

# **Analysis of economic impacts and evolutions of the italian cultural event “La Notte Bianca Romana”: a system dynamics approach.**

## **Stefano Armenia**

*PhD, MBA, Eng.*

*DII – Dept. of Business Engineering – “Tor Vergata” University,  
Rome (ITALY)*

*stefano.armenia@uniroma2.it*

*SYstem Dynamics Italian Chapter (SYDIC)*

*email: staff@systemdynamics.it – web: www.systemdynamics.it*

## **Gloria Fiorani**

*PhD student*

*DSI – Dept. of Enterprise Studies – Faculty of Economics – Tor Vergata” University,  
Rome (ITALY)*

*fiorani@economia.uniroma2.it*

## **Marco Meneguzzo**

*Full Professor*

*DSI – Dept. of Enterprise Studies – Faculty of Economics – “Tor Vergata” University,  
Rome (ITALY)*

*meneguzzo@economia.uniroma2.it*

## **Abstract**

We recently assisted to a net increase in discretionary policies by Local Governments relative to their objectives-resources relationships, which moved them far from previously used operative models, while favoring a general promotion of land in terms of a socio-economic growth. Moreover, a strong opinion about the relevant role of culture has arisen: great attention is dedicated to the relationship between territorial socio-economic development and cultural properties. In this context, we analyzed the cultural and artistic event “*La Notte Bianca Romana*”, which has been designed and realized by the Municipality of Rome, consisting in a territorial marketing tool to promote the “Eternal City” in the world. This manifestation has revealed itself as an important incentive to the economic and entrepreneurial development of the city, relating important issues like “economic growth”, “quality of life”, “social development”. Our work aims to show that, by correctly implementing the strategies designed by the Municipality of Rome (the strategic coordinator of the event), the actors of the system may have good chances in successfully developing the potentialities of this cultural event, both in terms of participation and territorial and temporal expansion, with positive social and economic downfalls on the territory.

## 1 Introduction and hypothesis

Over the last years, there's been a clear increase in discretionary decision-making policies by Local District Government as long as their objectives-resources relationship is concerned, which has moved them far from the operative models used in the past, while favoring a far less operative but more general promotion of their land in terms of social and economic growth. Moreover, according to this, also a strong conviction has arisen about the relevant role of culture: a particular attention is nowadays dedicated to the value of the relationship between territorial economic development and cultural properties, especially by means of the integration between the cultural properties production districts and the local social and economic tissue.

In this context, we find the cultural and artistic event called "*La Notte Bianca Romana*" (NBR), which has been designed and realized by the Municipality of Rome, Italy, which basically consists in a territorial marketing tool in order to effectively promote the "Eternal City" all over the world, which has also revealed itself as an important incentive towards the economic and entrepreneurial development of the city, also able to conjugate important issues like "economic growth", "improvement in quality of life" and "social development".

The present work has first determined which are the key actors involved in such an event and what are their strategies; then, by means of a System Dynamics modeling approach, it was meant to simulate the dynamics of its evolution in order to observe its medium-to-long-term impact, both direct and indirect, on the overall local economy. Our choice of System Dynamics is also due to the fact that in the last years, it is being more and more widely accepted as an evaluation tool in order to support decisions regarding the impact of Public Policies, thus assuming an increasingly important and relevant role on the process of strategic planning of Local Governments. The expected contribution of our work is to show that, by correctly implementing the strategies, designed by the Municipality of Rome (the strategic coordinator of the event), which have been tested in our model, the actors of the system may have good chances in successfully developing the potentialities of the cultural event "*La Notte Bianca Romana*", both in terms of participation and in terms of territorial and temporal expansion, with substantial positive social and economic downfalls on the territory.

## 2 "*La Notte Bianca Romana*" – The "White Night of Rome"

### 2.1 "*La Nuit Blanche*": the birth of an international event

The "*Notte Bianca Romana*" (NBR) is a whole-night all-cultural event, free and open to everybody, which is held every year in Rome at the end of the summer season. During such an event, many artistic performances or forms of art (concerts, movies, theatre shows, circus shows, exhibits of all kinds, etc...) are displayed at the same time, but also the public space is put on stage in all its forms (historical places, monuments, cultural places usually not accessible to the public), according to new interpretations performed by various artists. This happens both at a peripheral as well as at a central level of the city, thus favoring the cultural interchange between the city center and the outskirts.

Such a cultural kermesse was born in Paris in 2002, with the french name "*La Nuit Blanche*" (The White Night), meaning that the citizens, the tourists, and everyone visiting the city have the chance to stay up all night and get free access to public places as well as to free (at least in most cases) cultural events, with the support of the public services.

After the success of this event, the Major of Rome, in collaboration with the Chamber of Commerce of Rome, the Major of Paris and the Municipality of Brussels, decides to adhere to

the concept and promote the first “Notte Bianca” in Rome (September 27<sup>th</sup>, 2003). In 2006, 5 european capitals (*Paris, Rome, Riga, Brussels and Madrid*) chose to associate to each other, thus sanctioning the birth of an international event (“*White Nights of Europe*”), bond to be extended to other european capitals (Bucarest, in 2007) but also overseas, with an echo in the cities of *Rio de Janeiro, San Paolo* and *Montréal*.

The *NBR* is an initiative<sup>1</sup> which has been designed and organized by the Municipality of Rome and the Chambers of Commerce of Rome, in collaboration with the Ministry of Culture, Regione Lazio and some main banks (BNL, Banca di Roma, Monte dei Paschi di Siena). During the *NBR*, Rome becomes the stage of many cultural events dealing with solidarity, art, cinema, theater, music, sport, shopping, which bring to life every hidden corner of the city and involving many stakeholders of different nature, both public and private, everyone focusing on his own economic, recreational or social return. Taking part in this initiative are in fact also public and private museums, art galleries, historical squares, villas or gardens, various cultural institutes, theaters and cinemas, libraries, shopping centers, sport and fitness centers, churches and cult places, restaurants, hotels, and so on, with an overall advantage in terms of both economical and occupational returns.

## **2.2 Historical Data Series: confronting editions from 2003 to 2005**

In the following tables, we report some data which has been made available by the Municipality of Rome and by the Chambers of Commerce of Rome, with reference to the first three editions of the *NBR* event (years 2003 - 2005). The available data reports a consistent qualitative as well as significant quantitative development of the event, and, once validated, they have been used in order to feed the system dynamics model which has been designed in order to study the behavioral dynamics of the development of the *NBR* cultural event.

