Platform of Local Authorities and Communicators Engaged in Science

Modules used: A2, B1

Science Centre

2012

This is a standardized version of the original case analysis number 24. Specific names and locations have been substituted from the original document number 24 with generic references in order to preserve the anonymity of every participant.

In case you would like to read the original document, please contact occ@upf.edu.

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Abstract

Established in 1981, and highly renovated in 2004, the science museum of the city was the first science centre that opened its doors in the country. With more than 700.000 visits each year, it is the main science centre of the city and it is also internationally well known.

This case study aims to assess the impact of the science museum in its city, evaluating two dimensions: its impact on the public sphere (visitors) and on the policy sphere (city, local regional) dimensions.

The methods applied here were taken from *The PLACES Toolkit for the Impact Assessment of Science Communication Initiatives and Policies*. Two modules were used: [Module A2] standardized survey of visitors (n= 200, citizens who visited the museum) and [Module B1] semi-structured interviews with observers or stakeholders (n=7, 2 scientists, 2 journalists, 2 representatives of local administration and 1 teacher). Institutional information from the science museum and its foundation was also analyzed. Modules were translated and adapted to the case study

The results show that visits to the science centre are a social activity that in most cases is done with family. Visitors think going to the science centre is more interesting than visiting a gallery or a cultural museum, and they also think learning in the centre is more interesting than doing it at school or university.

Many repeating visitors explain that they have been motivated to search more information after their previous visits, and some think that they feel bit more self confident in terms of their capability of discussing scientific issues.

Both visitors and experienced observers interviewed consider the science museum a symbol of the city, and think that this centre is an important part of the cultural life of the city. Less than half of visitors also think that this centre has an important role in the city in terms of tourist attraction or economical benefits. Observers hold similar opinions.

All observers interviewed agree that the science museum has played a key role on the popularisation of science to the citizens in town, acting in three ways: a) giving access and visibility to science issues and local science players (universities, research centres, scientists…), b) engaging local and national mass media and increasing their interest in science issues, and c) acting as a model for other organisations (even outside the city).

There is also a consensus about the general educative value of the museum among visitors and observers. The last ones think that students learn

in their visits, and also that the science centre gives tools to teachers and schools to complement their tasks of education and has a great potential as vocation creator. That is, they consider that the museum has had an important role in the educative system of the city in the field of science.

One of the interviewees thinks that the majority of activities of the centre are more focused on “show and explain” than in promoting citizen participation, but that same person is aware that this situation is being changed in the centre.

A general observation is that the city needs to coordinate more of its activities and policies in science communication and that the museum could have a greater role in this in the future, particularly because its capacity to act as a link between public, academy, school and private (companies) sector.

Introduction

The science museum was originally established in 1981 as the Science Museum of the city, thus becoming the first science centre in the country. In 1998 it closed for renovations up until 2004, when it reopened under its current name. Today, it continues to be the main science centre of the city and it is also very well known in the international sphere. It belongs to a private foundation, a social, non-profit institution created by a bank. As the largest charitable foundation in the country, the foundation makes major investments in a wide range of public welfare causes. Through platforms like the museum, the foundation aims to provide resources for education and research programs, environmental protection and the dissemination of culture[1].

The centre is now 33.700 m^2, almost four times larger than it was originally. Since its reopening in 2004, the number of visitors has exceeded the 7 million, according to institutional data, and during 2012 it received the total amount of 788.176 visitors[2].

The science museum features a great variety of both temporary and permanent exhibitions. Permanent exhibits include: a structure that allows visitors to walk through an indoor rainforest that houses over 100 species of flora and fauna native to wet and dry environments of the Amazon rainforest; a wall that displays relevant geological processes; a hall that shows evolution beginning with a display of the big bang theory all the way to the birth of human civilization*;* one of several interactive exhibitions for young children which uses different kinds of games to encourage children to learn about science, and some interactive activities that allow visitors to become familiar with a variety of plants and animals, as they are presented by museum staff. The science centre also features a planetarium, which introduces young children to astronomy.

While institutional data[3] shows that the majority of the centre's visitors are there for its permanent exhibits, the centre always has a number of temporary exhibits running. During the time this study took place, the temporary exhibitions featured were on the world of epidemics (to see how diseases have affected human history) and about a technology revolution (to talk about convergent technologies). Indeed, according to institutional data, the busiest exhibits during 2012 were the temporary ones. It points out the large number of visitors in the 3D Planetarium in its first year of life, unique in the country and one of the world cutting-edge suitable for all audiences.

