



## POTENTIAL BENEFITS OF PORT RESTRUCTURING PROCESSES THE CONTINGENT VALUATION IN VALPARAISO. CHILE



UNIVERSITAT POLITÈCNICA  
DE CATALUNYA  
BARCELONATECH



Arq. M.Sc. **Biere Arenas, Rolando**  
Dra. Arq. **Garcia Almirall, Pilar**

## RESEARCH CONTEXT

This communication is part of the author's doctoral thesis research, in process, entitled:

*The process of port land restructuring, a strategy of urban regeneration.  
The case of the new land use port in Valparaiso.*

## PRESENTATION STRUCTURE

- A briefly presentation of **CONCEPTUAL AND METHODOLOGICAL ISSUES**, and
- Explanation of **PORT RESTRUCTURING EXPERIENCES**, and finally
- The presentation of **EXPERIENCES OF CONTINGENT VALUATION METHOD (CVM)**



## **CONCEPTUAL AND METHODOLOGICAL ISSUES**

**PORT RESTRUCTURING EXPERIENCES**

**EXPERIENCES OF CONTINGENT VALUATION METHOD (CVM)**

## GENERAL BACKGROUND

### PORT IMPORTANCE IN THE CITY

In many times it's difficult if not impossible to differentiate between the interests and economic activities of the city and its port. ***“The contribution of seaports to the development of cities is a fact that has been observed throughout history. The port structures have always promoted trade, fish, technology, relationships with other cultures...”***

ALEMANY, Joan. (23 06 2003) “La riqueza marítima de Baleares”. <http://www.masmar.com/articulos>

## GENERAL BACKGROUND

## CONCEPT OF URBAN REGENERATION

### PROCESSES OF URBAN TRANSFORMATION

**JANE JACOBS**

*mediated 20th century, USA, devastated with That was 'old'*

*diversity of uses of mutual sustentation*

*1970s - respect for the characteristics of each city*

**PETER HALL**

*life and history of the city and value of the urban regeneration*

**MANUEL CASTELLS**

*Information, local government, citizen participation*

**JORDI BORJA**

*norms, environmental, social and historical aspects, etc.*

### PORT TRANSFORMATIONS

**NUNO PORTAS**

*simultaneous to theories of the transformation of urban centers*

**ENRICO MUSSO**

*port regional economy, the port city - centre*

## GENERAL BACKGROUND

### WATREFRONTS

#### SEA FRONT

#### IMAGE OF CITY

#### HIGH STANDING USES

*In the theme of “WATERFRONT REDEVELOPMENT”: the influence of technological and logistical innovation and the change in the perception of the public position”*

*HAYUT (1994) en MUSSO, Enrico. “Città portuali: La economia e il territorio”.*

*The landscape and leisure potential of these places and the mediatic revaluation of their symbolic value, augment the speculative character of the investments. The waterfronts of cities come to define the SKYLINES dictated by new highly sophisticated urbanistic wholes and to construct a new imaginary urban label.”*

*PORTAS, Nuno (1998) “Água. Cidades e frentes de água”.*



## GENERAL BACKGROUND

### NEW IMAGE OF CITY

**KEVIN LYNCH**

*Traditional definition of border, path, milestone, edge, neighborhood.*

*Generation of **COLLECTIVE IMAGES** associated with the **SUCCESS** of cities, in which the **RECOGNISABLE SKYLINE** of a city has a global image.*