### ***Expenses and economic returns***

Table 1 reports data with respect to the expenses sustained for the *NBR* organization. In the first column, named “total expenditure” (E), we show the aggregate expense for the years 2003, 2004 and 2005, which is given by the sum of contributions of the Municipality of Rome (column 5), of the Chamber of Commerce (column 6) and of Private Sponsors (column 7). It is interesting to note how in 2005 a higher number of events were organized, in comparison to those in 2004 (see also Table 3) and with less resources: from this, it is possible to deduce how experience may have led to a growth on the learning curve of efficiency in the organization and realization of the event, as also confirmed by the Municipality of Rome.

Still with regards to the aim of our analysis, it is useful to underline the growing participation of private sponsors (column 7), which has thus implied a lower economic effort in 2005 by institutional organizers (columns 5 and 6) in comparison with 2004.

In columns 2, 3 and 4, the total expenditure for the event has been given further evidence in terms of its components, “Communication & Promotion” (E1), “Services” (E2) and “Events” (E3). It is interesting to note that, over the years, there’s been a clear reduction in expenses for Promotion. This may be due to economic problems which in the last years have hit the Italian Public Administration (especially in terms of cuts to expenses), to higher expenses for start-up investments (i.e.: the development of the *NBR*’s website mainly weighs on the 2003 balance), to reduced needs in advertising due to the “word-of-mouth” effect, given the success of the first editions.

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<sup>1</sup> Organized and produced by the company “Zètema Progetto Cultura”.

**Table 1 Expenses (in euro) per activity (per year)**

	1 – Total expenditure (E)	2 - Communication/Promotion (E1)	3 - Services (E3)	4 – Events (E2)	5 - Municipality expenditure (E)	6 - Chambers of Commerce's funds (R1)	7 - Sponsor's funds (R2)	8 - R tot
<b>2003</b>	<b>2848227</b>	506.400 (18%)	1.179.798 (41%)	1.162.029 (41%)	<b>1448227</b>	<b>1400000</b>	n.a.	1400000
<b>2004</b>	<b>3620851</b>	497.480 (14%)	1.501.269 (41%)	1.622.101 (45%)	<b>1820851</b>	<b>1500000</b>	<b>300000</b>	1800000
<b>2005</b>	<b>3456112</b>	375.000 (11%)	1.522.834 (44%)	1.558.278 (45%)	<b>1660900</b>	<b>1350000</b>	<b>445212</b>	1795212

*\* In the table the Chamber of Commerce and sponsors' expenditures (columns 6 and 7) are marked as "revenue" (R) because so classified in the Municipal budget.  
\* The percentages indicate the weight of individual expenses on total expenditure.*

According to data from the Municipality of Rome and the Chamber of Commerce, the return on a 3.4 mln euro investment for the organization of the 2005 NBR edition in terms of overall business has been around 60 mln euro (see Table 2)

**Table 2 Hotel bookings and overall business (per year)**

	Hotel booking – n. of tourists	Business (€)	Total Business (€)
<b>2003</b>	n.a.	n.a.	n.a.
<b>2004</b>	88000	n.a.	n.a.
<b>2005</b>	120000	30000000,00	60000000,00

### *Events and visitors*

In Table 3 is reported some data relative to the overall number of attendees to the organized events (that is, visitors of the manifestation) per edition.

**Table 3 Visitors & Events (per year)**

	Expected visitors	Effective visitors	Tourists	Events	Indoor events	Expected visitors x event	Effective visitors x event	Average cost of event (€)
<b>2003</b>	600000	1500000	n.a.	70	n.a.	n.a.	21428	16600
<b>2004</b>	1.600.000 (+30%)	2000000	300.000 (88.000 hotel)	300	n.a.	5333	6666	5407
<b>2005</b>	2500000	1000000	120000	500	334 (65%)	5000	2000	3116

The first thing to notice is that the number of shows has considerably increased over the editions, thus confirming our hypothesis of growth and expansion potentials for the NBR. In 2003, notwithstanding the rain and the clamorous electrical blackout which happened during the night, more than 1.5 mln visitors took part in the NBR. In 2004, thanks to the favorable meteorological conditions and to the higher number of shows on schedule, the visitors were already grown up to 2 mlns. In 2005, something around 2.5 mln visitors were expected (among which more than 100.000 thousands not from the city Rome), but only 1.0 mln visitors effectively attended the event. Such a drastic reduction may only in part have been due, again, to the rain, also because 334 shows over 500 (around 65%) were indoor. It is surprising to note that the number of visitors had not been at least equal to the previous year (2004),

when the number of overall events on schedule (300 shows, indoor and outdoor) was far lower than only those indoor organized in 2005. We thus tried to get evidence of other attendance reduction factors by analyzing again other aspects initially kept out of our mental model, and we found out that other factors may have contributed to such a decrease in presences, first of all the terrorism menace.<sup>2</sup>

It is also interesting to point out that there has been a clear increase in “non-daily tourists”. In 2004, around the 80% (aggregated value over the weekend in which the event took place) of hotels in town were booked out during the whole NBR period. In 2005, 100% of the hotels were already “full” at noon of the first day, so that many tourists or attendees in general could not find a place to stay in town (Source: APT Lazio - Tourism Agency of Regione Lazio).

### *Transportations*

Table 4 shows data on transportation activities during the various NBR editions. In all editions (and in particular on 2004 and 2005) the public transportation companies have increased their service levels, especially by adding new night lines or buses on existing night lines, as well as extending daily lines until late night. While during the first edition access to public transportation was completely free on every line, in 2004 and 2005 there was a special fare which allowed all-night bus and metro riding by just buying a whole day travel card at a special price of 1 euro.

Given that in 2005 public transportation has recorded around 1.23 mln passengers (800.000 on metro and railways, 430.000 on buses and tramways), and that data concerning the traffic density showed a clear decrease in car use, it is possible to affirm that the incentives and advertising to stimulate the use of public transportation during the whole night were successful and effective.

**Table 4** Transportation data

	People on metro and railways	People on buses and trams	People on public transport	Single ticket cost (€)	Total revenue from public transport(€)	N. of metro races	N. of bus races	Taxi in service	Engaged parking exchange
<b>2003</b>	n.a.	n.a.	n.a.	Free from h22.00	n.a.	n.a.	n.a.	1000	n.a.
<b>2004</b>	1000000	600000	1600000	1,00	n.a.	170	9200	n.a.	n.a.
<b>2005</b>	800000	430000	1230000	1,00	1123000	700	10000	n.a.	15-30%

### *Downfalls and consequences in terms of employment*

*La Notte Bianca Romana* (NBR) has also displayed some sensible consequences in terms of employment over the three editions. In fact, by comparing the 2005 NBR saturday night with a “standard” saturday evening, there’s evidence of an increase in employment of about 200.000 employees, mostly working in the field of security and safety. Overall dedicated employees in 2005 were 350.000. The employment increment between 2004 and 2005 reflects the data figures given before in terms of public transportation and security measures intensification (the latter in order to face the terrorism menace), as well as also in terms of the increase of public places openings and events on schedule, which thus have led to an occupational growth during the manifestation. Again, it’s worth noticing that 265.000 euro of the budgeted

<sup>2</sup> Data scored in 2006 confirm such an hypothesis.

