36 €	-22,38%	117.184	1,78%	13.927	3,76%	91.816	1,93%				
2003	54.435.683,22 €	-8,19%	121.076	3,32%	14.377	3,23%	94.407	3,05%				
2004	54.698.814,14 €	0,48%	123.584	2,07%	14.988	4,32%	94.642	2,37%				
2005	72.714.213,62 €	32,94%	128.152	3,70%	15.875	5,85%	99.505	5,26%				
2006	61.830.298,70 €	-15,24%	131.158	2,35%	17.205	9,01%	105.767	6,27%				
2007	69.518.531,72 €	12,80%	134.183	2,29%	18.678	7,99%	104.835	3,01%				
2008	60.893.348,72 €	-12,41%	137.536	2,51%	20.029	7,20%	107.770	2,80%				
2009	61.912.923,96 €	1,67%	140.223	2,00%	20.864	4,15%	107.118	-0,60%				
2010	58.476.991,33 €	-5,55%	140.194	-0,10%	21.373	2,43%	106.622	-0,46%				
2011	58.580.742,21 €	0,18%	134.085	-4,35%	21.839	2,18%	104.709	-0,98%				
2012	55.950.708,42 €	-4,49%	133.654	-0,10%	22.052	0,98%	107.311	0,47%				
2013	46.917.778,84 €	-16,14%	133.545	-0,08%	21.893	-1,65%	106.799	-0,59%				
Increment Average		1,49%		0,61%		1,00%		0,60%		10,62%		11,40%

Source, IDESCAT and Port of Tarragona memories.

Results show the high unbalance between the Port of Tarragona and the city of Tarragona, since the average growth for 33 years is the 1,49% in the case of the port revenues¹⁸ and the 0,61% in the case of the city's population. However, since the interface studied considers four municipalities: Tarragona, Vila-seca, La Canonja and Reus, they have been also included in the model. Thus, port growth and the urban related area emerge balanced, with a population growth of 11,40% in the same period of time. Nevertheless, it is remarkable that the two municipalities in the Tarragona Port Board, Tarragona and Vila-seca have an average growth of only 0,85%. The relative low population growth of the municipalities represented in the Port Board is amplifying the decision power

¹⁷ Instead Ducruet use a concentration index of traffic for the port to evaluate the stakeholder relevance in the interface, for this study, which also take into consideration the corporatization influence in the City-Port interface land conversion, port revenues are considered a consistent indicator. Port Authorities are required to obtain positive financial results at the end of the year, similar to Municipal administrations that depend on the population growth to balance the yearly results.

¹⁸ Annual port revenues are in 2013 currency. 1.49% is the average growth for 33 years.

differences between the stakeholders, since the Port is increasing in higher rate than hosting municipalities.

Apart from the specific data about Port revenues and population changes, what emerges from Table 2 is that city activities and Port activities have increased considerably through the past 30 years. As both activities are competing for the same area, it is necessary to design governance measures able to deal with them and to allocate available land in a satisfactory manner for all involved agents.

6. Land Market in the Interface.

A land market analysis is developed to compare tendencies and values at both sides of the Port of Tarragona border. Port land values are set by the port authorities through land appraisal, considering productivity and a land market assessment that takes into consideration neighbouring plots¹⁹. Furthermore, specific areas are assigned to a specific value zone (see figure 9), which should be linked to specific port uses (see figure 10). However, the areas use and value relationship is not clear, and updates between zoning and uses have been not the common they should be²⁰.

When compared to urban land values, results tend to be similar to the ones emerged in Barcelona: port land values are higher than urban land values in average (see figure 11)²¹. While the higher port land value capitalized is 2779€/m²²², the urban land is valued 14,5 times less, offered at a market value of

¹⁹ The procedure is coordinated by *Puertos del Estado* and similar for all the Spanish Port Authorities.

²⁰ The port of Tarragona is operating with the first land appraisal developed at the beginning of the 80's which is now reviewed in compliance to the *Puertos del Estado* requirements. Land use zones have been modified when the tenants have claimed the incoherence of the allocation.

²¹ Port data is publicly available through the Port of Tarragona's website. However, historical data have to be proven, since has been recently obtained from the Port Administrative Department. Data analyzed in this paper is a regression model based on the land values of 2012, deflated to year 2013 and considering land values adjustments linked to the Spanish GDP following port annual regulations.

