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Original Citation

Delsante, Ioanni and Miron, Luciana I. G. (2017) Urban growth, regeneration and social inclusion in Porto Alegre: the City Entrance Integrated Programme case study. *UPLanD: Journal of Urban Planning, Landscape & environmental Design*, 2 (2). pp. 239-254. ISSN 2531-9906

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UPLanD

Journal of Urban Planning, Landscape & environmental Design



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URBAN GROWTH, REGENERATION AND SOCIAL INCLUSION IN PORTO ALEGRE: THE CITY ENTRANCE INTEGRATED PROGRAMME CASE STUDY

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HIGHLIGHTS

- Since 1989 Porto Alegre has become a reference for sustainable and participatory planning
- Users' perceptions and Post Occupancy Evaluations have been delivered in PIEC housing projects.
- Despite the success of PIEC programme, there is room for improvement in terms of retention rate
- Recent trends show renewed challenges in terms of informal urbanization and housing needs

ABSTRACT

Since 1989 Porto Alegre has become an international reference for planning (UN Habitat, 1996) and regeneration practices associated also with the Participatory Budget process (Pacheco, 2001; Fedozzi, 1998), aiming at poverty reduction and social inclusiveness (Getúlio Vargas Foundation, 2004; UNDP, 2003; UN/UMP, 2003). Within the new city masterplan approved in 1999 the City Entrance Integrated Programme (henceforth PIEC) has been delivered since 2002 (Vargas, 2003; PMPA, 2014). The paper critically analyses the outcomes of the 4th District's regeneration process and relate them to recent trends in terms of informal rapid urbanisation, social and ecological indicators.

The findings highlight how, even though enjoying economic development and positive macro-economic trends, Porto Alegre is facing new or increasing challenges in terms of housing needs, informal urbanisation, social and environmental resilience. Unexpected internal people displacement, together with real estate speculation and the rise of new informal urbanization, provide a worrying picture of increasing inequalities across the city. The paper provides a reflection on the shortcomings and the fragility of the planning process, especially in terms of social and environmental impact, to draw some provisional conclusions and directions for further research activities.

ARTICLE HISTORY

Received: June 10, 2017
Reviewed: July 04, 2017
Accepted: July 20, 2017
On line: July 31, 2017

KEYWORDS

Porto Alegre
PIEC - City Entrance Integrated Programme
Post-occupancy evaluation
Informal urbanization
Social inequalities

1. INTRODUCTION

Porto Alegre, the capital of Rio Grande do Sul State, has 1.409.351 inhabitants (IBGE, 2010). Founded in 1769 it is geographically on the shores of Guaíba lake (Fiori, 2000), in a strategic position for trade and industry (Figure 1). Centre of a metropolitan region of 3.098.133 inhabitants (ASRGS, 2010) its expansion has been influenced by the topographical and infrastructural continuity with the surrounding territory, especially to the north.

1.1 *Planning and Social Inclusion*

Porto Alegre has become an international reference for planning (UN Habitat, 1996) and regeneration practices associated also with the Participatory Budget process (Pacheco, 2001; Fedozzi, 1998).

In more general terms, the urban planning and design system in Brazil has been largely influenced by laws and regulations approved in recent decades, starting from the national Constitution (Brasil Constituição, 1988) and the law known as “The Statute of the City” in 2001 (IDB, 2005).

This last one represents a framework for acting in informal settlements (Fernandes, 1997; Lara, 2010a). Parallel to this and to the rise of the Workers Party (PT) Brazil experienced a model of participatory democracy (Pacheco, 2001; Fedozzi, 1998). The Participatory Budget (henceforth PB) involves citizens in collective and open assemblies to define investment priorities for their neighbourhoods. PB has been recognized worldwide as best practice in urban planning (UN Habitat, 1996).

Since 1989 in Porto Alegre thanks to PB there have been huge improvements in terms of urban infrastructures, poverty reduction and social inclusiveness (Getúlio Vargas Foundation, 2004; UNDP, 2003; UN/UMP, 2003). Porto Alegre’s budget for PB has fluctuated between \$10.3m USD and \$63.9m USD year budget (2001-2011 decade), many times more than in similar cities where this process has been put in place (Scruggs, 2014). The process itself has been argued as inefficient – as many areas are still experiencing serious issues (Smolka and Damasio, 2005). In addition, after the government change in 2004 the PB lost the attention of the public administration. PB’s outcomes have been also argued not in terms of participatory process but in terms of expecting the same level of outcome in physical planning (Moore, 2007; Lara, 2010b).