560.000 (for the 2005 NBR) have been spent to cover costs for Municipal Police working overtime.

*Some evidences from data analysis*

Data analysis has shown that the NBR manifestation seems to be bond to expand in terms of number of events, of involved actors and stakeholders, but also under a temporal and territorial point of view. To support this affirmation, it's just sufficient to note the growing participation of private sponsors but also of tourists, as previously said, which caused some problems on the roman "hosting capacity".

In order to correctly take into account such a seemingly emerging behavior, it is possible to design some hypothesis concerning the adoption of different solutions:

1. **Capacity and Stakeholder expansion:** build new hotels in the suburbs or use different service contracts in order to accept in the hotel circuit also other types of lodging solutions (i.e.: vacation houses, etc... - *thus expanding the overall number of stakeholders*)
2. **Territorial expansion:** involve in the event some neighboring smaller municipalities, close to Rome (Ciampino, Frascati, etc...), in order to territorially extend the manifestation
3. **Temporal expansion:** extend the manifestation on a three day period.

In order to quantify the expansion potential of the event in terms of the previously identified hypotheses, data according to the hotel receptivity and capacity has been collected (Table 5 and Table 6; Source: APT).

**Table 5 Rome's Hotel lodging capacity**

Year	2003			2004			2005		
Stars	Hotels	Rooms	Beds	Hotels	Rooms	Beds	Hotels	Rooms	Beds
5L							17	2674	5794
5	19	3116	6835	19	3048	6552	3	518	1158
4	147	17457	35825	153	17575	35875	162	18431	37515
3	311	14028	27612	316	13927	27100	317	13755	26972
2	216	4497	8876	221	4615	9057	224	4733	9250
1	109	1308	2375	108	1279	2324	122	1411	2571
<b>Total</b>	<b>802</b>	<b>40406</b>	<b>81523</b>	<b>817</b>	<b>40444</b>	<b>80908</b>	<b>845</b>	<b>41522</b>	<b>83260</b>

**Table 6 Other types of lodging in Rome**

<b>Year</b>	<b>2003</b>			<b>2004</b>			<b>2005</b>		
<b>Type</b>	<b>Structure</b>	<b>Rooms</b>	<b>Beds</b>	<b>Structure</b>	<b>Rooms</b>	<b>Beds</b>	<b>Structure</b>	<b>Rooms</b>	<b>Beds</b>
Bed & Breakfast	1085	2104	4204	1172	2294	4585	1237	2474	4937
Rooms for rent	238	1128	2086	259	1268	2352	305	1445	2672
Holiday houses	184	5952	10071	189	6136	10410	190	6203	10386
Lodging in farms	20	79	235	20	79	235	24	67	163
Hostels	3	88	410	5	137	520	5	137	520
<b>Total</b>	<b>1530</b>	<b>9351</b>	<b>17006</b>	<b>1645</b>	<b>9914</b>	<b>18102</b>	<b>1761</b>	<b>10326</b>	<b>18678</b>

### **3 Description of the model: hypotheses and variables**

The dynamic model has been designed (and then simulated) with *Vensim*<sup>®</sup> on the basis of the following elements:

- data series relative to the past editions, made available thanks to the Municipality of Rome and the Chamber of Commerce of Rome;
- data series from the APT (Provincial Tourism Office) and from Rome’s Hydrographic and Meteorological Office;<sup>3</sup>
- a careful study on the behaviors and strategies of involved stakeholders.

The main goal of the simulations is to try to forecast, over a 10 years time-span (2004-2014), the possible evolutions of the NBR event as well as its impacts on the territory if the involved stakeholders do not change over time their initially declared strategies.<sup>4</sup>

Towards this end, the time unit has been defined in months and the initial time ( $t_0$ ) has been set to year 2004 (the year of the second edition) since data available for 2003 were deemed to be altered and not fully comparable with data related to the following NBR editions.

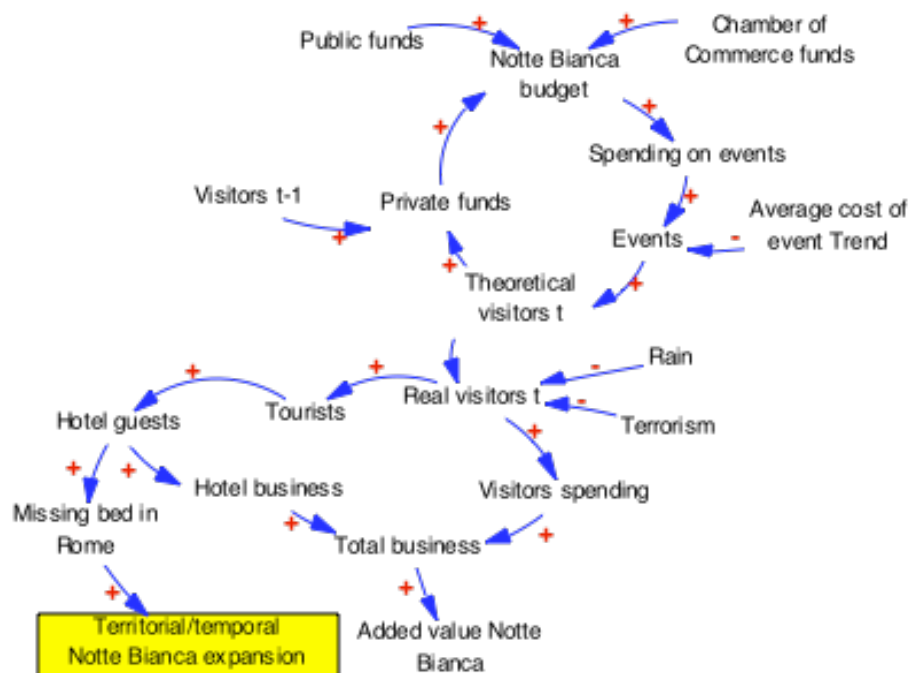
#### **3.1 Causal-loop diagram and non-linear functions**

Figure 1 shows the causal-loop diagram which depicts the main cause-effect relationships among the main relevant variables in the model.