²² Port land value models within the ports are set taking into consideration the formula *Capitalization rate = Interest Rate – Inflation*. For this appraisal, capitalization rate is calculated through using the Spanish interest rate for ten years bond.

192€/m²²³. Although, differences emerge when port converted land is analysed and compared to the Port of Barcelona results. In the case analysed in this paper, the most valuable zone within the Port domains is not the *citizen port* but the docks along the Levant Dike: Aragon, Navarra and Catalunya, which are extended



Figure 9, Port of Tarragona land value, 2012
 Source, Tarragona Port Authority, 2012

foreland, far from the city center (see Zone 5 in figure 9). Furthermore, urban activities within the Port of Tarragona differ from other urban ports in its density and capacity. It is necessary to consider the low density of the urban activities

²³ Urban data related to average land prices has been provided by the Infrastructure Ministry, but only from 2004 in advance. However, despite the interest of this study to analyze in deep the value areas along the interface with reference to the particularities of the urban landscape, more precise data has not been provided. There is the negative answer of the *Colegio de Registradores* (Property, Mercantile and Real Estate Registers College) to provide the required data, making reference to the data protection laws. Other administrations have been consulted like the General Directorate of Cadastre. But, despite the apparent interest on collaborating no data has been yet provided. Real Estate Appraisals have been also consulted without positive answer.

developed in the urban area of the Port of Tarragona, mostly limited to the marina moorings of recreational boats.

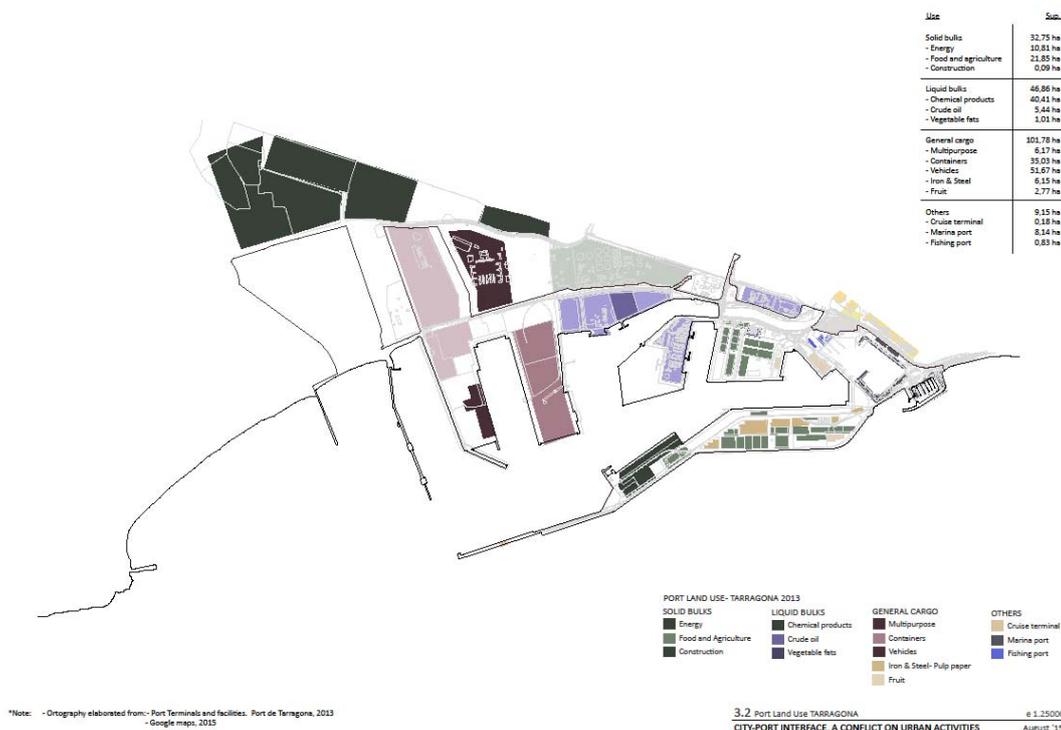


Figure 10, Port of Tarragona land uses, 2013
 Source, Port Terminals and facilities, Port of Tarragona, 2013