In 1999 the city of Porto Alegre approved a new masterplan, named Urban and Environmental Development Master Plan (henceforth PDDUA) (PMPA, 1999), after years of discussion through a forum called “Constitutive City”. The process largely involved the population in participatory processes and stated a clear response to the traditional modernist approach to planning (Vargas, 2003). The plan provides with a structure based on strategies and guideline principles, followed by different actions that create the strategy to ‘produce the city’: these include a social housing programme, and other programmes.

Within the masterplan a number of Special Areas for Social interest (henceforth AEIS) have been defined. In these areas the public authority can define standards for use and functions, specifically addressing social housing and community equipment (PMPA, 1999; Miron, 2008; Allegretti, 2000). The plan has been considered ambitious, but it has also been criticized because of potential risks in terms of economic exploitation and speculation (Vargas, 2003).

1.2 *The ‘neighbourhood-city’ (bairro-cidade) named the 4th District*

The so called 4th District is a large area (600 ha) of the city, that includes a number of neighbourhoods (*bairros*) (Humaitá, Farrapos, Navegantes) (Figure 1), and originated from the fast development process

in the first half of the 20th century (Fortes, 2001; Toscan Pittelkow Contassot, 2014). Deeply affected by environmental risks and never fully recovered from the 1941 floods, it is genetically fragile and suffers from a “cluster” condition with a lack of density and connections; even so it has been surrounded by a number of important infrastructures (airport, highways and railway) to connect the city to the region and beyond. It has historically attracted internal and external migrations (Fortes, 2001), and its social fragility is reflected into a number of informal urbanizations and “favelas”. Different strategies and plans have been put in place to regenerate the area, including those provided by the new masterplan (PMPA, 1999) and specifically by the PIEC program.

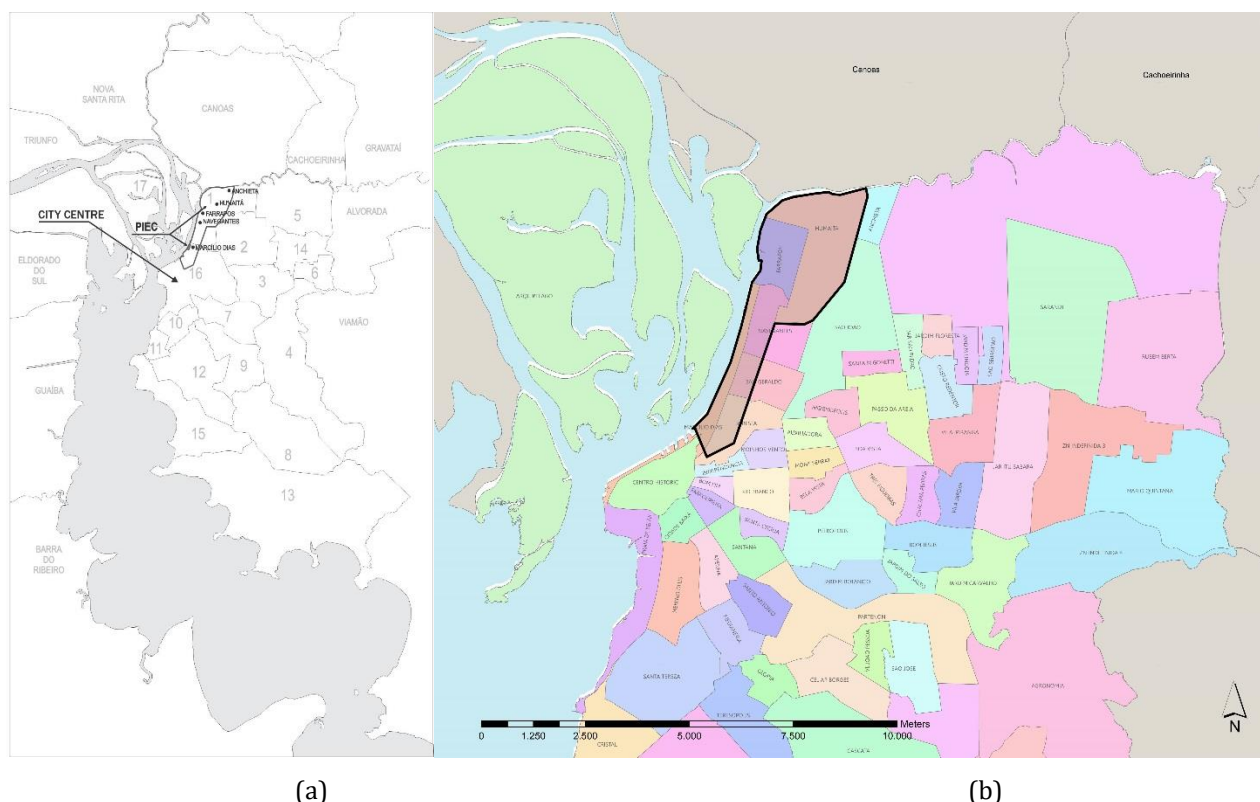


Figure 1: Porto Alegre and PIEC area of intervention. (a) The whole city facing the lake Guaíba; (b) The city districts (bairros) and PIEC area. Source: Prefeitura Porto Alegre, edited by authors