**CITY ARTWORK OR MONUMENT  
BUILDINGS DESIGNED BY LEADING ARCHITECTS**

### OPPORTUNITIES WITHIN THE URBAN PROCESS

*Post-war period: transformations associated with greater events*

**FLAGSHIP EVENTS, SPORTING, CULTURAL, COMMEMORATIVES...  
ECONOMIC INCENTIVES, TAXATION, ETC.**

### RANKING OF CITIES

*Information relating to cities is fundamental for the individuals*

**TOURISM, COMMUNICATION NETWORKS, GLOBALISATION  
COMPARATIVE ADVANTAGES  
MEASUREMENT PARAMETERS**

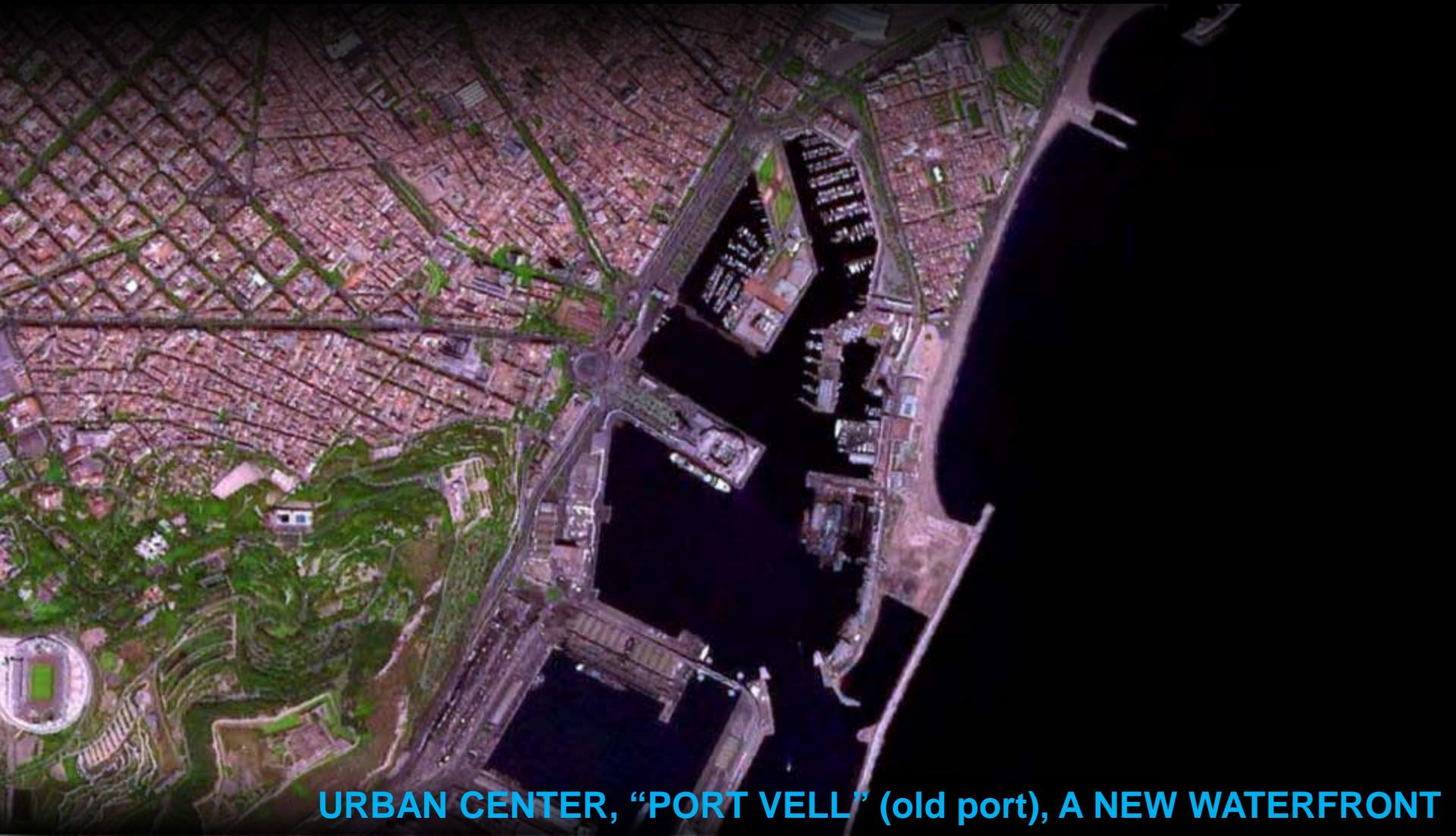


CONCEPTUAL AND METHODOLOGICAL ISSUE

**PORT RESTRUCTURING EXPERIENCES**

EXPERIENCES OF CONTINGENT VALUATION METHOD (CVM)

## EXPERIENCIES: BARCELONA



URBAN CENTER, "PORT VELL" (old port), A NEW WATERFRONT

## EXPERIENCIES: BARCELONA



## EXPERIENCIES: BARCELONA

### 1992 OLYMPIC OPERATIONS

- Olympic Games: Infrastructure Operation with an international event as an excuse



Olympic Games as an 'excuse' to concentrate investment...

