A Q Methodology approach to define urban sustainability challenges in a small insular city

Ana Fuentes Sánchez[1], Fabíola Sabino Gil[1], Luisa Alamá Sabater[2] Tomaz Ponce Dentinho[1]

[1]Unviversidade dos Açores .Departamento de Ciências Agrárias.

[2]Universitat Jaume I. Institut Interuniversitari de Desenvolupament Local

e-mail: anasanchez@uac.pt , fabiolagil@uac.pt, alama@eco.uji.es, tomazdentinho@uac.pt

Abstract

The objective of this paper is to define what problems the city of Angra do Heroísmo (Terceira Island, Azores) faces in what regards urban sustainability, so as to improve the quality of life of the residents and to ensure the adequate growth and progress of the city in all areas, as possible. The main themes approached in this work were urbanism, the city's current development level, public security, environment, culture and education, economy, funding, governance, migration, public participation and poverty. Selected stakeholders ranked statements pertaining each of these themes, from which we extracted three distinct social perspectives, one concerned with employment and the recovery of the city, another that praises the quality of human resources and a third that trusts the quality of the social infrastructure.

All perspectives seem to agree that there are no public security problems in Angra, and that rebuilding is a more sustainable option. They also believe that there is adequate support for migrants, good dialogue between public bodies and social organizations, and that the population is willing to play a greater role in the city's governance.

Key-words: urban sustainability, q methodology, stakeholder perspectives

Introduction

A sustainable city is "a city where achievements in economic, social and physical development are made to last" (Soegijoko et al., 2001). Thus, urban sustainability can be seen as a desirable state of urban conditions that persists overtime (Adinyira, Oteng-Seifah & Adjei-Kumi, 2007). The concept is often characterized by issues such as the

proper use of resources to guarantee a generational equity, protection of the natural environment, minimal use of non-renewable resources, economic vitality and diversity, community self-reliance, individual wellbeing, and satisfaction of basic human needs (Choguill, 1996; Hardoy, Mitlin, & Satterthwaite, 1992).

In the same line of thought, the European Commission (2006) defines urban sustainability as the challenge to "solve both the problems experienced within cities and the problems caused by cities," recognizing that cities themselves provide many potential solutions.

On the other hand, urbanization is defined by the United Nations as movement of people from rural to urban areas (2004). The rapid urbanization is often at the expense of the loss of valuable ecosystems and lands for satisfying the urban demands. In the case of Angra, it is the precious arable land along the coastal zone. Moreover, if the current and future urban areas continue with the same resource consumption practices without regarding the future needs, serious environmental, social and economic problems are expected (Daily, 1997; Millennium Ecosystem Assessment, 2003).

The magnitude and significance of sustainability indicators has received much attention in recent years, but their real use in measuring urban sustainability performance is at an initial stage. Descriptive indicators, illustrating the status of the environment and based on real, concrete physical measures, are easier to establish and interpret by judging them against specified benchmarks and thresholds. Mega and Pedersen (1998) suggest performance indicators based on policy principles and goals such as citizen participation, urban safety, public health, social justice, global change, urban metabolism resources consumption, urban mobility, economic growth, city deficit, employment, and environmental and social expenditure.

However, urban sustainability is a hot topic on which there is no established baselines for analyzing, evaluating and comparing challenges, objectives, and the policies adopted to face them (Legrand et al., 2007; Planque & Lazzeri, 2006; Kahn, 2006).

Angra do Heroísmo is a small insular city located in the Archipelago of the Azores, Terceira Island, Portugal. This archipelago is composed of nine volcanic islands situated in the middle of the North Atlantic Ocean, and has 5 cities, two of which are located in Terceira (the other Terceira city is Praia da Vitória). Angra, alongside with Ponta

Delgada (São Miguel Island) and Horta (Faial Island) are the chief administrative cities of the Regional Government of the Azores (RGA).

In 2009 the population of the Azores was of around 245,374 inhabitants a density of 100.28 inhab/km². The main industries are: agriculture, dairy farming (for cheese and butter, primarily), minor livestock ranching, fishing and tourism, which is becoming a major service activity in the region. In addition, the RGA is responsible for employing a large percentage of the population, directly or indirectly, in many of the service and tertiary sectors. Foreign trade is small and consists chiefly in the exportation of beef, dairy products and some fish.