1.3 The “PIEC” City Entrance Integrated Programme

The integrated programmes were defined as urban scale devices in the framework of the 1999 PDDUA (PMPA, 1999) to improve the quality of life in socially and environmentally vulnerable neighbourhoods. The integrated programmes involve various secretariats of the municipal government and seek to jointly solve problems of: housing; sanitation; sports equipment, health, education and culture; road system and infrastructure. The City Entrance Integrated Programme (PIEC) is an ‘integrated’ urban regeneration project started in 2002 and coordinated by Porto Alegre’s City Council that includes 13 AEIS (Miron, 2008). It targets a large area included in the 4th District, where several irregular settlements of families coming from the countryside were already established (Tillmann et al., 2011), occupying spaces once designated to the implementation of new roads and the enlargement of existing ones.

These irregular settlements (those in which the occupants are not land owners and do not have any legal contract assuring their permanence in that land) (PMPA, 2004) do not have adequate urban infrastructure and offer insalubrious conditions to its inhabitants.

Thus, the PIEC's overall aim is to regenerate that area, improving the connections with the city centre, providing environmental recovery and making sure that families are relocated to safe settlements nearby and included in the "formal" society. The PIEC Programme main goal (Rocha et al., 2009) is to improve the quality of life of the population in the northern neighbourhoods of the city.

To enable that, six complementary interventions have been planned. Social Housing projects (62.63% of the overall budget), road infrastructures (26.02%), Landscape (1.57%), Social Project – job and income generation (2.30%), Social Projects – community development (1.42%) and management (2.43%) for a total investment of \$55 million USD funded by different organizations (Habitar Brasil BID, Fonplata, Concepa, BID and Porto Alegre City Council) (Miron, 2008).

Moreover PIEC's conception has been strictly related to PB: the City Council Staff have considered that model to combine the planning and population needs with the funding bodies' requirements (Miron, 2008). Even if there have been initially frequent initiatives to involve Community leaders in consultations, then these progressively decreased because of changes in the administration.

As the project has been organized in different phases (e.g. first one concluded in 2004), an overall summary of the interventions completed is needed to better understand the complexity and the amount of works that has been delivered.

The PIEC programme initially addressed housing projects on 22 different sites, targeting 14,700 people and 3,775 families (PMPA, 2002). In 2014 it has delivered 1624 Housing units (PMPA, 2014). It has also delivered the 96.64% of the works on roads and landscape, including the refurbishment of 25 squares and other public spaces. Moreover it has delivered meaningful Social Projects for job and income generation targeting 1,290 people (46.65% delivery rate), and other community development projects (66.10% delivery rate) (Table 01).

The results of the post occupancy evaluations show that the PIEC project has had a very positive impact on the population (Tillmann et al., 2009). There is evidence the entire area (at least Farrapos neighbourhood) benefited from the urban regeneration process.

Table 1: PIEC program: sites and works planned and delivered

PIEC areas	budget	Sites and works planned	Target population (PMPA, 2002)	Sites and works delivered (PMPA, 2014)	Population targeted (PMPA, 2014)
Housing		22 housing projects on different urban areas (sites)	20 irregular settlements (slums) registered by PMPA (2000-2001) 3,322 housing units 3,477 families 12,872 people (new houses) 298 housing units 298 families 1,828 people (site urbanization) 3,775 families (total) 14,700 people (total)	Vila Tecnológica	61 HU
				Por do Sol	130 HU
				Progresso	222 HU
				Arco Íris	163 HU
				Santa Teresinha	*277 HU
				A.J. Renner	61 HU
				Bela Vista	124 HU
				Jardim Navegantes	190 HU
				Nova Esperança	105 HU
				Nossa Senhora da Paz	75 HU 19 Lots
				Nossa Senhora da Paz Urb.	16 HU 96 Lots
				Casas de passagem	200 HU
Site urbanization	- 298 Lots				
			52.80% executed	1,624 HU	413 Lots
Infrastructure projects		Infrastructure works on 10 roads and streets	31,964 people	96.48% executed	9 roads / streets and drainage system

				recovery
Landscape project	Recovery of 25 squares and Mascarenhas de Moraes Park; New squares in urban areas; Linear garden along freeway	31,964 people	96.64% executed	25 squares recovered Mascarenhas de Moraes Park recovered
Social Project - job and income generation	2 units of solid waste separation; cooperative of production and service; centre to support regional economic development;	1,290 people	46.65% executed	2 units of solid waste separation delivered
Social Project - Community development	2 community development centres; 4 preschools, day care centres; 4 residents' association; Expansion of municipal school	14,700 people	66.10% executed	Expansion of municipal school delivered 4 preschools, day care centres delivered 4 residents' association offices delivered