OLYMPIC OPERATIONS 1986-1992

## EXPERIENCIES: BARCELONA

### 1992 OLYMPIC OPERATIONS

#### MAIN PROJECTS

- Rehabilitation of the Olympic stadium
- Construction of a new sports stadium
- Ring roads (approx. 35 km)
- Other new roads. (approx. 35 km)
- **4,500 new flats in the 4 Olympic Villages**
- 2 telecommunication towers
- 5 areas of new centrality (offices)
- Enlargement of the airport
- **Improvements to the leisure port or marina**
- Cultural facilities (museums, etc.)
- 5,000 new hotel rooms

## EXPERIENCIES: BARCELONA

### 1992 OLYMPIC OPERATIONS

- The sectors of '*POBLENOU*' and the '*BARCELONETA*' were in decay

### THE MARINA - BARCELONETA

#### AUTONOMOUS PORT OF BARCELONA

*Gerencia 2000 - Management 2000*

*Independent system of financing to the Autonomous Port Authority*

GENERALITAT DE CATALUNYA (Regional government)

AYUNTAMIENTO DE BARCELONA (City Council)

MINISTERIO DE OBRAS PÚBLICAS Y URBANISMO (Ministry of Works and Urbanism)

#### OBJECTIVES

*Port space for leisure, cultural and tourist uses.*  
*Integration and establishment of activities and facilities for 'Ciutat Vella'.  
(the historical hearth of the city)*  
*Opening of the city to the sea.*

#### CHARACTERISTICS

*Management capabilities of the public and professional organizations*  
*Strategy for the creation of a model*  
*Management functioned as city promotion*