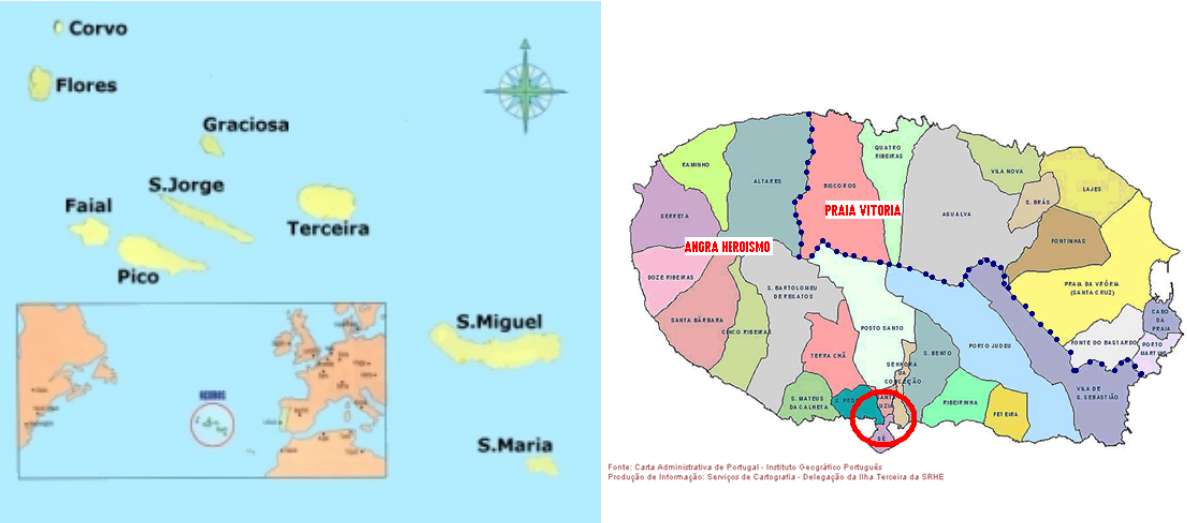

Figure 1: The Azores; Terceira Island.

Terceira is the second most populous island of the Azores and the city of Angra with around 21,300 inhabitants is the second largest city of the archipelago (data SREA 2008).

Angra's location within the Azores and in the Azores implies certain challenges. Like the rest of the Azores, the geographical distance from the mainland offers some challenges to exportation, innovation, etc, but it also has some advantages granted by its geostrategic position: historically, Angra (founded in 1474) was an important city for ships transiting between continents to gather supplies and water, thus becoming a trade center and a fairly cosmopolitan and rich city. This rich past was reflected in the classification of the city as a World Heritage site by UNESCO in 1983.

With the development of better sea-faring technology the city lost its importance but more recently, the island regained some of this affluence and exposure to foreign influence with the building of the airport by the British during the Second World War and subsequent installation of an American Military Base which still functions to this day.

The geographical configuration of the island, roundish and relatively flat, facilitates communications between all peripheral points and with the airport and the other city, Praia da Vitória, which now has the island's major commercial port.

The city's long history and its changing fortunes have left their marks on the urban structure and the more recent years, where a wealth of new challenges and possibilities emerge require some reflection on the mid and long term sustainability of Angra.

Faced with the multitude of issues that the city faces, we resorted to Q Methodology to discern social perspectives amongst relevant stakeholders.

Methodology

Q methodology (Stephenson, 1935; Brown, 1980) was chosen for this study because it allows to make explicit distinctions on the different social perspectives that emerge from the various stakeholders on a given topic and to quantify the subjectivity of the respondents using statistical techniques (Clarke, 2002; Berejikian and Dryzek, 1993, Ellis et al. 2007; Van Eeten, 2001; Webler et al., 2001). Unlike traditional opinion surveys, respondents are free to relativize the issues, by sorting them by their importance. In addition to informing decision makers about opinion currents, the Q-methodology can also be used as a starting point for the application of other methodologies aimed at public participation and to lay the groundwork for a dialogue. Q methodology has been applied by several authors to identify perspectives on citizenship, public interest, environmental policies and quality of participatory processes (e.g., Barry and Proops, 1999; Davies and Hodge, 2007; Swedeen, 2006; Webler et al. 2001; Wolsink, 2004).