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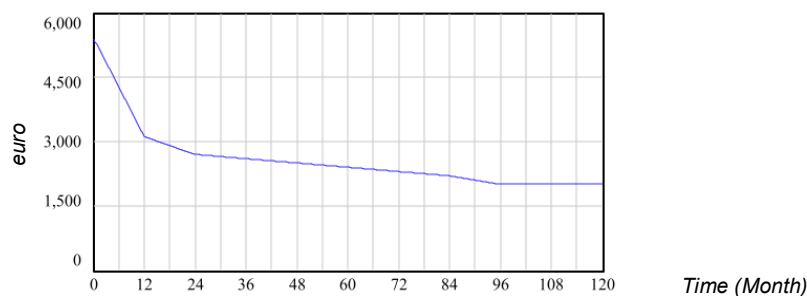
<sup>3</sup> Such data has not been reported in this work, but basically it’s about official data regarding the historical series of rainy days in Rome during the month of September, from 1990 to 2005. By elaborating such data, it was possible to calculate the probability to have a “rain event” during the NBR manifestation, which is:  $Pr(rain) = 0,27$ .

<sup>4</sup> As we will mention in par.6, in future developments of the model we are looking forward to introduce new variables in order to evaluate the impact of different strategies formulated by the organizers.



**Figure 1** Causal relationships among relevant variables in the model

As shown in the figure, there's a positive link between the NBR budget (*Notte Bianca Budget*), the budgeted expenses for the organization of the various events (*Spending on Events*) and the number of organized events (*Events*). The latter is positively influenced by the eventual decrease in the average cost per event (given a fixed budget, if the cost per event decreases, then there's money left to organize and schedule more events). As it has empirically been found and, as also confirmed by the organizers, the average cost per event will tend to decrease over time (*Average Cost of Event Trend*) thanks to lower transaction costs and to economies of scale. Figure 2 shows the expected behavior of this variable.



**Figure 2** Behavior of the variable Average Cost per Event (euro)

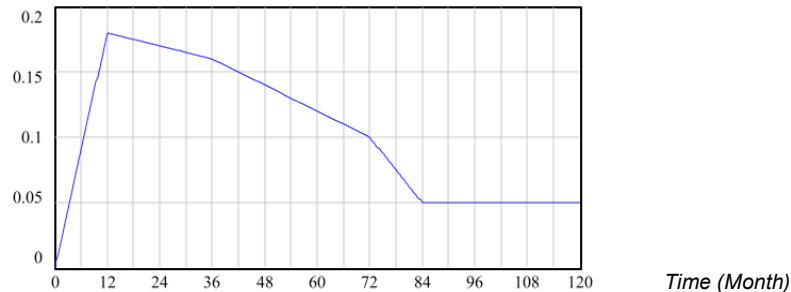
Following further the same causal chain, it is then intuitive to deduce how a higher variety of initiatives on schedule on year  $t$  (*Events*) may positively impact the expected number of visitors even at the same year  $t$  (*Theoretical Visitors t*): experience shows however how the number of *effective* visitors at time  $t$  may be lower than the *expected* ones, due to may negative factors like meteorological ones (*rain*) or social (*terrorism menace*).

The percentage of “lost” visitors due to the rain, calculated on the basis of available data, has been found to be at 42% of the theoretically expected visitors. The probability of a rain event



(which historically was equal to 0 in 2004 and to 1 in 2005) in editions following the 2005 one, has been calculated to be at 0.27.<sup>5</sup>

We also assumed in the model that the percentage of lost visitors, due to the menace of terrorism, will assume the decreasing shape shown in the graphical function depicted in Figure 3.

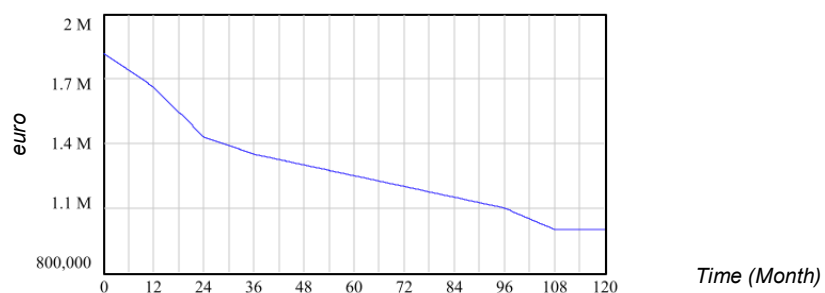


**Figure 3** Percentage of “lost visitors due to terrorism” – graphical function

The graph displays a percentage equal to 0% in 2004, which finds an explanation in the fact that the *actual* visitors were far more than the *expected* ones. In 2005 the percentage has been set to 18%<sup>6</sup>, basically due to the terrorists attacks in London just two months before the 2005 NBR edition. It is reasonable to assume that the perception will tend to decrease in the future if there won't be other attacks or if the international situation will remain stable and calm.

Since the sponsors decide the extent of their sponsoring funds (*Private Funds*) on year  $t$  based both on the number of attendees in year  $t-1$  and on the number of expected attendees on year  $t$ , the greatest these figures and the higher the funds will be. The loop then closes with a positive relationship on the NBR budget by also adding the both public funds and those coming from the Chamber of Commerce.

The behavior of Municipal funds (*Public Funds*) over our 10-year projection has been built on the basis of the strategies of the Municipality of Rome as declared by them: as it is possible to note in Figure 4, funds will tend to decrease over time until, after 6-8 years, they will reach a threshold value of 1 mln euro, which the Municipality declared that it won't be necessary to cut further.

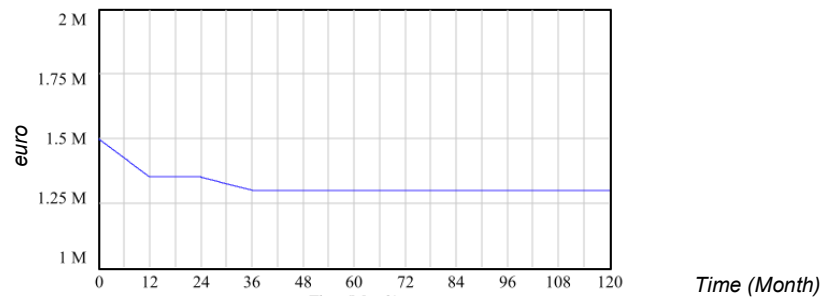


**Figure 4** Behavior of Public Funds from the Municipality of Rome (euro)

The Chamber of Commerce declared instead their will to maintain almost unchanged (though with a slight decrease) their contribution to the initiative (Figure 5).

<sup>5</sup> See note 3.