The majority of the centre's visitors are from the city and the surrounding region, with almost 70% being returning visitors. The centre is a major attraction for families with over 60% of visitors pertaining to this demographic.

The science museum has also a bookstore, a gift shop, a library, a teaching centre and a cafe. It is regularly used as a venue for scientific conferences. The foundation has recently implemented an environmental management system that focuses on social responsibility and environmental awareness among visitors and staff of the museum. Part of this initiative includes an exposition about recycling and regular workshops that aim at encouraging school-aged children to recycle more in their daily lives.

The decision to select the science museum for this case study was based on the long life of the museum, its relevance in terms of number of visitors and international projection, and because its affiliation with the PLACES project through its membership of ECSITE.

Methods

The methodology used in this case study was taken from the *PLACES Toolkit for Impact Assessment of Science Communication Initiatives and Policies*[4]. According to it, to analyze the impact of the museum on two levels –the public sphere and the local/political sphere– the following modules should be used:

- Module A2: standardized survey of visitors (n=200 visitors older than 16). We should remember that although higher percentage of people in a science centre would be young, because we are interested in the perception of people about the impact of visits in their lives and in the city, only visitors over 16 were interviewed.
- Module B1: semi-structured interviews with stakeholders (n=7). The observers for the semi-structured interviews were selected trying to include representatives of the principal sectors relevant for the study: 2 representatives of local government, 2 scientists, 1 teacher, and 2 journalists. Interviews were recorded and subsequently transcribed.
- Institutional data from the science museum. This included annual memories of the foundation corresponding to 2010, 2011 and 2012, institutional information about visitors and other institutional documents (references 1-3).

The next table summarizes the dimensions analyzed and the modules chosen.

	Science Centres and Museums	Science Events	Science Cities
Public sphere	• *Institutional Sources* • *Standardized survey of visitors:* ***MODULE A2 (n=200 people)***		
Policy/Local Sphere	• *Semi-structured interviews with observers or stakeholders:* ***MODULE B1 (n= 7 people)***		
Actors			

Table 1. In green and italics, the modules used for each dimension analysed.

Modules were adapted to this particular case and translated from the original language into the local language.

Cooperation from the science museum was very helpful. Workers from the museum and the foundation provided all the information asked, facilitated

the entrance and all required by researchers to carry out surveys among visitors.

A team of 3 representatives from a local university went to the museum during mornings and afternoons of 2 weekdays and one Saturday in order to carry out face to face surveys with the centre's visitors. Representatives placed themselves around the entry/exit points of popular exhibits throughout the centre. Interviews were undertaken between October and December 2012. Surveys aimed at exploring the impact of the museum on their visitors (public sphere) and also on the city itself. Surveys also had particular questions for repeated visitors in order to study the long term impact of the centre. Due to all these reasons, surveys were applied only to people older than 16. Although youngsters under 16 constitute an important population for the museum, it was considered that they couldn't answer those kinds of questions. The number of people who answered the survey was 200.

For the semi-structured interviews, a selection of 7 "observers" or "stakeholders" was considered. In this case, we wanted to study their knowledge and views about the impact of the science museum on the community and the city. Secondarily, we wanted to explore their views about the implications of a "city of scientific culture". To maintain some confidentiality of the interview partners, information and statements quoted in the following analysis are not specifically attributed to individual interview partners. Name and institutions of interviewees are listed on Annex 1.

	Code Name	**Position**
	Researcher 1	Professor at a main university of the city
	Researcher 2	Head of a unit in a research centre
	Teacher	High-school teacher. Biology teacher
	Representative of local Government 1	City Council
	Representative of local Government 2	City Council
	Journalist 1	Freelance journalist specialised in science (+15 years)
	Journalist 2	Journalist specialised in science (+15 years)

Table 2 Interviewees classification

Interviews were conducted between 23 October and 18 December 2012. All of them were conducted face to face. Average length was 30 minutes. All were recorded and subsequently transcribed.

Results

Results 1: Survey of visitors to the science museum

Visitors and visits

Demographics

The age and gender distribution of the 200 visitors interviewed was very similar to those observed in previous evaluation carried out by the museum, supporting the representativeness of our sample.

The percentage of women (55%) interviewed was slightly higher than men (45%). The average age of adult visitors was around 38 year old, but deviation points that age range was wide (not concentrated on 38). Minimum age of our interviewees was 16 and maximum 75 year old. It should be remembered that being younger than 16 was an exclusion criteria from the sample.