The first step of the application of the Q methodology (Figure 2) is the collection of all views about the issue under study by conducting semi-structured interviews with well-

informed stakeholders. Other sources such as media information or previous studies can also be used, with appropriate safeguards to prevent bias in the selection and acquisition of the information.

From the collected statements a subset is chosen which should be representative, balanced and accurate. The Q Statements should not contain contradictory concepts and, when possible, should be expressed in the words of the interviewees, to better reflect the local discourse.

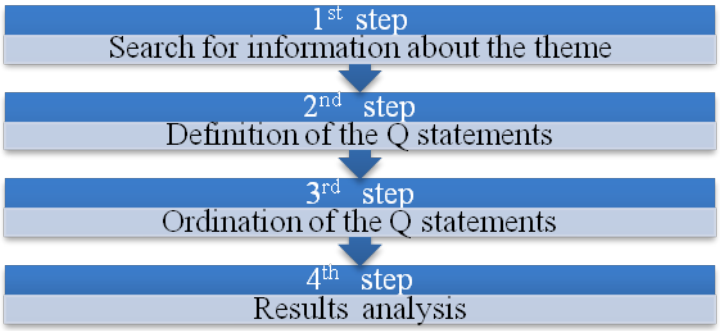

Figure 2. Steps of the application of the Q methodology.

This set of statements is then placed in cards and presented to a second set of stakeholders/respondents, who rank them according to the importance they attach to each of them, using a scheme such as the one presented in Figure 3, used in this study, where the far right (column 4) should hold the card with which the respondent agrees the most, followed by other statements in the remaining columns until, in the leftmost column (-4) is placed the card with which the responded agree the less.

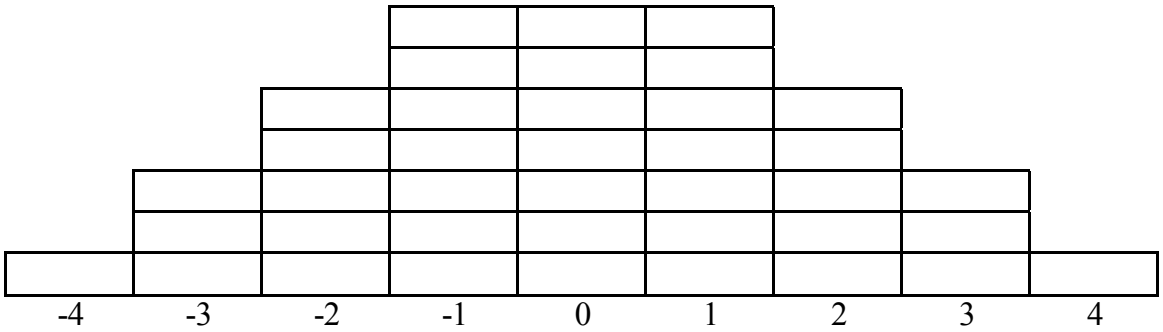

Figure 3: Pyramid shape

The data collected are then processed resorting to Principal Component Analysis (PCA), which results in factors, translated as groups of opinion or social perspectives.

In the present study, we chose different indicators of urban sustainability for study: the city's current development level, public security, environment, culture and education, economy, funding, governance, migration, public participation and poverty. From these themes, we extracted 39 Q Statements, presented in Table 1.

Table 1. Q Statements.