Also from the model set it is possible to highlight the apparent low increment of urban land values during the booming years, especially from 2004 to 2007 when the real estate market reached its peak. It is important to remark that in February of 2003 it was approved the development of the new Tarragona's waterfront, an urban competition won by the architect Ricardo Bofill, who also had won years before the competition for the controversial Hotel inside the Port of Barcelona. The Tarragona's project was never developed despite the inter-administrative agreement²⁴ and the increment in the foreseen number of apartments from the initials 1.200 to 2.756 (de-la-Flor 2006). It is very likely that the business plan for

²⁴ In September 2005, there is a common agreement between the municipality of Tarragona, the Generalitat de Catalunya (Regional Government) and the Infrastructure Ministry (Central Government).

the Tarragona's waterfront did not result attractive for real estate investors, in the same way that it is seen from the Tarragona Port Authority attending the figure 11.

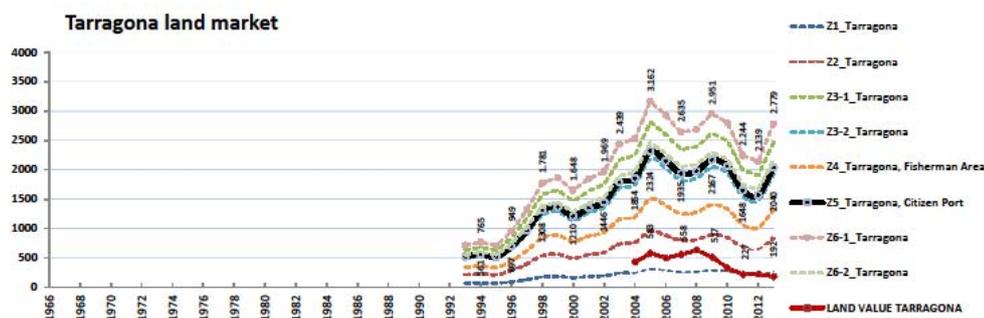


Figure 11, Tarragona city-port land market
 Source, Infrastructure Ministry and Tarragona Port Authority

Moreover, to put this in perspective it has to be considered the state of degradation of the neighbouring area of *El Barri de la Marina*. The urban expansion developed during the beginning of the XIX century under the direction of the engineer Smith represents the first Tarragona *example*. A derelict area needed of urgent investment and upgrading after more than two hundred years built. It is also the handicap of the limit generated by the train track along the urban-port limit, which is not favouring a fluent communication between the two main stakeholders in he area. Furthermore, in addition to the presence of the tracks and the neighbourhood degradation, the main economic activities have moved to new areas uptown not favouring the Port and market interest in the Tarragona's waterfront area. Similarly, *El Barri del Serrallo*, the once fisherman neighbourhood is also lacking of investment in its build up surface, being easy to find buildings abandoned within the area, notwithstanding the recent urban renovation process focused in the improvement of the public space. Real Estate properties located in the Tarragona waterfront are not apparently among the ones with the higher added value. It is also true that traditional residential wealth areas in Tarragona have

been located looking east, bypassing the Port connection and visuals since there are in the other topographical face of the Tarragona elevation.

Related to the provision of land, this is a limited and scarce good. Nevertheless, Spanish ports have the right to develop and extend foreland their boundaries by increasing land surface. Traditionally this process has been associated to expensive and hazardous developments. Despite this, from the study of the case of Barcelona emerged that the cost of the unit of land creation was only 220€/m². An early analysis in Tarragona reveals that the cost remains the same, almost 13 times lower than the higher land price within the port area²⁵. However, it is



Figure 12, The Port of Tarragona's growth increment
 Source, The Tarragona Port Authority archive

²⁵ The Port Director Plan 200-2014 has been modeled and deflated to 2013 currency. The result of 213,30€/m² is consequence of considering docks, dykes and landfilling costs. From this calculation urbanization, facilities and improvement costs were excluded. If those improvement costs are taking into consideration the unit costs will increase to 311.81€/m².

important to highlight that different to the case of Barcelona, urban real estate land price in Tarragona, 192€/m², is below the cost of the port land creation.