Repeated visits

Repeating visitors represent a majority, with a percentage of 60.5%. From those repeating visitors, more than a half (that is, 30.5% from the total of people interviewed) went to the museum more than twice in the previous two months.

This high frequency of repeating visitors was very relevant for the study main objective. That is, to analyze not just their actual visit but also the impact of previous visits.

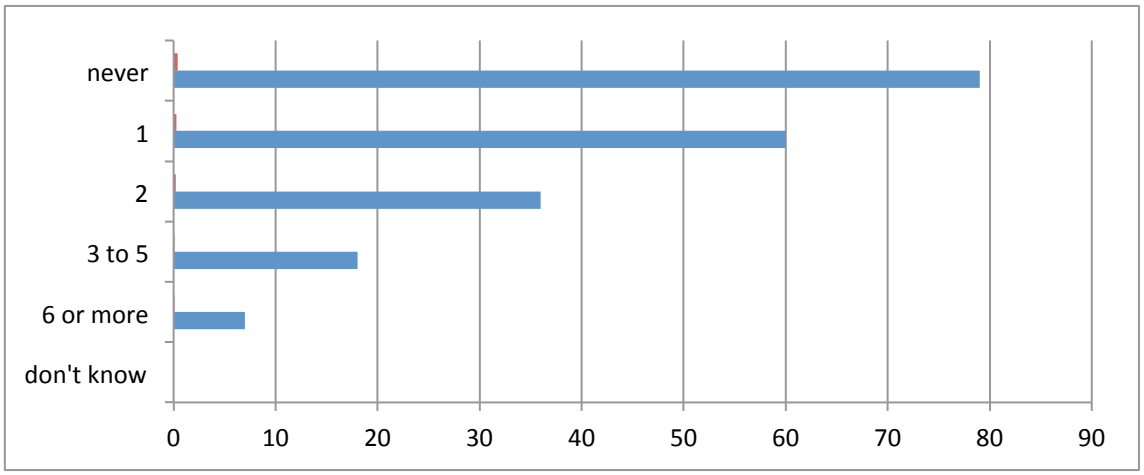

Figure 1. How many times did you visit this science centre before today?

As in previous evaluations carried out by the museum, most of the visitors came with their families (62.4% in this case) and a few went alone (only 4.1%). It

should be taken into account again that people under 16 were not included in the sample, and because of that the percentage of people accompanied by their teachers or classmates is not high.

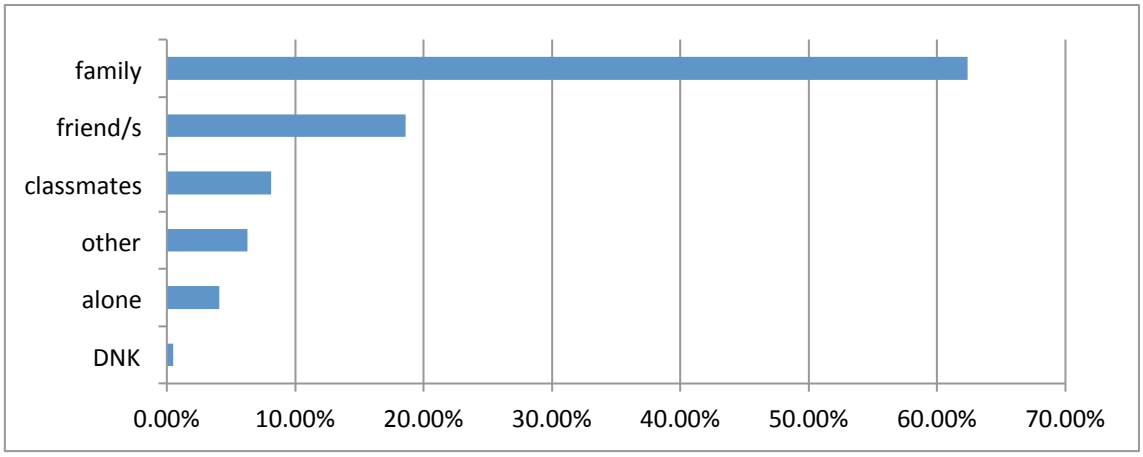

Figure 2. Have you come with…?