Q STATEMENTS
It is better to live outside the city instead of urban areas. (1)
The historic center needs urban action. (2)
There are many empty houses in the historic center. (3)
The citizens are satisfied with the beauty of the streets and buildings of the historic center. (4)
It is best to rehabilitate urban centers than to continue to use non-residential land on the outskirts of the city. (5)
Actions by the city are maintained over time and ensure a lasting change. (6)
In this city there are NO public safety issues. (7)
The city is clean. (8)
Air pollution is a serious problem in the city. (9)
Noise pollution is a serious problem in the city. (10)
This city is committed to the fight against climate change.(11)
Health services in the city are sufficient in quantity and quality.(12)
If we want sustainable cities, we will have to reduce energy consumption. (13)
There is a lack of recycling points in the city. (14)
The residents of this city are pleased with the cultural infrastructures (concert halls, museums, libraries ...). (15)
People are the main source of an intelligent territory. (16)
This city accepts and integrates well social and cultural diversity. (17)
The priority for the city should be to increase the availability and quality of educational infrastructures. (18)
There are few job opportunities in this city. (19)
There are no houses at affordable prices. (20)
The city is innovative in its context and has components of excellence. (21)
The process of housing and urban rehabilitation includes additional measures related to employment and other problems. (22)
The rehabilitation of houses is more profitable than new construction. (23)
If we think about house rehabilitation, the future resale value should be considered. (24)
We should encourage the rehabilitation and revitalization instead of building new houses. (25)
The concentration of economic activity in the city improves its infrastructure and public services. (26)
Municipalities should issue a sustainability report. (27)
The budget for the integration of migrants is appropriate. (28)
The foreign presence is beneficial to the city. (29)
Foreigners are well integrated in the city. (30)
There is a network of associations representing all sectors of the population. (31)
The dialogue between public authorities and social organizations contributes to social cohesion. (32)
The citizens are the protector of the environment and their city. (33)
The residents believe in the concept of sustainable development and good practices. (34)
The population is willing to engage in more sustainable policies in the city, for the harmonious growth of society and the environment. (35)
In this city, poverty is a problem. (36)
There are programs of solidarity and volunteering aimed at vulnerable groups. (37)
The problems of poverty and social inequality in this city has been successfully resolved.(38)
To solve the problems of marginalization in the cities contributes to sustainable development. (39)

Then, for the statement ranking, we selected thirteen stakeholders, representing different social groups: 3 senior officials of the technical council, 3 representatives of the university community, 3 citizens, 2 representatives of associations and 2 representatives of traders.

The data was analyzed data using the Principal Component Analysis (PCA), with VARIMAX factor rotation, performed with the program PQMethod v. 2.11. The PCA reduced the 13 individual perspectives into three factors (or social perspectives, or groups) was interpreted by itself and then was compared with the others, to define the points of agreement and disagreement.

Results

The three perspectives we obtained were marked by specific individuals, signed with an X in Table 2. The model accounts for 55% of the sample's variance.

Table 2: Factor Matrix with an X Indicating a Defining Sort.

QSORT	Perspective A	Perspective B	Perspective C
3 COUNCIL3	0.6141X	0.2318	-0.1448
5 MARKETER 1	0.7521X	-0.0162	0.0427
8 CITIZEN 2	0.7095X	-0.2097	0.3494
9 UNIVERSITY 1	0.7558X	0.0826	0.1691
12 MARKETER 2	0.6201X	0.2313	-0.1305
1 COUNCIL 1	-0.0010	0.7981X	0.1064
2 COUNCIL 2	0.0847	0.7129X	0.3802
7 CITIZEN 1	0.0012	0.4712X	0.2186
10 UNIVERSITY 2	0.2588	0.6880X	0.0784
4 ASSOCIATION 1	0.5510	0.0137	0.5970X
6 ASSOCIATION 2	0.2046	0.2801	0.6804X
11 CITIZEN 3	-0.0884	0.2726	0.6426X
13 UNIVERSITY 3	-0.0368	0.1421	0.6367X
% expl.Var.	22	17	16

There is a low correlation between factors 1 and 2 (Table 3), but factor 3 correlates a little higher with factor one and highest with factor 2 (that is, it is less independent from the remaining factors).

Table 3: Correlations between factor scores

	Factor 1	Factor 2	Factor 3
Factor 1	1.0000	0.1921	0.3114
Factor 2	-	1.0000	0.4533
Factor 3	-	-	1.0000

Perspective A

The higher ranking statement, which is also a distinguishing statement for this group, refers to the economy of the city: "There are few job opportunities in this city (19)" (Table 4). Other statements characterizing this group refer to urban characteristics, such as "The historic center needs urban action (2)", "It is best to rehabilitate urban centers than to continue to use non-residential land on the outskirts of the city (5)" and "There are many empty houses in the historic center (3)". And finally, there is a third group of relevant statements, focusing on funding and governance: "We should encourage the rehabilitation and revitalization instead of building new houses (25)", "Municipalities should issue a sustainability report (27)," and "The concentration of economic activity in the city improves its infrastructure and public services (26)".