## EXPERIENCIES: BARCELONA

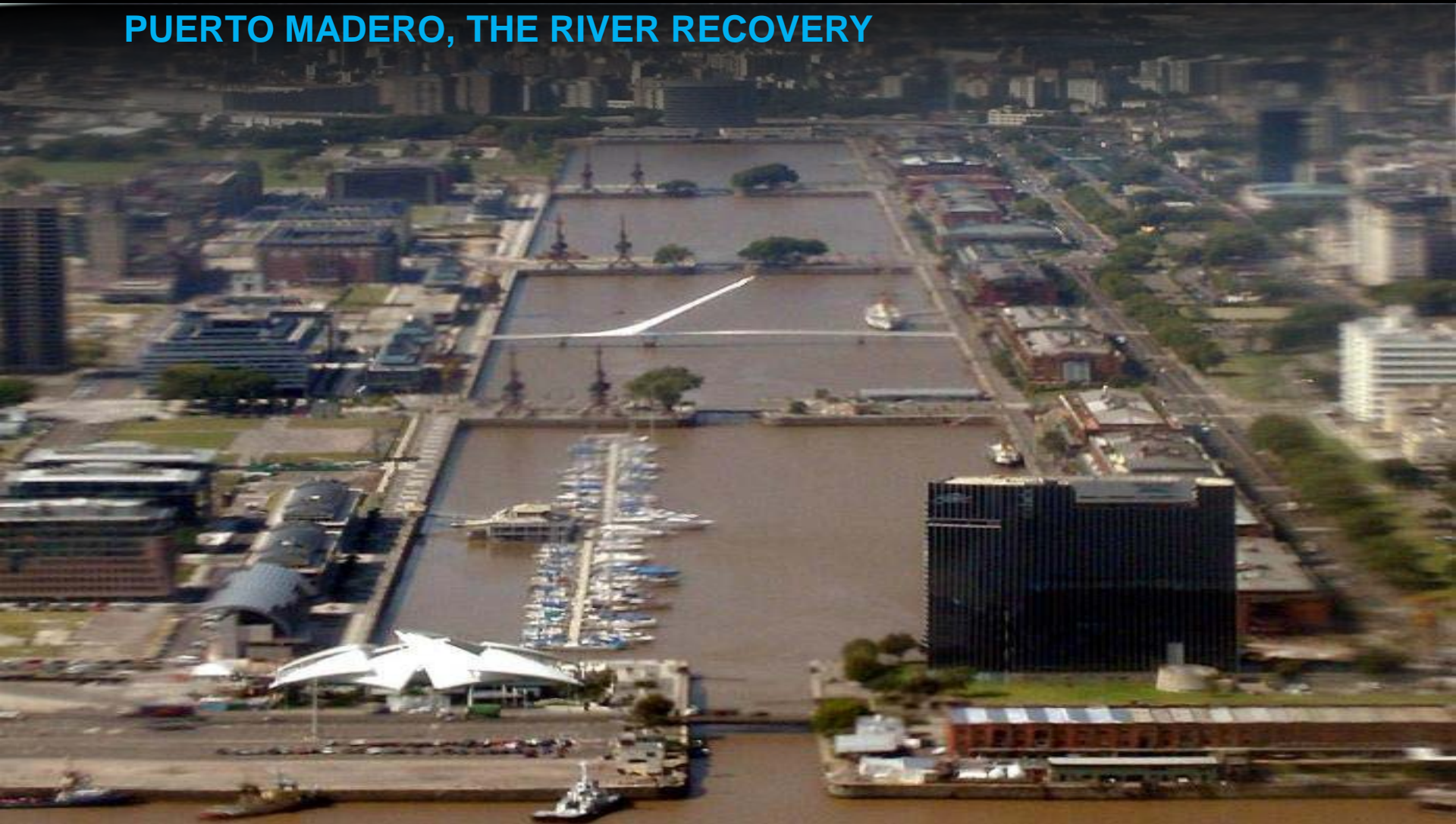
### 1992 OLYMPIC OPERATIONS

#### STRENGTHS

- Use of an **INTERNATIONAL (FLAGSHIP) EVENT** as an element for attracting both *public and private investment*, and for covering the to the deficits arising from the infrastructure.
- Integration of the *Olympics project* with a *wider strategic plan*.
- **COLLABORATION** between the *public* and *private* sectors. (60-40%-40)
- **INSTITUTIONAL CONSENSUS.**
- Development of an *ad hoc formula of management*: HOLSA (43% of the government investment of 450.000 MPTA)
- **LEADERSHIP** from Barcelona City Council: *political* and *technical*.

## EXPERIENCIAS: BUENOS AIRES

### PUERTO MADERO, THE RIVER RECOVERY



## EXPERIENCIES: BUENOS AIRES

### PUERTO MADERO, THE RIVER RECOVERY

#### STRATEGIC PLAN

#### COMMERCIAL, RESIDENTIAL AND CIVIC USES

#### OBJECTIVES - URBAN REGENERATION STRATEGY

Coast Recovery and green space in the city.  
Puerto Madero as an opportunity for new center model.  
New home supply center.  
New offer tertiary space.  
Reuse of warehouses and architectural heritage.  
New range of medium density residential area.  
System accessibility.  
Main Shaft “historic center-river ecological reserve”  
The size should be absorbed with controllable scale operations.  
Development for public-private investment.  
Puerto Madero, an important urban part of Buenos Aires.

**PUERTO MADERO CORPORATION.** A master plan commissioned a technical team

*PLANNING DEPARTMENT OF THE COUNCIL OF BUENOS AIRES  
EUROPEAN CONSULTANTS ASSOCIATES (JOAN BUSQUETS & JOAN ALEMANY)*

## EXPERIENCIAS: BUENOS AIRES

### PUERTO MADERO, THE RIVER RECOVERY

#### STRATEGIC PLAN

#### PORT STORAGE RECOVERY...



## EXPERIENCIES: RÓTTERDAM

### SEARCH FOR ENVIRONMENTAL FRIENDLY ENVIRONMENT



## EXPERIENCIES: RÓTTERDAM

### SEARCH FOR ENVIRONMENTAL FRIENDLY

#### METHODOLOGY APPROACH

key social, economic, transport, housing and advocacy  
participation of public and private sectors

#### PROCESS, MODULATED AND EVOLUTIONARY

ongoing evaluation, adapting to the changing environment  
democratic approach to process

#### DETERMINATION OF PRIORITY ACTIVITIES

#### ADMINISTRATION OF THE MANAGEMENT PROCESS

#### ***SPECIFIC ENTITY***

realization of the process  
control of the stages of implementation and time and resources