**Delivered in two phases: 12/2006 = 214 HU and 06/2008 = 63 HU*

Source: Miron (2008), Formoso and Miron (2008), PMPA (2002), PMPA (2014)

2. AIMS, OBJECTIVES AND METHODOLOGY

The research methodology is based on various data collection and methods, both quantitative and qualitative. Social and economic data was collected from official statistics and governmental sources. Planning documents, maps and complementary information have been provided by or accessed through City Council official documents. Informal interviews has been delivered through field work: direct observation and contacts with City Council staff and community leaders were carried out in March 2015 and May 2016.

Together with quantitative outcomes (2002-2014) the paper draws on the results of previous studies, as series of Post Occupancy Evaluations (henceforth POE) carried out in 2006-2008 in five different urban areas to establish satisfactory and un-satisfactory features of the project and to define possible ways of improvement. Moreover, an investigation on retention rates have been carried out in different times (2006, 2008 and 2013) showing recent trends in internal population displacement.

While the outcomes in terms of improvement and shortcomings on housing units have been widely analysed, a further reflection on the impact of POEs at urban scale, and the links with the agenda set by the masterplan is addressed through this paper.

The findings draws on the shortcomings and the fragility of the planning process. The paper, by critically analysing the outcomes of the regeneration process, relates to recent urban trends including informal urbanisation, social and ecological fragility. Finally, it provides key directions for further research activity.

2.1 Research methods and sources of evidence

The post occupancy evaluations (POE) are based on data collection already carried out in researches (Miron, 2008; Formoso and Miron, 2008; Miron, 2014) (Table 02) but data have been interpreted, synthesized and differently organized throughout the paper. Retention rates takes also into

consideration more recent data collection and research studies (Miron, 2014).

The survey questionnaire was organised in four parts (Miron, 2008). The first part addressed the household profiles portrayed by the same variables employed in the register questionnaire (PMPA, 2002). The second part consists in two open questions which are used in order to identify the best and worst (importance) features of living in the PIEC allotments perceived by the households/residents. The third part included approximately twenty four closed questions with a five-point satisfaction scale concerning the PIEC Programme attributes (features). The fourth part explored the retention of the target population in the PIEC housing projects. It was made up of six open questions and six closed questions that explore the most important reasons for staying and leaving the PIEC housing units. A Cronbach's Alpha test was also performed for assessing the internal consistency of the survey questions. The retention measurement (2006, 2008 and 2013) has been collected taking into consideration two variables and the information in the POE questionnaire. The first one is residence time (which should be the same time of occupation of the housing project from house delivery to data collection); the second is the origin of the previous housing (which should be some of the informal settlements/slums registered by the municipality in identifying PIEC beneficiaries). If the two variables correspond to the expected results, that housing unit has been considered resident belonging to the original PIEC register. The retention construct was calculated as the ratio between the numbers of households of the target population (i.e., households from original PIEC register or informal settlements) over the total number of households of each allotment (from the informal settlements or not).

Table 2: POE and retention rate: data collection samples, main statistical tests and sources.

Data collection	2006	2008	2013	Statistical Tests and measures			
Housing Areas	3	2	3	Satisfaction		Retention	
Population	413	377	413	Correspondence analysis (Hair et al., 2005), Chi-square test (Everitt, 1992), analysis of adjusted residuals (Everitt, 1992), Analysis of frequency (percentage)	Nonparametric test (Bradley, 1968), Multiple comparison appropriate to Friedman test (Bradley, 1968), chi-square test (Everitt, 1992), ranking (Bradley, 1968)		
Sample collected	159	124	80				
Publications related	Miron (2008)	Formoso and Miron (2008)	Miron (2014)				

3. DISCUSSION

3.1 Post Occupancy Evaluations' outcomes and the urban scale

The POEs have been carried out in: namely Vila Tecnológica, Por-do-Sol, Progresso, Arco-Iris and Santa Teresinha (Figures 2,3,4,5,6). The most mentioned best feature among the five different neighbourhoods is the urban environment particularly when referred to localization, the quality of public spaces and the social relationship with neighbours. Another positive feature is the presence of urban basic infrastructures including electricity, water, bin collection (table 03).

The satisfaction survey shows also some meaningful results: in all of the five areas, for example, urban services are acknowledged as the best features. But there are also other meaningful positive results referred to, for example, participatory process (both PB and specific PIEC meetings).