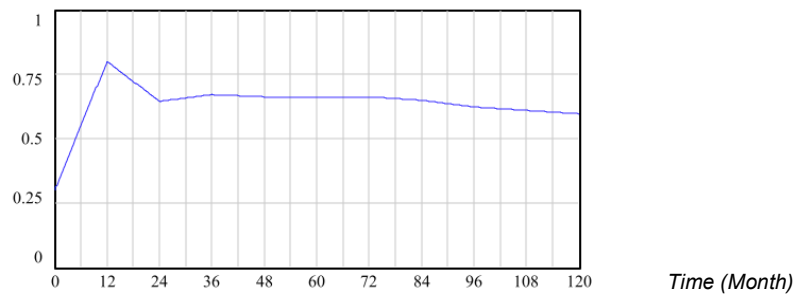
<sup>6</sup> Such a percentage has been calculated as the difference between the total “lost visitors” percentage and the “lost visitors due to rain” percentage.



**Figure 5 Behavior of funds contribution from the Chamber of Commerce (euro)**

On the lower part of our causal-loop diagram, it is possible to observe the links which put in relationship the effective visitors (*Real Visitors*), especially in terms of “non-daily” tourists (thus coming from outside Rome, *Hotel Guests*), with the *total business* value and with the expected *Added Value of the NBR* initiative.

On the basis of available data related to the first editions, and also in consideration of the international affirmation of the initiative, it has been assumed that the percentage of non-daily tourists will in the future follow the behavior depicted in Figure 6.



**Figure 6 Non-daily tourists percentage**

While the non-daily tourists grow, thus there is the need for either a territorial or temporal expansion of the manifestation, in order to sustain, at least on a short-term, the lodging capacity of hosting structures in Rome and efficiently manage the growing tourists flow.

### 3.2 The Stocks & Flows model diagram

We will now introduce the System Dynamics model in terms of its Stocks & Flows diagram. There are four main level variables in the model, each representing a peculiar aspect concerning the “dimensions” of the NBR initiative:

- Manifestation’s budget (*Notte Bianca budget*), whose initial value<sup>7</sup> is set to 3.620.850,00 euro, and is changed by the flow variable “*budget variation*”;
- The number of organized cultural events (*Events*), whose initial value is set to 300, and is changed by the flow variable “*event variation*”;
- The number of overall *Visitors*, whose initial value is set to 2 millions and is changed by the flow variable “*Visitors variation*”;
- The amount of *private funds*, whose initial value is set to 300.000,00 euro, and is changed by the flow variable “*private funds variation*”.

<sup>7</sup> The initial value is considered to be the values assumed by the variables at the beginning of the 2004 edition.

This is the basic Stocks & Flow structure (represented in Figure 7) of the model which will be then simulated in order to study the evolution dynamics of the cultural initiative “*La Notte Bianca Romana*”.

For details on the auxiliary variables equations, see the Appendix.

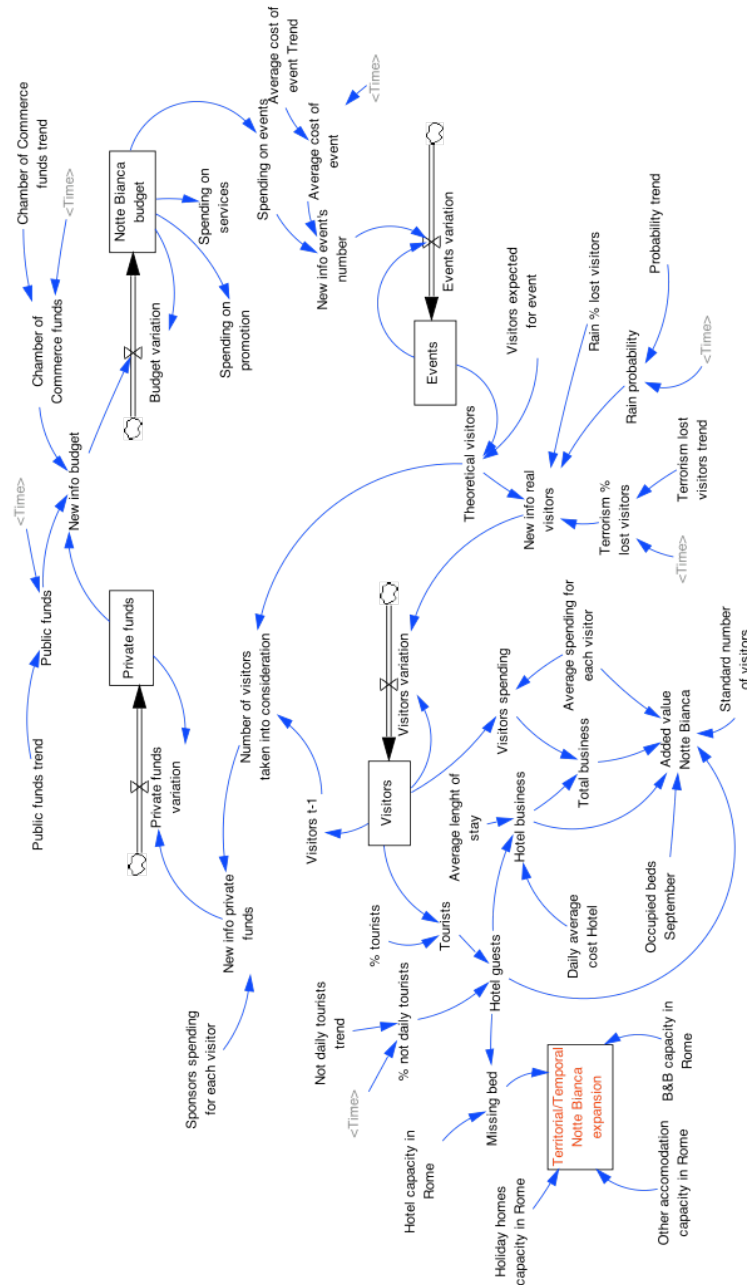


Figure 7 Model structure for “La Notte Bianca Romana”

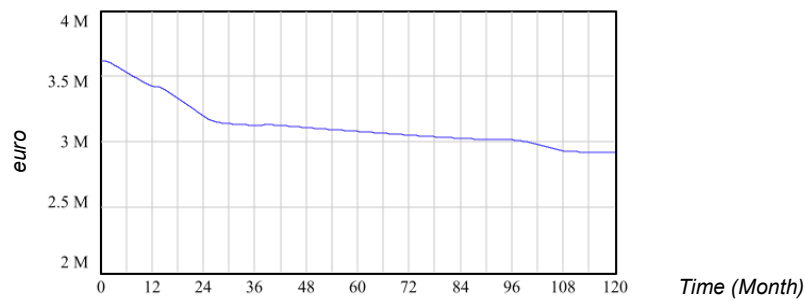
#### 4 Simulation results

The results of the simulation would seem to confirm the prospect of further development of the “NBR”. The following considerations refer to the principle variables, which were studied and kept under observation.