## EXPERIENCIES: LONDON'S DOCKLANDS

### RECOVERY FOR ECONOMIC AND COMMERCIAL ACTIVITIES



## EXPERIENCIES: LONDON'S DOCKLANDS

### RECOVERY FOR ECONOMIC AND COMMERCIAL ACTIVITIES

#### START WITHOUT URBAN PLANNING

*Seventies: a period of futile attempts to develop*

#### CREATION OF THE LONDON DOCKLANDS DEVELOPMENT CORPORATION (1981)

*Urban Development Corporation*

*Enterprise Zones. attracting private investment*

*Tax and economic benefits*

#### CHARACTERISTICS

*Financial support in an initial amount of 60 to 70 million per year.*

*Control unit development sector in three municipalities.*

*Acquisition of land by public authorities.*

*Enterprise Zone Manager of the Isle of Dogs.*

*Developer and marketer of the Docklands area.*

## EXPERIENCIES: FINAL REMARKS

## PORT RESTRUCTURINGS PROCESSES

### **MAIN STRATEGIES**

#### **GOVERNMENTS OR INSTITUTIONS**

DEVELOPMENT CORPORATIONS PUBLIC - PRIVATE  
STATE OR LOCAL PUBLIC AGENCIES

#### **PUBLIC FIGURES OR MAYORS (own efforts and institutional)**

*ED LOGUE*

BOSTON

*ORIOL BOHIGAS*

BARCELONA

#### **PRIVATE BUSINESS**

*INVESTMENT PROJECTS WITH EMPHASIS ON THE PUBLIC*

## EXPERIENCIES: FINAL REMARKS

### PORT RESTRUCTURINGS PROCESSES

#### **BASIC OBJECTIVES**

**URBAN REMODELING** for new business development, tourism and culture.

**RECOVERY PORT INFRASTRUCTURE** and obsolete or underused spaces.

**GENTRIFICATION**, through development of areas adjacent to central urban areas and new.

Contribution to **SOCIO - ECONOMIC DEVELOPMENT** of the city overall.

## EXPERIENCIES: FINAL REMARKS

## PORT RESTRUCTURINGS PROCESSES

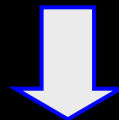
### **SPECIFIC OBJECTIVES**

**URBAN:** *New systems of coastline, upgrade planning, release of areas of activity.*

**ECONOMIC:** *Integrated new economic activities and employment generation.*

**BUSINESS:** *Private investment opportunities.*

**SOCIAL:** *Increased quality of life and social identity.*



**USING THE CONTINGENT VALUATION METHOD**



CONCEPTUAL AND METHODOLOGICAL ISSUE

PORT RESTRUCTURING EXPERIENCES

EXPERIENCES OF CONTINGENT VALUATION METHOD (CVM)

## QUANTIFYING THE ENVIRONMENTAL VALUES

In these processes of restructuring port ...

How could we value the real environmental benefits for citizens?



In this field of study are two main families of methods:

**REVEALED PREFERENCES**

**HEDONIC PRICING METHODOLOGY**

**TRAVEL COST METHODOLOGY**

**STATED PREFERENCES**

**CONJOINT ANALYSIS METHODOLOGY**

**CONTINGENT VALUATION METHODOLOGY**

## CONTINGENT VALUATION METHOD: BACKGROUND

The **ABSENCE OF MARKET** (prices) **FOR SOME PUBLIC ASSETS** generated in the port restructuring **DOES NOT MEAN THAT THOSE HAVE NO VALUE**, because they have a high social value helping to **IMPROVE THE WELFARE OF CITIZENS**.

To assess these public assets, the economy has developed since the mid-twentieth century, various methods, among which the **CONTINGENT VALUATION METHOD (CVM)**

Basically consists of a **HYPOTHETICAL MARKET CONSTRUCTION** for the willingness of the people to pay (DAP / WTP) **FOR A PUBLIC ASSET**.

(Mitchell and Carson, 1989)

The contingent valuation method is a **SAMPLING TECHNIQUE** designed to address issues from an empirical perspective on the **ALLOCATION OF RESOURCES**.

(Kriström and Riera, 1997)

In the area of port restructuring has been **SAZ, SALVADOR** who applied the method to the **CASTELLÓN COSTA PIER (2000)** and coastline of **VALENCIA (2003)**

## CONTINGENT VALUATION METHOD: BACKGROUND

Everyone **SHOULD MAKE ASSESSMENTS OF HIGH COMPLEXITY** from the information they provide through a questionnaire and make an economic choice through their interpretation of that information..

A contingent valuation exercise **INVOLVES FOUR PHASES**, whit a close relationship between them (**KRISTRÖM** y **NYQUIST**, 2000):

### PLANNING AND DEVELOPMENT

*Conceptual model building where it should be clear what is intended to assess*

### INTERVIEW PREPARATION AND ADMINISTRATION

*Drafting of the questionnaire and interview rate decision (personal, telephone, etc.)*

*The questionnaire has three parts: setting, individual questions and questions DAP*

### DATA COLLECTION, and

*Implementation of the survey process. (group counseling, check-safe)*

### ANALYSIS AND PUBLICATION OF RESULTS

*It's important to know the response rate, statistical model selection and validation*

## CONTINGENT VALUATION METHOD: APPLICATIONS

### PORT OF VALENCIA AND PORT OF CASTELLÓN

#### DESCRIPTION OF THE SURVEY PROCESS

	VALENCIA	CASTELLÓN
SURVEYS (FINAL ADMINISTRATION)	1.332	700
SURVEYS (PILOT STAGE)	100	100
GEOGRAPHICAL AREA	<i>Valencia, maritime districts and Metropolitan Area (L'Horta)</i>	<i>Castellon, El Grao and nearby municipalities (Benicassin, Almassora, Vila-Real And Borriana)</i>
PAYMENT METHOD	<i>Annual voluntary contribution</i>	<i>Annual voluntary contribution</i>
QUESTION FORMAT	<i>Open end twice as dichotomous</i>	<i>Simple dichotomy more open end</i>