However, from the open-question survey the most mentioned as worst feature when referred to security of the urban area (2 neighbourhoods out of 5). Urban services have been also evaluated as worst feature

in one area out of 5, but probably this is referred to the fact the project was not completely built at the time of the survey (neighbourhood Progresso). Other issues are related to lack of parking areas. In terms of users' dissatisfaction, the main issue refers to the urban area with reference to parking spaces and again to security (4 neighbourhoods out of 5).

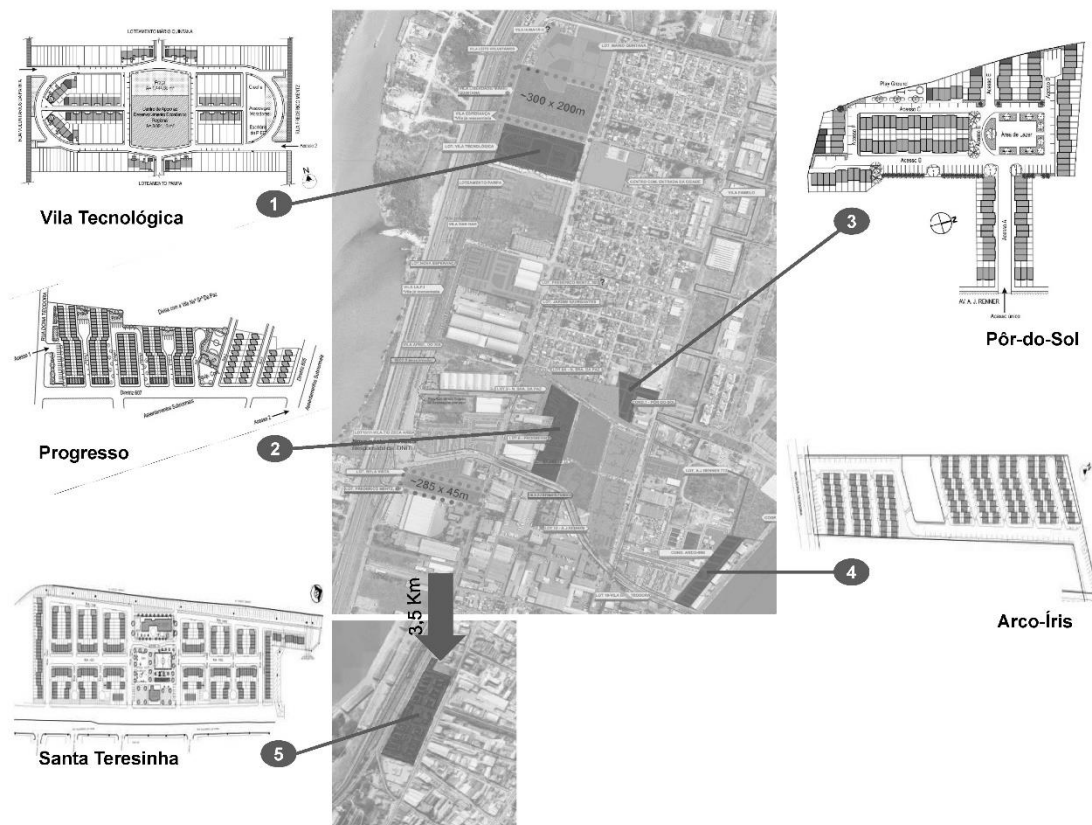


Figure 2: PIEC and housing areas where the POEs were delivered. *Source: Prefeitura Porto Alegre, edited by authors*

In conclusion, the results show how PIEC has been a successful project in terms of upgrading environmental and social conditions in deprived and poor areas. It has provided basic urban infrastructures, housing units and community services to large number of families. That is confirmed by the POE that indicates features with very high levels of satisfaction, with specific reference to infrastructures and urban services. However, there are shortcomings that shall be addressed in the progress of the project: they may require amendments to planning policies (quantitative or qualitative), design features and long-term project management.

Table 03: Results of post occupancy evaluation, overall summary

	VILA TECNOLÓGICA	POR-DO-SOL	PROGRESSO	ARCO-IRIS	SANTA TERESINHA
Sample	35	56	68	61	63
Data collection date	11/2006	11/2006	11/2006	06/2008	06/2008