To begin with, the simulation shows a tendency to reduce the *budget* despite an increase in financial support on behalf of sponsors<sup>8</sup> and a certain continuity in funding on the part of the Chamber of Commerce.<sup>9</sup>

This is because the Municipality of Rome aims to reduce financial contributions to a maximum amount of 1 million euros over a span of 6 to 8 years.<sup>10</sup>

Thus, the cost of the “NBR”, which amounted to 3,6 million euros in 2004 will tend to fall below 3 million euros in the future (Figure 8).

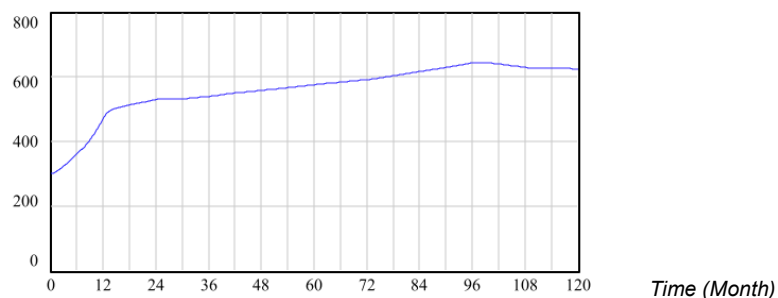


**Figure 8 Budget trend (euro)**

However, despite gradual reductions in funding (in the model percentile of the total budget, eq. n. 3 and 4 in the Appendix) it is interesting to point out that the simulation indicates a growing number of events (concerts, exhibits, etc...).

This positive result probably depends on the fact that it is possible to cut the average cost for each single event<sup>11</sup> thanks to lower transaction costs and to economies of scale, as well as also by reducing red tape (bureaucratic procedures) and generally improving organizational techniques (based on correcting past mistakes) thereby increasing overall efficiency<sup>12</sup>.

In fact, in 2004, 300 artistic and cultural events took place; 500 in 2005, and it is calculated that this number could come close to 700 (Figure 9), considering the prospects for expansion, in the future.



**Figure 9 Event's trend**

<sup>8</sup> See Figure 12.

<sup>9</sup> See Figure 5.

<sup>10</sup> See Figure 4.

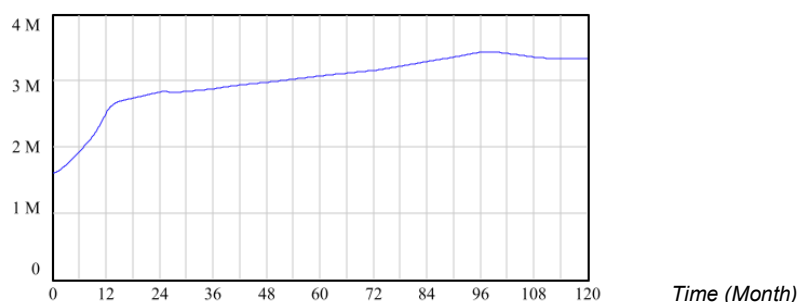
<sup>11</sup> See Figure 2.

<sup>12</sup> See Paragraph 2.2.

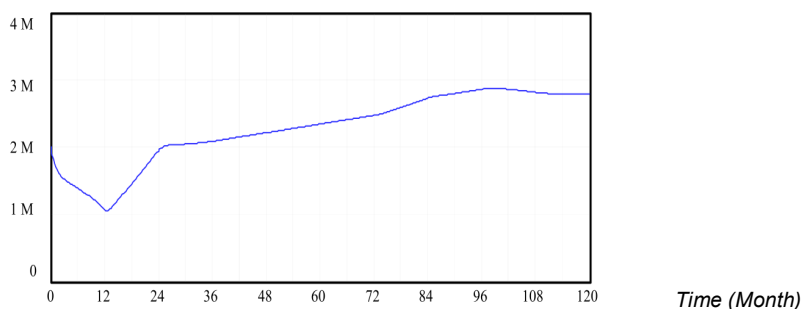
The variety of events is the most important factor in determining how many people are expected to come (*theoretical visitors*)<sup>13</sup>.

The simulation shows a general increase in the number of *theoretical visitors* (Figure 10) and also, although to a lesser extent, of the number of “*real visitors*”, (this variable depends not only on the “*theoretical visitors*” trend but also on the percentage of visitors who decided not to come for reasons such as the possibility of rain<sup>14</sup> and/or the threat of terrorism<sup>15</sup> and on the probability of rain<sup>16, 17</sup>).

In 2004, 2 million people came to the “NBR” and although there was a sharp drop in the number of participants in 2005, because of bad weather or the threat of terrorism, it is calculated that as many as 3 million people could be present in future editions (Figure 11).



**Figure 10 Theoretical visitors trend**



**Figure 11 Actual visitors trend**

Sponsors will eventually decide in what way to finance the “NBR” in the year  $t$  on the basis of how many people participated in the year  $t-1$  and how many people the organizers predict will participate in time  $t$ .<sup>18</sup>

The simulation demonstrates that more and more sponsors are contributing financially to the “NBR” (Figure 12).

In fact, private sponsors initially provided 300.000,00 euros in 2004 then 445.000,00 in 2005 and it is possible that in future editions private contributions could exceed 600.000,00 euros.

<sup>13</sup> Eq n. 5 e 6, Appendix.

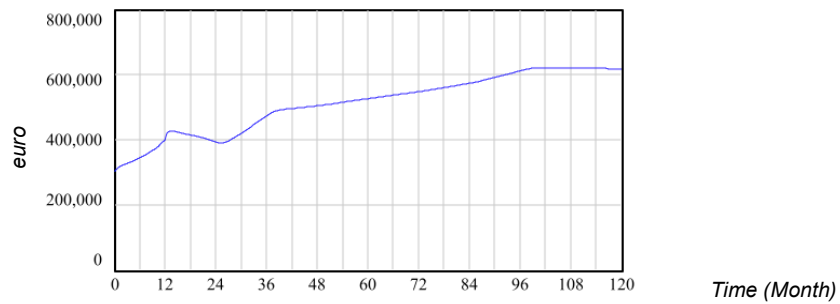
<sup>14</sup> Eq. n. 7, Appendix.

<sup>15</sup> See Figure 3.

<sup>16</sup> The probability of rain (0 in 2004 and 1 in 2005) has been calculated in the editions following the year 2005 at 0,27% (see note 3).

<sup>17</sup> Eq n. 8, Appendix.

<sup>18</sup> Eq. n. 27-30, Appendix.