Their interest in science issues

Surveys point out that visitors are quite aware of the importance and interest of science. They agreed in the necessity of science to make our lives easier, healthier, and more comfortable (86.5% of positive answers) and agreed in the importance to know about science for their daily life (94% of positive answers). They also understand how science works: visitors thought that scientists must check the results of the others (91% of positive answers), and that is normal for scientists to disagree (88% of positive answers).

Despite their appreciation of the value of science, a high percentage of interviewees think that science practice is not always as rigorous as it should be. In this sense, 52% of the polled visitors thought that scientists adjust their findings to get the answers their funders want, only 13% give a negative answer (disagree or strongly disagree) to this question.

Impact of the science museum on visitors

Cultural and educative interest

In the opinion of 67% of visitors, the interest of the museum is greater than such from an art gallery or a cultural event (more or much more interesting), while 32% of them thought that it has the same interest, and only 1% thought that it is less interesting.

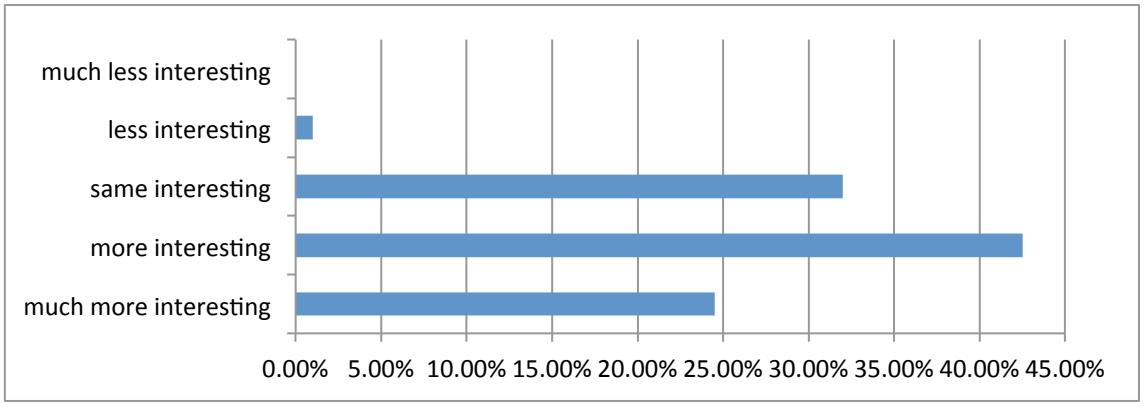

Figure 3. In comparison with a gallery or a cultural museum, do you think that this science museum...?

In a similar way, most of the polled visitors (80%) thought that the experience of learning in the museum is more or much more interesting compared with learning at school or at an academic field. A great percentage (37%) thought that is much more interesting.

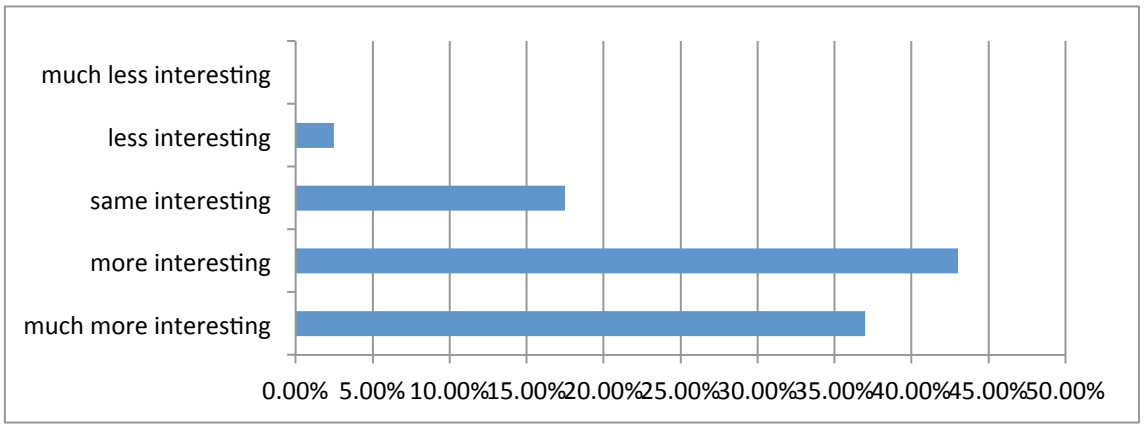

Figure 4. In comparison with learning in school or university, your learning experience here, at this science centre, is…?