Best features	Urban area (63): (18) Location (16) Neighbours relationship (15) Common areas Urban services (41)	Urban area (80): (33) Neighbours relationship (15) Location (14) Common areas Urban services (51)	Urban area (88): (28) Neighbours relationship (19) Security (18) Location Urban services (55)	Urban area (76): (27) Neighbours relationship (19) Location (19) Common areas Urban services (36)	Urban area (58): (21) Location (14) Neighbours relationship (13) Common areas Housing Unit (43)
Worst features	Urban area (28): (14) Security	Urban area (49): (25) Neighbours relationship (14) Common areas	Urban services (57): (18) Streets (12) Bin collection (11) Drainage	Urban area (83): (25) Security (24) Common areas (19) Adequacy	Urban area (83): (57) Security (26) Drug trafficking (21) Police
Best satisfaction	Urban services: 100%-91.4% (5 subcategories) Social Project: 100%-85.7% (4 subcategories)	Urban services: 98.2%-94.6% (5 subcategories) Social Project: 100%-74.2% (4 subcategories)	Urban services: 98.5%-61.8% (5 subcategories) Social Project: 88.9%-72.7% (4 subcategories)	Urban services: 98.4%-83.6% (5 subcategories) Social Project: 94.1%-60.0% (4 subcategories)	Urban services: 95.6%-60.3% (5 subcategories) Social Project: 84.2%-73.1% (4 subcategories)
Worst satisfaction (Dissatisfaction)	Urban area: 56.7% Parking 54.3% Security	Housing Unit: 58.9% Kitchen Urban area: 48.1% Parking	Urban area: 61.8% Security 56.3% Parking Urban services: 33.8% Sewerage	Urban area: 86.5% Parking 62.1% Playground Housing Unit: 68.9% Courtyard	Urban area: 42.9% Parking Housing Unit: 36.8% Kitchen 35.7% Stairs
Built Improvements	42.62% Protection	49.53% Coatings	36.97% Coatings	47.44% Coatings	54.26% Protection
Intended Improvements	55.36% Expansions	41.44% Expansions	49.22% Expansions	53.85% Coatings	38.28% Coatings
Important features to stay (numbers in Rank)	2.76 Urban services 2.83 Housing space 2.97 Social work	2.76 Urban services 2.95 Friendship 3.04 Association	2.31 Urban services 2.82 Friendship 3.04 Association	2.23 Urban services 2.82 Friendship 3.06 Association	2.29 Urban services 2.96 Housing space 3.05 Friendship
Reasons to leave (Problems with)	30.43% Adaptation 30.43% Taxes, bills 17.40% Violence 13.04% Illegal selling	41.5% Adaptation 19.5% Taxes, bills 19.5% Illegal selling 17.1% Neighbours	55.2% Taxes, bills 27.6% Adaptation 15.5% Illegal selling	41.81% Taxes, bills 18.18% Violence 12.72% Neighbours	23.53% Violence 21.57% Taxes, bills 19.6% Illegal selling

Sources: Data collection of 2006 by Miron (2008) and Data collection of 2008 by Formoso and Miron (2008).

3.2 Social housing retention rate

In 2014 PIEC has already targeted 1,408 families and 5,477 people, and the retention rate is a meaningful indicator of housing and regeneration project outcomes, as it relates to the delivery of new housing units. This is particularly meaningful in PIEC case study so if the retention has a high rate it suggests some better quality of life has been achieved (Formoso and Miron, 2008), especially for population previously settled in informal areas.

The retention rate varies from 70% to 79% in the five housing projects (2006-2008) (table 04). At the same time that this data was collected a survey was completed to reveal the most important reasons for leaving or staying. The most frequent reason for keep staying in the houses was (1st preference in 5/5 interventions) the presence of urban infrastructure services (water, electricity, sewerage). But other

reasons are the friendship with neighbours (2nd and 3rd preference in 4/5), house space (2nd preference in 2/5) and the presence of residents' associations (3rd preference in 3/5) (table 03).

By contrast, the most frequent reason for leaving the housing unit was the need to pay taxes and bills (social house leasing, electricity and water bills) (1st preference in 3/5) and problems related to adaptation to project (1st preference in 2/5). But also it is important to register how money offers (for illegal selling of housing owned by the City Council) were already present as reasons to leave in 4 out of 5 areas (table 03).

But from a more recent data collection operated in 2013 (Miron, 2014) the retention rate has fallen significantly. Even if the survey is less detailed than the previous ones, the trend is shared between the different projects, and the results show an increasing displacement (table 04).

Across the three interventions that have been surveyed again, it is possible to estimate that 232 housing units changed residents, and this means approximately 902 people were displaced out of the original 1239 (72%). On the basis of Farrapos census data (IBGE, 2010) this means a range between 4.25% and 5.25% of the overall resident population. PIEC staff assumes this population has moved back to illegal or informal settlements, probably close to where they were previously living. Given the circumstances in which these data are collected, it is impossible to provide better evidence of this phenomenon. However, there is sufficient evidence to show how the retention rate is deeply affected by local governance and planning policies, applied to socially and economically fragile contexts.

Table 04: Retention rate in PIEC selected housing sites.