( Source: **SAZ, Salvador**, 2003)

## CONTINGENT VALUATION METHOD: APPLICATIONS

### PORT OF VALENCIA AND PORT OF CASTELLÓN

#### SUMMARY OF RESULTS

	VALENCIA	CASTELLÓN
SUBJECTIVE ASSESSMENT OF THE PROJECT * (AVERAGE)	7,80	8,51
SAMPLE SIZE (NUMBER OF RESPONDENTS)	1.332	695
DAP / WTP AVERAGE	37,50	44,90
DAP / WTP x 3 **	150,10	134,80
POPULATION > 18 YEARS OLD	1.006.830	206.115
VALUE SOCIAL BENEFITS OF URBAN AND ENVIRONMENTAL IMPROVEMENTS	151.134.026	227.779.554

\* Having described the different parts of the project, asking the respondent on a scale of 0 to 10, which valued the whole of it.

\*\* The commitment made by the respondent was an annual payment during the three years duration of the works.

( Source: **SAZ, Salvador**, 2003)

## CONTINGENT VALUATION METHOD: APPLICATIONS

### PORT OF VALENCIA AND PORT OF CASTELLÓN

#### SUMMARY OF RESULTS

From the questions in the first part of the questionnaire, both subjective assessment **GIVEN BY RESPONDENTS TO ALL THE PROJECT WAS VERY HIGH.**

As for **SOCIAL BENEFITS**, in the case of Valencia, urban and environmental improvements resulting from their coastline remodeling amounting to some **151 MILLION EUROS**, while in the case of Castellón about **28 MILLION EUROS.**

These figures are the result of **MULTIPLYING THE AVERAGE OF THE DAP (WTP)** obtained (37.5 euros in Valencia, and 44.9 euros in Castellón) by the **POPULATION OVER 18 YEARS** and the **NUMBER OF YEARS OR LONGER** works.

# CONTINGENT VALUATION METHOD: THE CASE STUDY

## THE CASE OF VALPARAISO

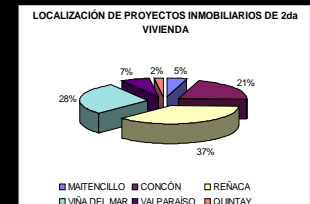
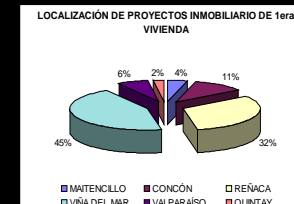
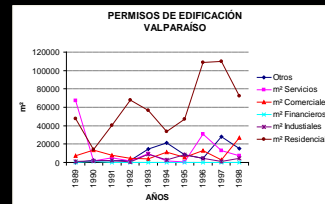
### PROCESS DESCRIPTION

**STAGES**

**STRUCTURE**

*Alternative land use*  
*Economic and social assessment*  
*Alternative definition of Validation Workshop (2000)*

Evaluation of the profile of the port expansion project.  
 Analysis of Proposals for the Public and Private sector.  
 Determination of claims in the coastal real estate.  
 Structuring alternatives to the coastline.



Building Permits in Valparaiso.  
 (Source: URBE/INE)

## PORT MASTER PLAN

*Methodology of stages and review workshops*

**“OBJECTIVE IMAGE” PROPOSAL**  
**SECTIONAL PLAN “PORT BARON” PROPOSAL**  
**BUSINESS PROPOSAL**



# CONTINGENT VALUATION METHOD: THE CASE STUDY

## THE CASE OF VALPARAISO

### GENERAL OBJECTIVE

Transforming of two obsolete areas that open zones of the city to the sea, **PIER BARON**, warehouses area and **PIER PRAT**, Sotomayor Square area. This proposal was initially raised in the **CONTEXT OF BICENTENNIAL PROJECTS**.

Country: <b>Chile</b>	City: <b>Valparaíso</b>	Period: <b>1998 - 2010</b>
<b>Objective:</b> Release the ground zone of “BARON PIER”, currently used as the port sector and leave it available for use for the city as public space tourist with services and facilities, commercial and residential. Reduce the port land and build a wharf refurbishment in the “PRAT PIER” sector.		
<b>Context action:</b> celebration of the bicentennial of the independence of chile		
<b>Sector:</b> Ground sector "BARON PIER" and remodeling industry, "PRAT PIER"		
<b>Estimated cost:</b> 300.000.000,00 US dollars		
<b>Management Entity:</b> Company Puerto Valparaiso. This point deserves comment, since it is not considered the creation of an autonomous operating entity, whose sole purpose is the transformation process.		