Impact on their quality of life

Intellectual curiosity

Previous visits have had a positive impact on approximately half of the visitors in terms of motivating the search of more information or gain knowledge about the scientific issues discussed in their visits or about science and technology in general. Figure 3.

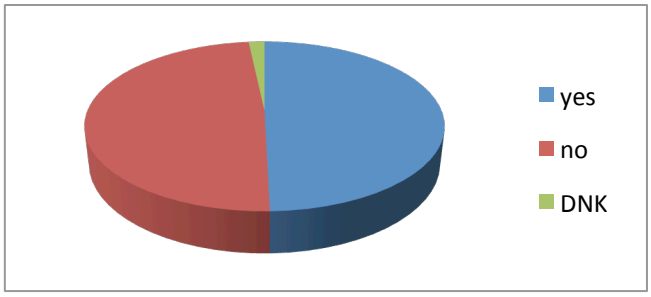

Figure 5. Have you searched more information after your visit, as a consequence of it?

Self confidence

Most of the visitors don't think that visits to the museum had impacted on their self confidence (their perceived capability to discuss scientific issues), but 31.5% of them felt a little more confident after their visits and 3% felt much more confident.

Impact of the science museum on the city

Visitors generally agreed about the important role that the science museum plays in the cultural life of the city (84% of positive answers).

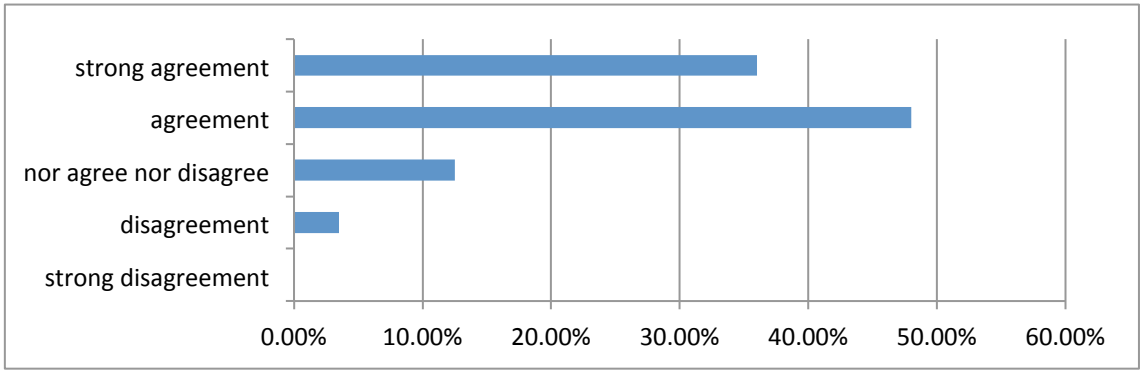

Figure 6. Do you think that the centre plays an important role in the cultural life of our city?

Most of them also think that the museum is an important symbol of the city (70% of positive answers).

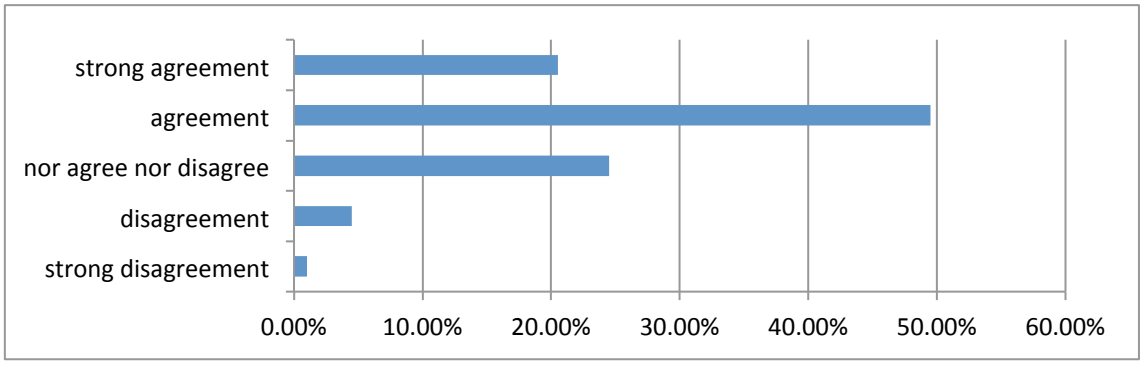

Figure 7. Do you think that this science centre is an important symbol of our city?