	VILA TECNOLOGICA	POR-DO-SOL	PROGRESSO	ARCO-IRIS	SANTA TERESINHA
Number of housing units	61	130	222	163	214
Housing delivery date	05/2003	11/2003	03/2004	03/2007	12/2006
Data collection date	11/2006	11/2006	11/2006	06/2008	06/2008
HU surveyed - Sample	35	56	68	61	63
RETENTION RATE	77%	79%	71%	70.5%	72.05%
Data collection date	11/2013	11/2013	11/2013	-	-
HU surveyed - Sample	19	21	31	-	-
RETENTION RATE	68%	24%	48%	-	-

Sources: Data collection of 2006 by Miron (2008); Data collection of 2008 by Formoso and Miron (2008); Data collection of 2013 by Miron (2014).

3.3 Urban growth and social inequalities

Brazil and Porto Alegre's economy has partially recovered from the global financial crisis of 2008 (Serrano and Summa, 2011). The construction sector started growing again: in the state of Rio Grande do Sul the Construction Index has been growing since 2010 and it seems to be more stable than other economic indexes (State PIB, VAB, VAB Industry) even if it is lower than the national index (SINDUSCON-RS, 2013).

Moreover, the financial sector associated with housing construction is growing at a very high rate. The number and the amount of housing mortgages through the two different programmes (SBPE and FGTS) dramatically increased in 2013 by 19.4% and 7.42% in 2012 (SINDUSCON-RS, 2013). There is evidence that economic growth after the financial crisis is still based on the civil construction sector and on real estate development.

Housing deficit is another meaningful indicator for Brazil's urban condition: from 2007 the deficit at national level has decreased from 10.00% to 8.53%, and in Rio Grande do Sul decreased from 7.1% to 4.8% (Fundação João Pinheiro, 2015). In the Porto Alegre Metropolitan region this index has dropped from 8.8% to 5.2%. There is an estimated deficit of 74.575 housing units in 2012 (SINDUSCON-RS,

2013): the issue of “housing” has been reducing in the last decade, but it is not still solved. In Porto Alegre’s construction private sector the sold houses have been 5.172 in 2013, 8.86% more than in 2012 and more than the average of the last five years (5.017/year). The selling speed index (8.17%) is higher than in the 2003-2006 period, but still far from the high rates of 2007-2010 (SINDUSCON-RS, 2013). The stock of unsold houses dropped in the last year, showing that the market is still dynamic and there is still demand for housing units.

The 4th District is positively involved in the construction sector’s growth and Porto Alegre development: as in 2008 the 52.2% of dwellings on the market was concentrated in five neighbourhoods, 14.2% were in Humaitá (PMPA, 2008a). Moreover, due to favourable economic conditions and the world cup event (2014) private developers found other opportunities to invest in the area: the new Arena do Grêmio (stadium) and related commercial activities has been estimated at \$330 million USD invested.

Other official statistics show how macro data on urban services, census and quality of life have benefitted from development and economic growth. In Porto Alegre the level of basic infrastructure services is very high: 84% of housing is connected to the sewerage system; 99.5% receive treated water; 98% electricity; and 100% of the suburbs are serviced by selective waste collection (Smolka & Damasio, 2005). The urban infrastructure upgrade has been largely funded through Participatory Budget: sewer and water connections increased from 75% of households in 1988 to 98% in 1997.

The population has been constantly growing, from 1,360,590 (IBGE, 2003) to 1,409,351 inhabitants in 2010 (IBGE, 2010). This growth has been particularly meaningful in some neighbourhoods (Lomba do Pinheiro, Mario Quintana, Rubem Berta, Teresópolis). From 2000 to 2010 60% of the city’s population growth was concentrated into two suburban neighbourhoods, while the rest of the neighbourhoods are slowly growing or even decreasing. In 4th District, Humaitá has grown from 10,470 to 11,502, Farrapos from 17,019 to 18,986 but Navegantes has decreased its population from 4,475 to 4,322 (PMPA, 2011).



(a)

(b)

Figure 3: PIEC programme and its implementation. (a) Vila Tecnológica, and (b) Progresso neighbourhoods. *Source: authors*

Looking at urban density the 4th District has been increasing as a result of PIEC programme and other private developments: Farrapos neighbourhood reached a density of 115.67 person/ha (Observa POA, 2015), while the Vila Tecnológica site has a density of 140 persons/ha, and the private development called ‘Jardin Residence’ reaches 280 persons/ha. Even if this has been considered a positive effect of urban regeneration process (Castello & Castello, 2008) the effects of these selected islands of density should be better evaluated in terms of overall urban framework and services.

In spite of generally positive trends, there are also some figures that are negative: part of the population

is living in a number of irregular or illegal settlements and it was estimated that the annual population growth in these areas is 4%, while for the entire city it is 1.35% (Smolka & Damasio, 2005). This is meaning that, even if the basic infrastructures are widespread across the town and with a successful participatory budget in place, irregular settlements are still growing more than the planned city.