Observing the statements with which the respondents grouped in this perspective agree less, we can observe that they refer to the environment, with the suggestion that there is a lack of good habits or proper environmental education (e.g., "The city is clean (8)" and "This city is committed to the fight against climate change (11) rank low) and the lack of civic participation ("The residents believe in the concept of sustainable development and good practices (34)", and "There is a network of associations representing all sectors of the population (31)".

Another point to refer is that the respondents in this group feel that there is a lack "Health services in the city are sufficient in quantity and quality" (12).

Table 4. Highest and lowest ranking statements for Factor 1

Statement	Z- Score	Rank
There are few job opportunities in this city. (19). *	2.166	4
The historic center needs urban action. (2) *	1.516	3
It is best to rehabilitate urban centers than to continue to use non-residential land on the outskirts of the city. (5)	*1.479*	
We should encourage the rehabilitation and revitalization instead of building new houses. (25)	*1.446*	
Municipalities should issue a sustainability report. (27).*	1.186	2
The concentration of economic activity in the city improves its infrastructure and public services. (26) * *	1.146	2
There are many empty houses in the historic center. (3)	1.116	
People are the main source of an intelligent territory. (16) **	*1.059*	
The problems of poverty and social inequality in this city has been	-1.069	-2

successfully resolved.(38) *		
Actions by the city are maintained over time and ensure a lasting change. (6)	-1.165	
There is a network of associations representing all sectors of the population. (31)*	-1.197	-2
The city is innovative in its context and has components of excellence. (21)	-1.204	
This city is committed to the fight against climate change.(11)	-1.409	
Health services in the city are sufficient in quantity and quality.(12)*	-1.457	-3
The residents believe in the concept of sustainable development and good practices. (34)	-1.470	
The city is clean. (8) *	-2.066	-4

(*) Indicates distinguishing statement for Factor 1 at a significance level of P < .01
(**) Indicates a distinguishing statement for Factor 1 at a significance level of P < .05

In the previous table, the statements marked in italic are important to factor 2 and underlined the important ones for factor 3, for positive and negative Z-Score.

Perspective B

Some of the highest ranking statements for Perspective B also rank high in Perspective A, but are placed at different priority levels (Table 5). Perspective B also shares some consensual statements with Perspective C, but on the issues which they value less.

For this group, the most important statement, which is also the most distinctive, is "People are the main source of an intelligent territory (16)." This statement is supported by "The priority for the city should be to increase the availability and quality of educational infrastructures (18)", also referring to culture and education.

The statements which, according to Perspective B, are less representative of the city's reality are divided into two main areas: environment (statements 9 and 10) and economy (statements 19 and 22), as the respondents do not seem to think that in Angra do Heroísmo there are pollution or employment problems. These last statements are reinforced by the statement 36, which states that poverty is not something that characterizes the city.

Table 5. Highest and lowest ranking statements for Factor 2

Statement	Z- Score	Rank
People are the main source of an intelligent territory. (16) *	*2.318*	*4*
It is best to rehabilitate urban centers than to continue to use non-residential land on the outskirts of the city. (5)	*1.853*	
We should encourage the rehabilitation and revitalization instead of building new houses. (25)	*1.547*	
The priority for the city should be to increase the availability and quality of educational infrastructures. (18)	*1.318*	

The citizens are the protector of the environment and their city. (33)	1.294	
The city is clean. (8) *	1.122	2
In this city, poverty is a problem. (36) .	-1.059	
There are few job opportunities in this city. (19).*	-1.247	-3
The process of housing and urban rehabilitation includes additional measures related to employment and other problems. (22) **	-1.318	-3
Noise pollution is a serious problem in the city. (10)	-1.869	
Air pollution is a serious problem in the city. (9)	-2.341	

(*) Indicates Distinguishing Statements for Factor 2 Significance at P < .01
(**) Indicates Distinguishing Statements for Factor 2 Significance P < .05

The statements in italics are also important for Factor 1, and the underlined statements are the statements with the lowest Z-Scores for Factor 3.