( Source: Author, 2002)

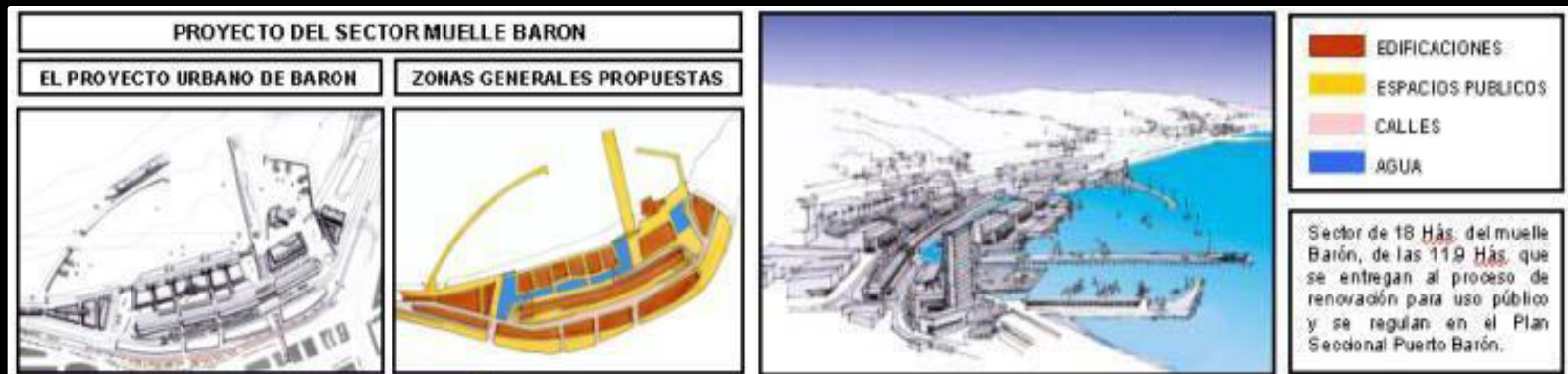
# CONTINGENT VALUATION METHOD: THE CASE STUDY

## THE CASE OF VALPARAISO

### FEATURES OF THE PROPOSAL

#### OBJECTIVE IMAGE

Consider the **WATER AS LAND MANAGEMENT**, which is constituted as a succession of urban voids at the edge, watching the recycling of Simon Bolivar warehouse as a **SUPPORT ADDING A PROMENADE OF COASTAL AND BEACHES**



( Source: Author, 2002)

## CONTINGENT VALUATION METHOD: THE CASE STUDY

### THE CASE OF VALPARAISO

### CONTINGENT VALUATION PROCESS

### PLANNING AND DEVELOPMENT

The **ASSET** defined as a value, **IS THE OPENING OF BARON PIER**, as it is an area that poses a hypothetical profit higher, as the city released a physical barrier exists.

- We define an open twice question:

Would you be willing to pay ... for ...? How much?

### INTERVIEW PREPARATION AND ADMINISTRATION

**PERSONAL and ELECTRONIC (BY EMAIL) SURVEYS:** with Word attachment type.

-**PERSONAL**; two periods of delivery, in October 2005 and December 2005

-**ELECTRONIC (BY MAIL)**; period between October 2005 and June 2006

### QUESTIONNAIRE STRUCTURE:

- **SETTING:** Written description, images, data tables, and **5 questions**.

- **DAP / WTP**, alternatives and **5 questions**.

- **INDIVIDUAL SITUATION:** sex, age, neighborhood where he lives... and **10 questions**.

## CONTINGENT VALUATION METHOD: THE CASE STUDY

### THE CASE OF VALPARAISO

#### CONTINGENT VALUATION PROCESS

#### DATA COLLECTION

Process begins during a **TRIP TO CHILE** with the collaboration of a **GROUP OF ARCHITECTURE STUDENTS** (4 year course of Urbanism, School of Architecture, University of Valparaiso), and then tracked for a week in October 2005. Repeat the process in December of that year.