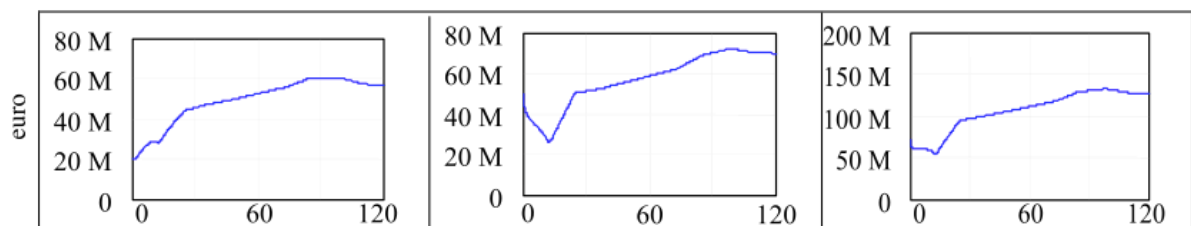


**Figure 12 Private funds' trend – sponsor (euros)**

There are 2 other important aspects which the model develops and which are influenced directly by the variable “*visitors*”. The first has to do with the economic gains of the “NBR”, with a particular reference to the hotel industry.

The second refers to an eventual expansion (both territorial and/or temporal), of the “NBR”. The simulation reveals an increase in the number of “*hotel guests*” (the variable “*hotel guests*” is determined by the number of tourists calculated as a percentage of visitors and as a percentage of tourists staying for more than a day in the Capital)<sup>19</sup> and consequently an increase in “*hotel business*” as calculated with the constants “*daily average cost hotel*” and “*average length of stay*” (Figure 13 to the left).<sup>20</sup>

Considering that every visitor spends an average of 25,00 euros during the “NBR” (usually for transportation, food and shopping)<sup>21</sup> it is possible to calculate how the variable “*visitors spending*” will proceed in the future: in 2005 economic activity induced by the “NBR” brought in 30 million euros and the possibilities for future growth are immense (centre Figure 13). Furthermore, by putting together the 2 variables “*hotel business*” and “*visitors spending*” (eq. n. 17, Appendix) it’s possible to deduce the “*total business*” (Figure 13 to the right) of the “NBR” and how it will continue in the future.



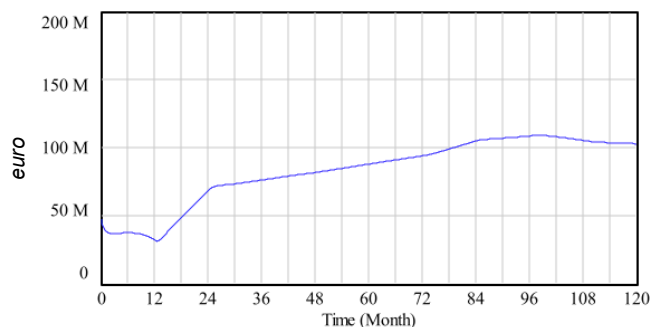
**Figure 13 Hotel business; Visitors spending; Total business. (X-axis unit: Time/Month)**

The *added value* of the “NBR”, which amounted to 30 million euros in 2005, is still less than the total business for the reason that September is considered to be “high season” by the hotel industry which means that 70% of their sleeping accommodations would be occupied in any case (eq. n. 18 - 20 Appendix).

<sup>19</sup> Eq. n. 11-13, Appendix and Figure 6.

<sup>20</sup> Eq. n. 14-16, Appendix.

<sup>21</sup> Eq. n. 9 e 10, Appendix.



**Figure 14 Added value of the NBR**

An important factor in determining the potential of further territorial (or temporal) development of the “NBR” is that which concerns “missing sleeping accommodations” (“*missing beds*” in the model) calculated according to the actual number of beds in the various accommodation structures in Rome (eq. n. 21-26, Appendix).

As indicated graphically from 2005 on (Figure 15) there are excellent possibilities for expansion.

## 5 Conclusions

The results obtained by the simulation confirm the substantial economic impact of the “NBR” and its potential for further development.

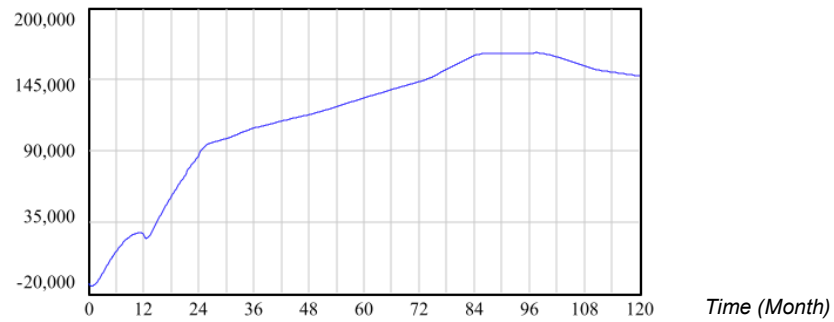
The number of events will tend to grow and consequently so will the number of actors involved (sponsors, visitors, tourist, hotels, etc...). More visitors and in particular an increase in the number of tourists who remain for more than a day will create the basis for a further expansion of this important manifestation both territorially, on a time basis and also in the number of actors involved.

Eventually, if the NBR is not prolonged for more days (*temporal* expansion of the manifestation)<sup>22</sup> with the purpose of regulating visitor turnover on a longer period of time, inevitably the various Roman accommodation structures such as B&B and holiday housing will be involved and subsequently new actors belonging to the areas surrounding the Capital (in particular the accommodation structures in Ciampino and Frascati) will be, formally or informally, involved too.

Figure 15 shows the trend in the number of “longer staying tourists” (in the model “*non-daily tourists*”) who could not be received by the Roman accommodation structures<sup>23</sup>, thus confirming indirectly the concept of territorial (and/or temporal) expansion of the NBR.

<sup>22</sup> A solution adopted in the 2006 and 2007 editions.

<sup>23</sup> Hotels and other kinds of room and board businesses.

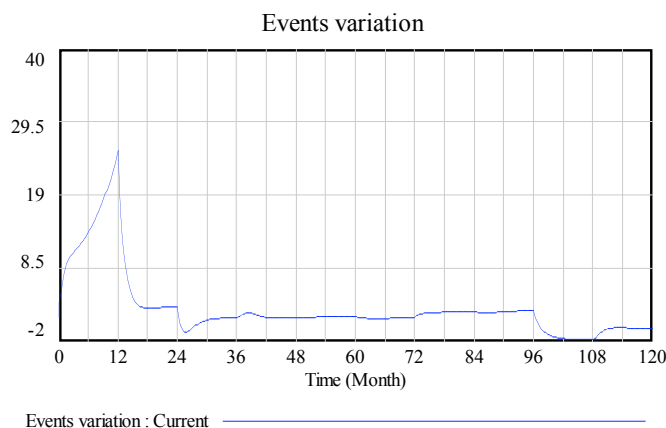


**Figure 15 Territorial expansion of the “NBR”: tourists not received by the Roman accommodation structures**

It’s worth to note that the tendency of the curve in Figure 9 (and, as a consequence, of related curves depicted in Figures 10, 11, 12, 13 e 14) to decrease after month 96<sup>th</sup> (approximately) doesn’t change our conclusions.