Perspective C

This perspective gives very little importance or actually disagrees with statements related to the environment (9, 10 and 11), allowing us to conclude that people in this group do not consider Angra do Heroísmo a polluted city (Table 6). This last idea is reinforced by statement 34, which indicates that the lack of public participation is not a problem.

This group thinks that "there programs of solidarity and volunteering aimed at vulnerable groups" and that poverty is not a problem. Despite the notion that there are many empty houses in the center of the city (3), they do not see their occupation as viable as "There are no houses at affordable prices (20)."

Table 6. Highest and lowest ranking statements for Factor 3

Statement	Z- Score	Rank
There are programs of solidarity and volunteering aimed at vulnerable groups. (37) *	1.689	4
There are many empty houses in the historic center. (3)	1.657	
There are no houses at affordable prices. (20) *	1.472	3
The foreign presence is beneficial to the city. (29)	1.051	
The residents believe in the concept of sustainable development and good practices. (34)	-1.195	
Noise pollution is a serious problem in the city. (10)	-1.315	
In this city, poverty is a problem. (36)	-1.627	
This city is committed to the fight against climate change. (11) *	-2.394	-3
Air pollution is a serious problem in the city. (9)	-2.588	

(*) Indicates Distinguishing Statements for Factor 3 Significance at P < .01

Consensus Statements

As we saw in Table 3 (Correlations between factor Scores), the largest similarities between factors can be expected between Perspectives B and C (45%), followed by Perspectives A and C (31%), and Perspectives A and B (19%).

Table 7. Consensus statements

Statements Q	A Perspective	B Perspective	C Perspective
7* In this city there are NO public safety issues.	-1	1	-1
13* If we want sustainable cities, we will have to reduce energy consumption.	**1**	**1**	**1**
23 The rehabilitation of houses is more profitable than new construction.	0	0	-2
28 The budget for the integration of migrants is appropriate.	-1	0	-2
32* The dialogue between public authorities and social organizations contributes to social cohesion.	1	2	2
33*The citizens are the protector of the environment and their city.	1	2	2
35 The population is willing to engage in more sustainable policies in the city, for the harmonious growth of society and the environment.	0	-1	-1

All listed statements are Non-Significant at P>.01, and Those Flagged With an * are also Non-Significant at P>.05

As expected, there is an agreement between the different groups in statements placed at the center of the pyramid, that is, statements which are mostly neutral. These statements are primarily about civic participation (32, 33 and 35).

Divergences between Perspectives A and B

The greatest divergence by far between these perspectives refers to the economy, where perspective B finds this a trivial matter whereas Perspective A gives it capital importance.

As for statement 9, on atmospheric pollution, for Perspective B, this is utterly unimportant, whereas Perspective A places it in a neutral position. A similar case occurs with the noise pollution statement, but with a minor divergence.

Table 8. Divergences between Perspectives A and B

Statement	Perspective A	Perspective B	Difference
There are few job opportunities in this city. (19)	2,166	- 1,247	3,413
Air pollution is a serious problem in the city. (9)	- 0,159	- 2,341	2,182
Noise pollution is a serious problem in the city. (10)	0,058	- 1,869	1,927
The concentration of economic activity in the city improves its infrastructure and public services. (26)	1,146	-0,726	1,872
The process of housing and urban rehabilitation includes additional measures related to employment and other problems. (22)	0,314	- 1,318	1,631
There is a lack of recycling points in the city. (14)	0,398	- 0,880	1,279
Municipalities should issue a sustainability report. (27)	1,186	- 0,023	1,210
If we think about house rehabilitation, the future resale value should be considered. (24)	0,428	- 0,720	1,148
The historic center needs urban action. (2)	1,516	0,453	1,063