Likewise, it has been considered relevant to analyse the Port land acquisitions in recent times with the aim to test the differential with the land creation cost, at the same time that it was assessed the amount of land extended by both ways²⁶. First of all, it exist a clear differential between the cost of extending land foreland and the cost of land acquisition inland at it was already proved in the case of Barcelona. In this sense, the case of Tarragona is only corroborating early results. Thus, by taking for reference the period 1993-95, when the Port of Tarragona conducted a large land investment inland, the average price of the 32 referenced plots is of 28,25€/m², almost 7 times less than the cost of growing foreland²⁷. Despite this, it is clear the shift in the political strategy of the Port, since in the last 20 years no land has been acquired inland (see table 3) despite the abundance of unproductive empty plots. In the plan attached (see figure 12) is clear the prevalence of the green blur which represent the land extended foreland²⁸. Thus, the cost of growth for the Port could be minimizing its capacity to extend.

Table 3, Port of Tarragona surface increments

Year	1930	1980	1995	2005	2013
Inland increment	2,86ha	61,29ha	28,9ha +150,68ha	0	0
Foreland increment	6,93ha	71,17ha	101,68ha	96,85ha	40,53ha

Font, anonym

²⁶ Data related to the Port of Tarragona land acquisitions was obtained from port managers involved in the process.

²⁷ Resulting prices by m² are in 2013 euros.

²⁸ ZAL zone is not represented in color, despite is counted in the study, since the criteria from the Port Authority is not to included in the Port Memories.

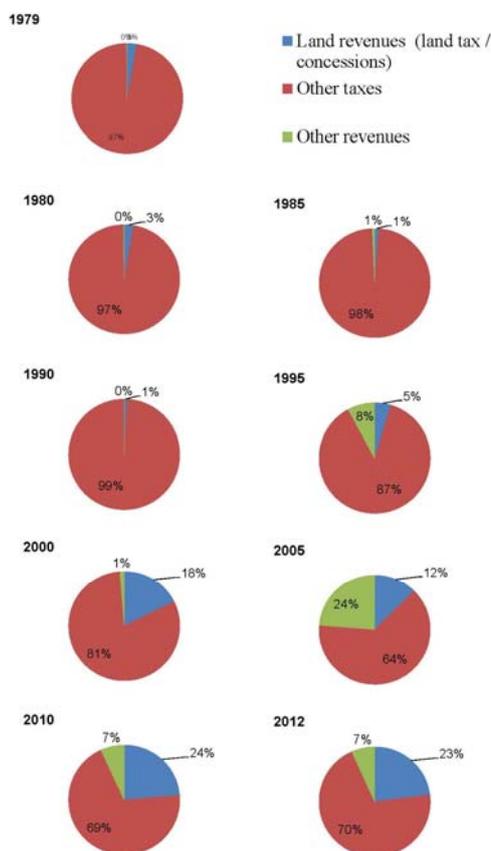


Figure 13, Port of Tarragona, captured taxes
 Font, Tarragona Port Authority's Memories

With reference to the Port incentive to maximize the use of the land within its borders, a Port tax analysis have been elaborated taken into consideration the same period of time used for the rest of the studio, 1979-2013. From this period of time it is observe the annual increment of the land taxes revenues captured by the Port when compared with other port taxes (see figure 13). In this sense is consistent with the Barcelona study and literature, since land taxes are an efficient system to capture value. Furthermore, when land taxes revenues are compared with the total port revenues is also visible the tax growth tendency, which is modifying the way the port use to capture value, focused in taxes to the traded goods.

As a consequence, Port tenants complain against what they consider excessive land rents. Thus, despite little have been done to reduce the land rent within the Port of Tarragona and especially the Port of Barcelona, the claim has resulted in the case of Tarragona in the modification of the municipal regulations for the buildings high, in coordination with the Tarragona Port Authority. The update of the regulation facilitates the increase of the plots density, which maximize their land use.