They are less optimistic about the role of the centre as a main tourist attractions of the city (42.5% of positive answers) or in its economic development (41.5% of positive answers).

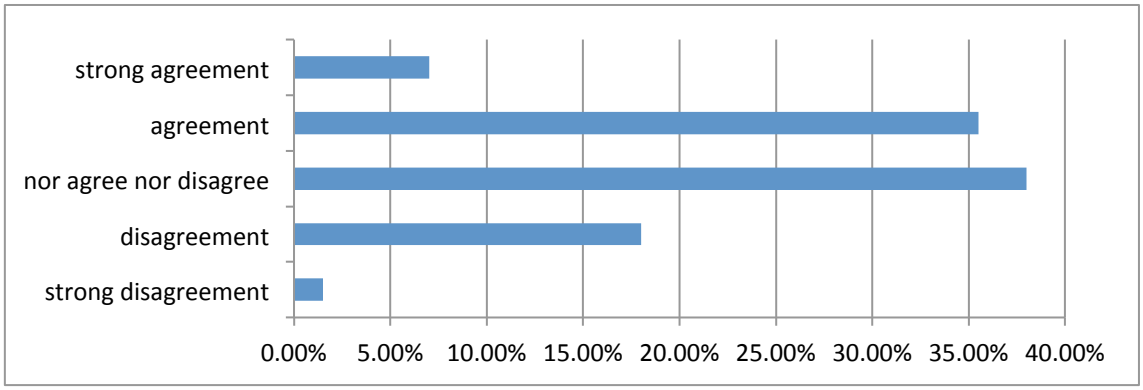

Figure 8. Do you think that this science centre is one of the main tourist attractions in our city?

Results 2: Semi-structured interviews with actors/stakeholders

Responses to the questions are grouped below under the four categories of impacts indicated in the PLACES guide for semi-structured interviews (policy, quality of life, social and economic, and education). Each interviewee is quoted with a code name (Teacher, Researcher 2...). There are some interesting points that are largely shared between the interviewed and are worth noting.

All of them think that the museum has played a key role on the popularisation of science to the citizens of the city, giving visibility to local players in science (universities, research centres, scientists…), engaging local and national mass media and increasing their interest in science issues, and acting as a model for other organisations (even outside the city).

There is also a consensus about the general educative value of the museum. They think that students learn in their visits, and also that the science centre gives tools to teachers and schools to complement their tasks of education and has a great potential as vocation creator.

Regarding the survey, interviewees also think that the museum has a big impact in the cultural life of the city, and that it is a symbol for the city as science centre, although they know that this potential is diluted because of the huge touristic and cultural offer of the city.

In the future, interviewees think that the science culture offer of the city should be more coordinated in order to improve the general impact of these activities, and that the museum could focus them all, acting like a pillar for the science communication and a link between public (universities) and private (companies) sector.

Local policies

The introductory question about the overall added-value of science culture had a similar answer. They all agreed on the great scientific culture of the city, and in the importance of the museum for them.

Science communication is very relevant in modern life (...) scientific knowledge changes the way of seeing the world, and when this changes, the behaviour of people also changes: they become more tolerant, supportive, with well-balanced opinions, and it also improves the quality of life. –Researcher 1-

They were quite optimistic about the future, mentioning of course the economic situation

The value is important, and politicians think that science culture and innovation is the way to the future. –Representative of local government 1-

The question about the relationship among local authorities and the museum received different answers. Some think that the support already exists and that it is strong. Others think that collaboration is only punctual; others that authority support is not necessary, since the museum is a private center and has a big institutional support.

As far as I can see, their implication [authorities] is not important. I hope that it could change in the future –Representative of local government 1-

A bank is behind the museum, without them, if it depended on the government, things would be very different –Teacher-

However, in general, the interviewees point out that the museum has influenced in a higher science communication movement compared to other cities. In this sense, it can be concluded that the museum has been more influential to local policies than the other way around.

The museum has impacted on the city's cultural identity: has been one of the most advanced, has provided resources, organised programs, courses... varied activities. Despite the crisis, all this impact has set the trend and has created inertias, and when a minimal economic recovery happen, the history that we have created will put the situation in its place and we will be back at the front of divulgation. - Researcher 1-

A recurrent recommendation is to improve the locally coordination of scientific communication activities.

Very good science and science dissemination-related activities are done in the city. Some aspects as the coordination of the different activities taking place at a time could be improved. In some cases there's a dispersion that doesn't help to the public being aware of all the science-related activities done in the city. - Journalist 1-

They generally agreed on the greater implication of researchers in communication activities.