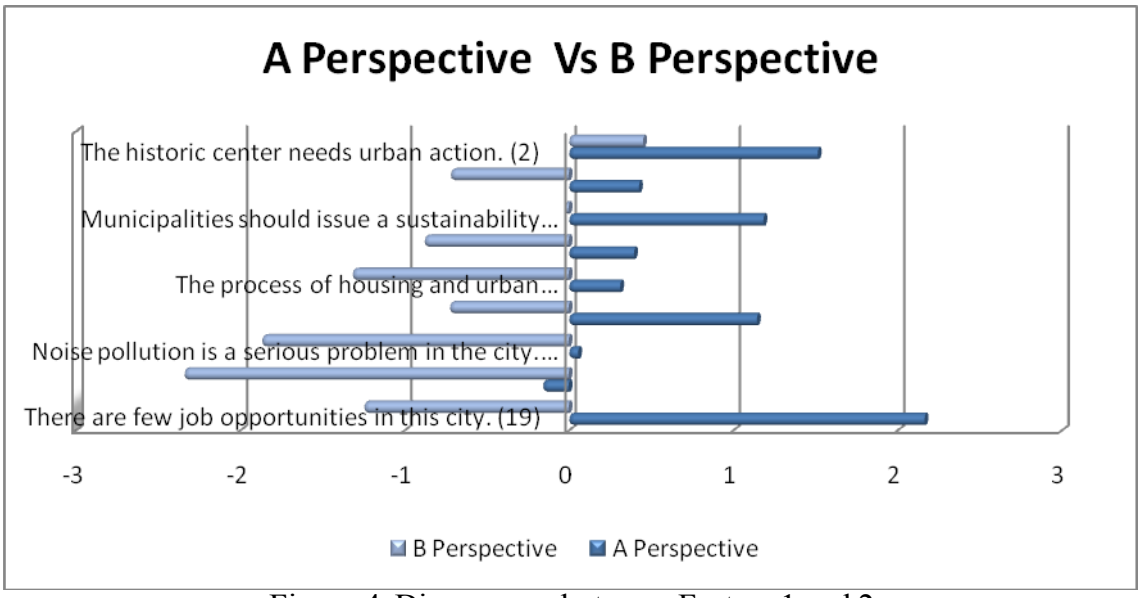

Figure 4. Divergences between Factors 1 and 2

Divergences between Perspectives A and C

The main differences between these perspectives are in what concerns the importance of air pollution as a problem and the need for action in the urban center.

Table 9. Divergences between Perspectives A and C

Statement	Perspective A	Perspective C	Difference
Air pollution is a serious problem in the city. (9)	-0,159	-2,588	2,429
The historic center needs urban action. (2)	1,516	-0,605	2,121
The priority for the city should be to increase the availability and quality of educational infrastructures. (18)	0,904	-0,634	1,538
Noise pollution is a serious problem in the city. (10)	0,058	-1,315	1,373
There are few job opportunities in this city. (19)	2,166	0,805	1,361

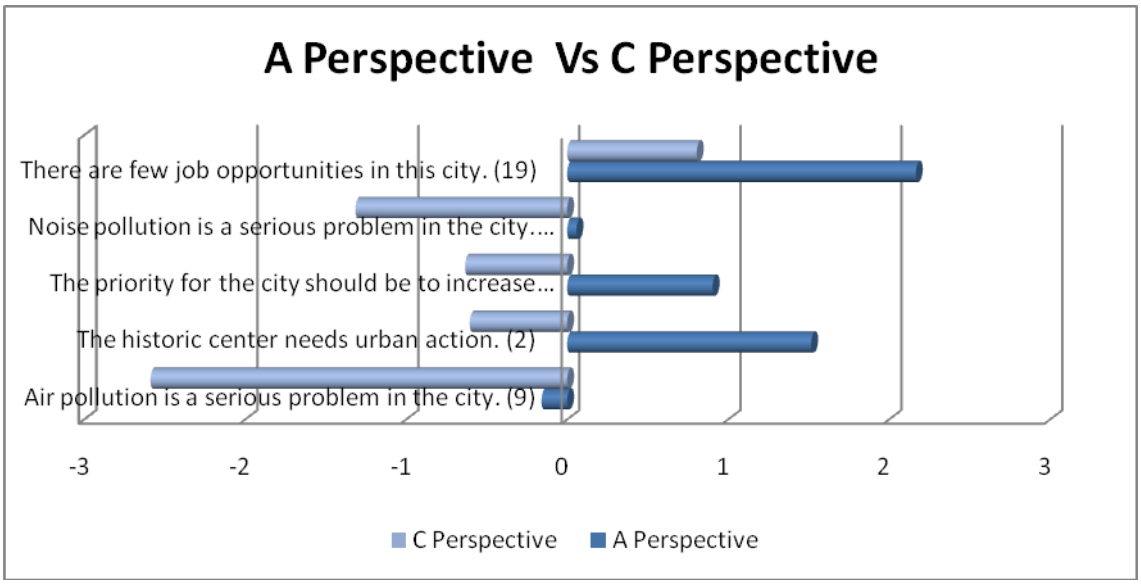

Figure 5. Divergences between Perspectives A and C

Divergences between Perspectives B and C

The main differences between these perspectives are related to the education level of the citizens and its importance for the city's development.