-Estimation of **400 SURVEYS**, of which **368 APPLY**

#### IMPLEMENTATION PROBLEMS

Subsequently makes the **PROCESS OF SENDING MAILS**, which **TOOK LONGER THAN PLANNED** and carried out **FEWER QUESTIONNAIRES THAN EXPECTED**

- Was conducted between **NOVEMBER 2005 and JUNE 2006**
- The **LAST REPLY** was received **IN OCTOBER 2006**
- Of the estimated 600 surveys, **SENT 574 AND RECEIVED 513**

# CONTINGENT VALUATION METHOD: THE CASE STUDY

## EL CASO DE VALPARAISO

### CONTINGENT VALUATION PROCESS

### ANALYSIS AND PUBLICATION OF RESULTS

-The first is to validate the answers:

\* Of the **368 PERSONALLY**, there are **357 APPLIED CORRECTLY (97,01%)**

\* Of the **513 BY MAIL**, there are only **378 ANSWERED CORRECTLY (73,68%)**

- The following is working with the results:

SECTION	PERSONALLY	BY MAIL	AVERAGE	WEIGHTED
SUBJECTIVE ASSESSMENT OF THE PROJECT	8,2	8,9	8,55	8,41
DAP AVERAGE (Chilean pesos) *	\$ 23.243,00	\$ 17.671,00	\$ 20.457,00	\$ 21.571,40
EQUIVALENT IN EUROS **	28,91 €	21,98 €	25,44 €	26,83 €
EQUIVALENT IN EUROS ***	35,38 €	26,90 €	31,14 €	32,84 €
DAP AVERAGE **x 5	144,55 €	109,89 €	127,22 €	134,15 €
DAP AVERAGE ***x 5	176,91 €	134,50 €	155,71 €	164,19 €
POPULATION (2005)	292.642	292.642	292.642	292.642
POPULATION (2011)	311.729	308.137	308.137	308.137
<b>SOCIAL VALUE OF THE BENEFITS OF IMPROVEMENTS **</b>	<b>42.300.131,13 €</b>	<b>32.159.601,48 €</b>	<b>37.229.866,31 €</b>	<b>39.257.972,24 €</b>
<b>SOCIAL VALUE OF THE BENEFITS OF IMPROVEMENTS ***</b>	<b>55.148.056,80 €</b>	<b>41.444.394,84 €</b>	<b>47.978.495,00 €</b>	<b>50.592.135,07 €</b>

\* Original value in national currency (Chilean \$) when implementing the survey.

\*\* Equivalent to December 31, 2005, 1.00 € = \$ 804.002 Chilean

\*\*\* Equivalent to July 11, 2011, 1.00 € = \$ 656.915 Chilean

## FINAL REMARKS

- *Although there are **COMMON METHODS OF WORK AND SIMILAR URBAN PROGRAMS**, the implementation of **VARIOUS TYPES OF CONVERSION**, born from the study of the **SPECIFIC NEEDS AND CHARACTERISTICS** to each city or region.*
- *Port restructuring aren't only limited to **RECONVERT OBSOLETE PORT AREAS**, but can even consider the use of coastal urban areas, **TO BE RENEWED, REHABILITATE, REVITALIZE AND INTEGRATED** into at the same project.*
- ***MANAGEMENT OF THESE PROJECTS** should ideally **BE LED BY AN AUTONOMOUS PRIVATE OR PUBLIC ENTITY**, which integrates the efforts and interests of different sectors towards compatible goals and complementary.*
- *Much of the success of projects that provided a significant private sector investment, is derived from **MAKING AN APPROPRIATE ALLOCATION OF RISKS THAT GENERATE CONFIDENCE AMONG THE PARTIES**.*

## FINAL REMARKS

- ***GENERATE BENEFITS FOR CITIZENS, EMPLOYERS AND THE AREA OF DIRECT AND INDIRECT INFLUENCE OF SUCH PROJECTS ARE, AMONG OTHERS:***
  - ***Ordering of the coastline.***
  - ***Reuse of obsolete areas.***
  - ***New market rents for the city and harbor.***
  - ***Changing the image of the city.***
  - ***Employment generation.***
  - ***Quality of life.***
- ***Finally it's shown, THE EMPIRICAL POSSIBILITY TO USE THE CONTINGENT VALUATION METHOD AND IT'S VALIDITY IN THE CONTEXT OF RESTRUCTURING PORT, useful for PUBLIC AUTHORITIES AND PRIVATE to detecting the value that people attach to the urban improvements resulting from these processes.***



...THANKS  
...OBRIGADO  
...GRACIAS  
...GRÀCIES  
...GRAZIE



UNIVERSITAT POLITÈCNICA  
DE CATALUNYA  
BARCELONATECH



Arq. M.Sc. **Biere Arenas, Rolando**  
Dra. Arq. **Garcia Almirall, Pilar**