More and more scientists are involved in these activities. And it is a great news, because is better to have an expert. –Representative of local government 1-

On the other hand, interviewed researchers were not so optimistic in this subject.

There aren't many scientists involved in science communication. A full-time scientist doesn't have time, and also most of them didn't develop the necessary skills for science communication –Researcher 1-

I think that science communication tends to professionalization, and it will be difficult for scientists to communicate in this situation. –Researcher 2-

Finally, interesting ideas for new policies appeared.

They [the science museum] *should act as a link, a bridge between universities and private sector. Because of its importance, they must be a loud-speaker for the science of the city* –Teacher-

Quality of life

There was a big consensus about the impact of the museum in the media: it has a great impact, greater than any other scientific activity or museum.

Absolutely. Everything with the name of that bank has a big impact here, and it is normal because it is a very good thinking centre –Teacher-

Not only in the media. In the town hall's web its activities are always present – Representative of local government 2-

Although they think that the museum is well treated by media, some of them think that media are less interested in science.

When they were asked about the public participation in the museum, they seemed to not understand the question. Some of them had a positive answer, but others were more sceptical.

I think that the museum doesn't help to public participation, because is not its duty, is more like a museum. Activities weren't very participative. However, I think that they are working in this way in order to improve participation. –Representative of local government 1-

I feel like some activities, such as the evening conferences, require too much knowledge. They should find a half-way point between difficulty and banality – Representative of local government 1-

They also think that the museum has a great impact on cultural identity. Answers were positive and enthusiastic in this question

Of course. It is a cultural model. It has marked a school of thought and a career. –Representative of local government 1-

The museum has impacted on the cultural identity of the city, thanks to its activities, conferences, programs, courses… It has means and policies to be a scientific symbol –Researcher 1-

Social and economic impacts

The question about the possible benefits of the science museum had different answers. On one hand, the museum has private funds as support; on the other hand, their activities are usually free or extremely cheap. And the organization of activities such as the conference of a Nobel Prize can be expensive. Actors think that the museum does not bring benefits, because it does not need them.

The museum doesn't bring benefits, because it shouldn't be the aim of a museum like this. However, it has the support of a bank, that understands the museum as a social activity. –Researcher 2-

Having said that, the next question was whether the museum has an impact on tourism. Although some of the actors think that it has, most of them think that the importance and impact of the museum as a touristic attraction is diluted in the city due to the huge touristic offer of the city.

I don't think that people come to see the centre, although is one of the most visited museums […] *In the future we must change our idea of the city and start presenting the cultural side of the city, where the museum could be a pillar.* –Representative of local government 1-

People come to the city to see the football stadium, *not the science museum. It is also true that they can go to the museum, but they don't come here because of it* […] *A change of mind-set is required.* –Researcher 2-

I came to the city just to visit the museum. I think that people find it interesting, because there is only one and it is spectacular, so people can travel to visit it. –Teacher-

The museum could perfectly fit in any touristic program in town, because scientific tourism should be part of the appealing of any city. –Researcher 1-

When they were asked whether new infrastructures had been created in the last few years, the answer was mostly negative. They think that crisis has played a role in that, but in the future thing will get better.

Everything is quite paralyzed right now, and not only in the scientific sector. Rather than create new infrastructures, we should make a good profit of the existent ones,

improving and increasing the coordination between actors –Representative of local government 2-

Quite the opposite, we are experiencing a big decreasing in this area, something that you can feel as soon as you visit a science center or museum. However, I am optimistic about the future –Researcher 1-

Education and educative system

Finally, they were asked about the possible impacts that the museum has on the education of the citizens of the city. Answers were unanimous and positive: as the most important science museum of the city, and one of the most important ones of the country, the museum plays a vital role in the education, something comprehensible considering that it should be one of its main objectives as a museum.

For example, when they were asked whether the science centre helped to create vocations, answers were absolutely positive. In fact, some of them pointed that the museum had created vocations on themselves.

Of course it creates vocations, and I am the best example, I went there when I was a student, and it motivated me to start working on my field. –Representative of local government 2-

I hated physics when I was in high-school, and I remember that the visit to the museum changed my mind about physics. After a visit I was more interested in them and at the end I liked them. –Teacher –

I've seen many school visits; I think it's one of the most important tasks that these centres can accomplish. -Researcher 1-

To the question whether school visits have increased in the museum, answers were also positive.