Table 10. Divergences between Perspectives B and C

Statement	Perspective B	Perspective C	Difference
People are the main source of an intelligent territory. (16)	2,318	0,247	2.071
The priority for the city should be to increase the availability and quality of educational infrastructures. (18)	1,318	-0,634	1.952
This city is committed to the fight against climate change.(11)	-0,904	-2,394	1.490
The city is clean. (8)	1,122	0,019	1.102
The historic center needs urban action. (2)	0,453	-0,605	1.058
It is best to rehabilitate urban centers than to continue to use non-residential land on the outskirts of the city. (5)	1,853	0,809	1.044
Health services in the city are sufficient in quantity and quality.(12)	0,6	-0,4	1.000

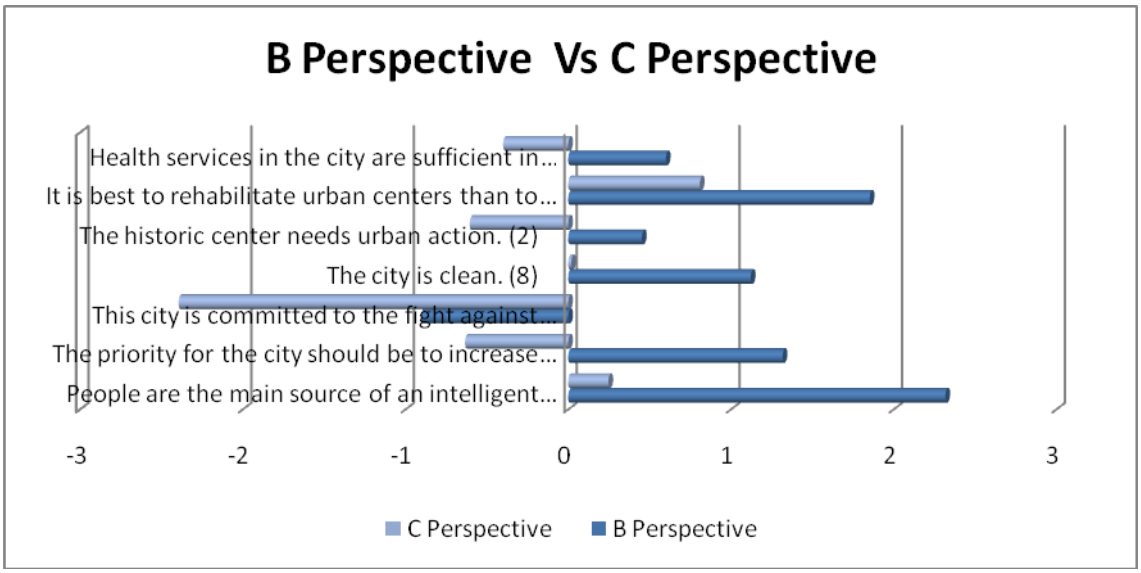

Figure 6. Divergences between Perspectives B and C

Conclusions

We found three social perspectives in what concerns the challenges and opportunities regarding the sustainable urban development of Angra do Heroísmo. The first of these is characterized by a concern with the economic situation, namely unemployment and seems to favor the recovery and preservation of the old buildings instead of letting the city grow into the adjacent areas.

The second social perspective places education and human resource quality at a high level of importance for the sustainable development of the city and devalue issues related to the environment and with the economy.

The third perspective puts the emphasis on the quality of the social infrastructure and does not see poverty or poor environmental quality as problems.

All perspectives seem to agree that there are no public security problems in Angra, and that rebuilding is a more sustainable option. They also believe that there is adequate support for migrants, good dialogue between public bodies and social organizations, and that the population is willing to play a greater role in the city's governance.

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