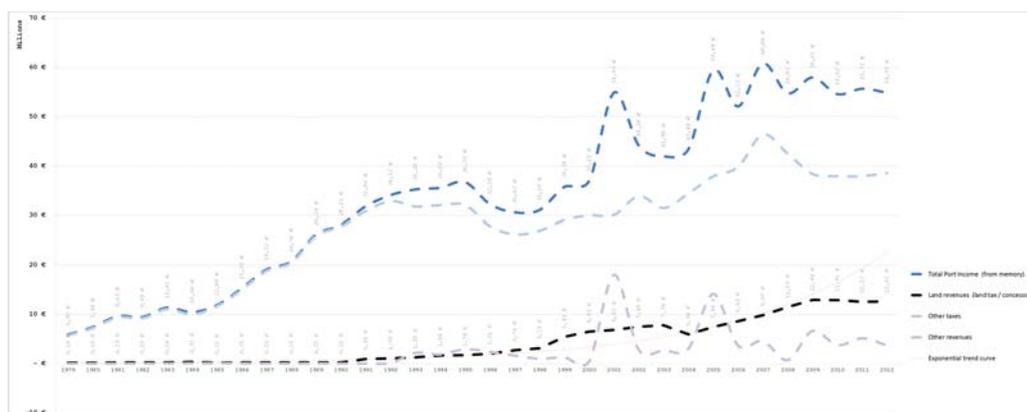


Figure 14, Port of Tarragona, revenues

Economic activities within the port and outside its borders along the interface differ in scale as well as in economic activities. Urban and industrial-logistic activities have grown in tandem, from the city center to the outskirts offering a product in line with the market demand. Thus, the logistic areas located closer to the urban core present frames different than the ones set recently in the interface borders. Differences are visible in the size of the plots, warehouses conditions and capacity, transport mobility adequacy to new trading systems, ... Furthermore, new logistic areas are focusing on giving response to an increasing higher demand for developments above 20.000m² which are easier to locate far from the Port borders. Moreover, original storehouses located along the port are less demanded for logistic purposes, despite there is an incremental occupation by urban related uses.

At this respect is also relevant the location of the Port gates along the Port border. Since the port administrative border is physically present through the existence of a fence, it does not exist a continue communication or relationship between stakeholders. This connection only could happen through the gates. But, in the case of Tarragona, different from Barcelona, the number of connections along the Port fence is limited to three gates: two in the inner city center, near to the Port Authority Headquarter and origin of the old Port, and one originated at the end of the highway A-27 (see figure 15). Furthermore, activities at both sides of the gates

are distant and mobility is restricted to vehicles making clear the lack of interest on receiving visitors. Moreover, the gate at the end of the A-27 is located on top of an elevated lane that passes above the Francolí logistic park signifying the lack of interest in a closer collaboration. Difficulties can be argued in reference to the river and rail track infrastructures, however, from the Francolí River channel to La Pineda beach, the only entrance is through the elevated A-27 lane.



Figure 15, Port of Tarragona gates, 2013

7. Conclusions

This paper has analysed land values and land conversions in city port interfaces. The approach of the paper is through land management. The interest is on providing information to the city-port stakeholders with the aim of improving the interface conditions by elaborating new and trustable policies and collaborative development processes. The condition of the research is to be a multidisciplinary study, which combines economic and spatial urbanistic knowledge. At the same time is the interest of



this study to analyse both sides of the city-port border from the same perspective, making clear the interest in providing a neutral point of view, non-port or city partial perspective. Likewise, this study continuous previous works which play attention to the emergence of new city-port models supporting the idea that dialogue and flexibility are necessary conditions for our city-ports to keep ongoing.

Although the empirical application is referred to the Port of Tarragona, main conclusions of the analyses are extensible to many other similar Mediterranean ports. In this sense, the extension of the port land conversions is related to the urban demand, which in the case of Tarragona due its geographical conditions and scarce demand for urban space, is low. Likewise, there is a common trend toward an increment on the mixture of industrial and urban activities, which claim for a more flexible regulation and land density increments.

Finally, in terms of policy implications, this paper provides useful insights for land conversion processes around a big infrastructure as a port is. Although these processes are heavily shaped by local specificities in terms of available land and geographical features, the procedures share a large part a common attributes. Apart from the fact that the generalities of the process may help other areas to improve their governance systems around land use, there are some key results that for sure will help local authorities to manage land use in the area. For instance, in terms of derelict and underdeveloped areas in the Tarragona's City-Port interface, this paper shows that there is plenty of available land (some of them quite close to the Port's infrastructures) ready to be used without huge infrastructure investments.

A further extension of this paper will test the opinion of the stakeholder in the Tarragona city-port interface on the discussed topics to corroborate the main findings of this study. Likewise, there is the interest on setting the link between the inland logistic parks and the Port of Tarragona, with the aim of assessing the interface of the potential to compete with inland offer. Furthermore size and density of the properties will be analysed to bring some light to the interface densification process.



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