Visits are increasing because benefits are double: the museum wants to be known, and schools want to complement their education. I am sure that visits will increase even more in the future –Researcher 1-

The teacher also pointed out a very interesting fact: as part of a private company, the museum gives grants to school students that, without that help, could not pay the visit.

I work with very poor students, and the museum gives us grants that make our visit possible. They organize the activities and explain the museum exactly the same, it doesn't matter if the class can pay it or not, and that is nice –Teacher-

Finally, the interviewees were asked whether they wanted to add some conclusion or final thoughts, some of them had valuable conclusions.

I think that these centres have future, and in the future there will be more, and their work will be promoted. They are essential for a modern and developed society, with an educated and cultivated public. –Researcher 1-

Maybe we should focus our work. We can't cover every task, and museums should act as museums, and libraries should act as libraries. Specialization is the key – Representative of local government 1-

As far as I can see, we need to improve the coordination between parts, to organize a more complete and accurate science communication. In this context, the museum could play a vital role –Representative of local government 2-

Conclusions

Impacts on public sphere/ visitors:

1. Visits to the science museum are a social activity that in most cases is done with family. This feature, that has been described previously in this centre and other science centres, is very relevant from the point of view that it has the potential of strength the laces among the members of a family. This is particularly important because in many cities there are not many activities for families (particularly indoor activities). Going with family also means that all members of the family are potentially exposed to science issues independently if they are interested or not in science. Finally they enjoy their visits and the majority considers that it is even more interesting than going to a gallery or to another cultural event.

2. There is also a consensus among visitors and observers about the general educative value of the museum, not only for visitors but also for the local educative system. Observers are convinced and give examples showing that students learn in their visits, and also that the science centre gives tools to teachers and schools to complement their tasks of education and has a great potential as vocation creator. Most visitors even think that learning in the museum is more interesting than doing it at school or university.

3. Visits to the science museum motivate many visitors to search more information about scientific issues and, in some of them, produces an increase in their self confidence (in terms of their capability of discussing scientific issues).

4. This science centre could do more to promote the citizen participation in science, in the opinion of one of the interviewees, instead of activities focused on showing and explaining. In this sense, it seems that the centre it is now going on the right direction.

Impact on policy sphere (local dimension)

1. The museum is a symbol for the city, and has an important part of the cultural life of the city. Less than a half of visitors –and some of interviewees– think that this centre has an important role in town in terms of touristic attraction or economical benefits. Observers think that, being a big city with a rich cultural agenda and entertainment offers (beach,

football team, etc.), dilutes in some way the visibility of the science museum for foreign people and its attraction of tourists.

2. The museum has played a key role on the popularisation of science to the citizens of the city and the rest of the region, acting in three ways:

    a. Giving access and visibility to science issues and local science players (universities, research centres, scientists…)
    b. Engaging local and national mass media and increasing their interest in science issues
    c. Acting as a model for other organisations (even outside the city).

3. A general observation is that the different actors that participate in activities and policies in science communication offered in the city need to be more to coordinated and that the museum could have a greater role in this in the future, particularly because its capability to act as a link between public, academy, school and private (companies) sector.

Recommendations

The city has a great touristic offer: beach, football, gastronomy… and also culture. However, it has also a great potential in research and science. It should be a big challenge to change the mentality and make a “Scientific city” label as known as Cultural or Sunny city. Paraphrasing one of the observers interviewed:

There are more things in the city besides football.

The science museum has proved to be an icon for science communication in town, acting as a leader for a movement of promotion of scientific culture in the city. It has a big support thanks to the foundation but it would be recommended to increase the coordination among all the actors pivoting science communication in the city, as well as increasing the interactions among them.

References

1. Here the author refers to a report about the strategic plan of the foundation participating in the museum this case study is about. The name of the report has been suppressed in order to maintain the anonymity of this case report. If you need more information or wish to know more about it, please send a message to occ@upf.edu.

2. Here the author refers to the 2012 annual report of the foundation of the museum this case study is about. The name of the report has been suppressed in order to maintain the anonymity of this case report. If you need more information or wish to know more about it, please send a message to occ@upf.edu.

3. Institutional resources on evaluation of publics (2010 and 2011 data).

4. De Semir et al. (2012) *The PLACES toolkit for the impact assessment of science communication initiatives and policies*. Barcelona: Universitat Pompeu Fabra.