Recent data shows even more evidence of the current trend: in Porto Alegre the population in the favelas has grown from 143,292 to 192,843 (2000 -2010), from 10.53% to 13.68% of the population with an increase of 29.91%. In the “Humaitá/Navegantes” urban region (including six neighbourhoods and 43,689 inhabitants) the population living in *favelas* has grown from 6,237 to 9,225, (from 14.82% to 21.23% of the population) with an increase of 43.25%. More detailed data is also available for neighbourhoods (2010): in Humaitá the population in favelas was 1,259 (11.3% of the population) while in Farrapos was 7,775, corresponding to the 41% of the population (Observa POA, 2015). Despite the positive economic trends, housing needs, informal settlements and internal people displacement are still key issues in Porto Alegre’s development.

3.4 Urban growth and environmental concerns

The City Council recently approved the realization of a new stadium (Arena do Grêmio), that was considered as a mixed functions development but in reality is mono-functional and event-related place, and there is little evidence of positive effects on the neighbourhood.

The City Council approved also a new private development on the side of the stadium: it is under construction (March 2015), with high rise buildings and it already looks like a gated community for middle class. Most of all, it has been an area originally allocated as AEIS (PMPA, 2006) and recent investigations are revealing doubts on the transparency of the entire planning process.



(a)

(b)

Figure 4: PIEC programme and its implementation. (a) Por do Sol. (b) Arco Iris. *Source: authors*

In Humaitá there are also other recent private developments approved after the original PIEC plan: the “Jardin Residence” development, is arranged as a gated community (Lara, 2011) with single family houses and some shared spaces. It targets middle class and it is enclosed within walls with just one entrance: the physical arrangement shows the clear meaning of division with the surrounding town. Not far from this development, also in front of the main park of the district, other gated communities have been built (2010-2015) on both sides of R. Martins Silva (“Residence Verdi”) with medium rise multifamily buildings. The amount of non-built areas is rapidly decreasing, as the City Council has been

approving a number of new schemes that were not included in the PDDUA or in the PIEC programme. The extent and the position of these schemes may impact on the general environmental balance of the district, especially in relationship to potential floods that are frequent in the area and potentially disruptive as it was in 1941.

In addition to that, within the PIEC area 33% of settlements were mapped as irregular in 2000, representing 4.53% of total irregular settlements in the city (Tillmann et al., 2011). These are particularly set in Farrapos and Humaitá, especially along infrastructures and fringes areas.

What is most worrying is that new illegal occupations are still taking place, for example in Av. Ernesto Neugebauer. The illegal occupation (Allegretti, 2000), has been organized with very small plots of land divided into different dwellers, but with no basic urban infrastructures. These kind of phenomena happen very quickly and in similar ways in different Brazilian towns (Gutberlet & Hunter, 2008). Government officials usually come to know about these when already settled: as a matter of fact in Porto Alegre City Council staff did not know about this illegal occupation.

These circumstances confirm (Gutberlet & Hunter, 2008; Allegretti, 2000) that urban policies on informal settlements (Fernandes, 1997) have been introduced in national law but should be reinforced by local actions and housing alternatives. When these measures, delivered at local level, are slowing down or not properly delivered, the rush towards illegal occupation does not stop.

4. CONCLUSION

The PIEC programme was supposed to deliver most of the goals set by the PDDUA. As a matter of fact, it delivered a significant number of housing units and infrastructures, together with extensive participatory practices, social and economic care for local residents. However, the PIEC project itself has been subject to political decisions (Baierle, 2007). It is recognized that in the years social housing delivery slowed down (PMPA, 2014). Lack of political support, discontinuity and decreased speed of delivery provide evidence of the fragility in local governance and planning processes. Moreover, these provide evidence of the effects of changes in urban policies on long-term regeneration projects.

In this respect, the achievements of PIEC are well recognisable through POEs, especially in terms of urban and infrastructural features. Shortcomings have been also highlighted through different means, and provide substantial elements to potentially improve the following stages of the project.

However, low retention rates show a major drawback effect and the inefficacy of planning on long term. As it is likely that those residents have moved back to irregular or informal settlements, this fact represents a major concern in terms of social as well as environmental impact.

The paper recognises how city wide housing needs has not been sufficiently reduced, and informal urbanization has still been growing at a higher rate than the formal one. These elements, together with neo liberal practices of real estate development, provides a deeply worrying picture of increasing social inequalities, on the top of which specific environmental concerns are associated with the most vulnerable areas.

Studies of this kind can provide evidence of sustainability and long term impact in urban regeneration projects. Mixed methods demonstrate how to tackle complex issues, at city and district scale, and provide a basis for further explorations, also in comparative terms.

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