The “Events” level (in Figure 9) assumes a decreasing behavior starting from month 96 since its associated flow “events variation” is also decreasing (and goes to a negative value, thus meaning a “drain” from the associated level) between months 96 and 108 (see Figure 16). Such a flow assumes a negative value because the “public funds” (Figure 4) reduction does not get compensated anymore by the reduction in the “average cost per event” which, as an initial assumption, cannot decrease below the value of 2100,00€ (see Figure 2).

Moreover, public funds do not decrease after month 108 (they also reach a threshold value under which, as an initial assumption, they cannot go). As a consequence, the “events variation” flow, which is somehow pulled also by the overall growth dynamic of the NBR, does not remain negative after month 108 (Figure 16). If the flow is positive (*or equal to zero*), the events trend, and the one of its associated variables, starts to grow again (*stabilizes*). In figures from 9 to 14 such a dynamic is not clearly visible due to systems’ delays and to the chosen time horizon. However, such an observation allows to infer and conclude that the Municipality of Rome has identified a threshold value for its own contributions under which it won’t be possible to go, unless causing an overall NBR involution.



**Figure 16 Events variation**



## 6 Future developments of the model

The proposed model will be improved in order to take into account and describe eventual future developments of the NBR structure and policies. It could also be necessary to introduce new feedback control mechanisms or just functions in order to sustain the hypothesis of an eventual “emptying” of the levels kept under observation (implying the “death” of the manifestation). The way in which the Flows have been defined will potentially allow this possibility to be met.

With this in mind, it would be best initially to join promotional and service expenditures with the number of “theoretical visitors”. For example, a new variable could be created (“the historical trend of promotional and service expenditures”), which describes different strategies adopted by the organizers concerning a percentage of the budget allotted to promotional and service expenditures over the years (variable over the years) and supposing that the difference between the value assigned to such a variable ( $x$ ) and the value (constant) assigned to the variable “promotional and service expenditures” ( $y$ ) implies fluctuations in the number of visitors (an increase if  $x > y$  or a decrease if  $x < y$ ): if the difference is equal to zero there is no variation; at the extremes ( $x = 100\%$  or  $0\%$ ) the total “emptying” of the variable “visitors” would occur (“death” of the manifestation). Excluding extreme cases, the problem is to comprehend the fluctuation consistency regarding the number of “theoretical visitors” and how this is related to eventual variances of factors  $x$  to  $y$ . By changing a percentage of the budget allotted to events, services and promotional expenses it will be possible to evaluate strategic choices of promoters and financiers as well.

Eventually new factors will need to be introduced in order to study how sponsors behave considering their willingness to participate partially depends on “*media attention*” (this variable has not yet been taken into consideration by this model).

Among the other issues that will be addressed in future developments of the model are:

- a detailed sensitivity analysis, in order to understand how initial assumptions on variables, parameters and table functions values (i.e.: the probability of rain, the average spending for each visitor) may impact the final simulation results
- a better model validation, due to new available data. In particular, data from NBR editions 2006 and 2007 have recently been made available (at the start of our research, we only had data available concerning years from 2003 to 2005), and soon will be also data regarding the 2008 edition.
- Addressing more aspects and details in order to evaluate the impact of the different strategies formulated by the organizers on the event development and evolution: that is, adding more variables or factors that would clarify the mechanisms at work behind the success of the NBR (again, at the moment, the model only tries to assess the evolution of the NBR and the impact of such an event if the organizers do not change or modify their strategies: that is: free evolution analysis, given certain initial assumptions in the model)

## 7 Appendix

### *Auxiliaries definitions:*

1. "Spending on promotion" = "Notte Bianca budget" \* 0.13
2. "Spending on services" = "Notte Bianca budget" \* 0.42
3. "Spending on events" = "Notte Bianca budget" \* 0.45
4. "New info event's number" = "Spending on events" / "Average cost of event"
5. "Visitors expected for event" = 5333 visitors
6. "Theoretical visitors" = "Events" \* "Visitors expected for event"
7. "Rain % lost visitors" = 0.42
8. "New info real visitors" = "Theoretical visitors" - ("Theoretical visitors" \* "Rain % lost visitors" \* "Rain probability" + "Theoretical visitors" \* "Terrorism % lost visitors")
9. "Average spending for each visitor" = € 25
10. "Visitors spending" = "Average spending for each visitor" \* "Visitors"
11. "% tourists" = 0,15
12. "Tourists" = "Visitors" \* "% tourists"
13. "Hotel guests" = "% not daily tourists" \* "Tourists"
14. "Daily average cost Hotel" = € 90
15. "Average lenght of stay" = 2,5 days
16. "Hotel business" = "Daily average cost Hotel" \* "Average lenght of stay" \* "Hotel guests"
17. "Total business" = "Hotel business" + "Visitors spending"
18. "Occupied beds September" = 83260 \* 0.7 beds
19. "Added value Notte Bianca" = "Total business" - ("Occupied beds September" \* "Hotel business" / "Hotel guests" + "Standard number of visitors" \* "Average spending for each visitor")
20. "Standard number of visitors" = 400.000 people
21. "Hotel capacity in Rome" = 83260 beds
22. "Missing bed" = "Hotel guests" - "Hotel capacity in Rome"
23. " 'Holiday homes' capacity in Rome" = 10386 beds
24. "B&B capacity in Rome" = 4937 beds
25. "Other accomodation capacity in Rome" = 3400 beds
26. "Territorial/Temporal Notte Bianca expansion" = "Missing bed" - ( "B&B capacity in Rome" + "Holiday homes capacity in Rome" + "Other accomodation capacity in Rome")
27. "Visitors t-1" = DELAY FIXED(Visitors, 12, 1.6e+006)
28. "Number of visitors taken into consideration" = ("Visitors t-1" + "Theoretical visitors") / 2
29. "New info private funds" = "Number of visitors taken into consideration" \* "Sponsors spending for each visitor"
30. "Sponsors spending for each visitor" = € 0,2
31. "New info budget" = "Chamber of Commerce funds" + "Private funds" + "Public funds"

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