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The Dynamics and Economic Impact of the Cultural Event "La Notte Bianca Romana"

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The Dynamics and Economic Impact of the Cultural Event "La Notte Bianca Romana"

Marco Meneguzzo[1], Gloria Fiorani[2], Stefano Armenia[3]

Abstract

This paper analyzes the cultural and artistic event "*La Notte Bianca Romana*", which has been designed and realized by the Municipality of Rome. It consists in a territorial marketing tool to promote the "Eternal City" all over the world. This event turned out to be an important incentive to the economic and entrepreneurial development of the city, putting in relationship very 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), all the actors in 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.

JEL Classifications: L60, L25, L11, L15, M16

Keywords:

System Dynamics, Cultural Network, Strategic Management, Local Government.

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Summary

Over the last years, there has been a clear increase in discretionary decision-making policies by local administrations as long as their objectives-to-resources relationship is concerned, which on one side has moved them far from the operative models used in the past, while on the other has favoured a far less operative but more general promotion of the land in terms of social and economic growth. Moreover, also a strong opinion has arisen about the relevant role of culture: a particular attention is today 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 background.

In this context, the cultural and artistic event called "*La Notte Bianca Romana*" (NBR) has been designed and realized by the Municipality of Rome, Italy, and it basically consists in a territorial marketing tool in order to effectively promote the "Eternal City" all over the world. This event has also revealed itself as an important incentive towards the economic and entrepreneurial development of the city, as well as 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 subjects involved in this event and what are their strategies; then, by means of a System Dynamics modelling approach, the dynamics of the event evolution have been simulated in order to observe its medium-to-long-term impact, both direct and indirect, on the overall local economy. Our choice of the System Dynamics methodology has been due to the fact that in the last years, it is being more and more widely accepted as a modelling tool which associated with the power of simulation software develops into a powerful 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 Administrations. 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 surrounding territory.

1. "La Notte Bianca Romana" – The "White Night of Rome"

1.1 "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, and it is held every year in Rome at the end of the summer season. During such an event, many performances and different forms of art (concerts, movies, theatre shows, circus shows, exhibits of all kinds, etc…) are displayed at the same time, and the very same public space is put on stage in all its forms (historical places, monuments, cultural places usually not accessible to the public), also 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 favouring the cultural interchange between the city center and the outer districts.

The idea behind such a cultural *kermesse* was conceived in Paris in 2002, and it was given 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 (at least in most cases) to public places as well as 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, decided to adhere to the concept and promote the first "Notte Bianca" in Rome (September 27th, 2003). In 2006, 5 European capitals (*Paris, Rome, Riga, Brussels and Madrid*) chose to cooperate on this subject, thus sanctioning the birth of an international event ("*White Nights of Europe*"), bond to be extended to other European capitals (Bucharest, in 2007) but also overseas, with an echo in the cities of *Rio de Janeiro, San Paolo* and *Montréal*.

The *NBR* is an initiative[4] 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 important banking institutions (BNL, Banca di Roma, Monte dei Paschi di Siena).

During the *NBR*, the city becomes the stage of many cultural events dealing with solidarity, art, cinema, theater, music, sport, shopping, which all contribute to bring to life every hidden corner of the city, by involving stakeholders of different nature, both public and private, everyone focusing on his own economic, recreational or social return. Taking part to this event 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 various cult places, restaurants, hotels, and so on, with an overall advantage in terms of both economical and occupational returns.

1.2   Historical Data Series: confronting editions from 2003 to 2005

In the following tables, we report some data which has been provided by the Municipality of Rome and by the Chambers of Commerce of Rome, with reference to the first three NBR editions (years 2003 to 2005). The available data highlights a consistent qualitative as well as significant quantitative development of the event over time. Once validated, data has been fed to the system dynamics model which has been designed to study the behavioural dynamics of the NBR development as a cultural event.

Expenses and economic returns

Table 1 reports data with respect to the expenses sustained for designing and organizing the NBR. 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 from the Municipality of Rome (column 5), the Chamber of Commerce (column 6) and private sponsors (column 7). It is interesting to note how a higher number of events were organized in 2005, in

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[4] Organized and produced by the company "Zètema Progetto Cultura".

comparison to those in 2004 (see also Table 3) even though with less re-sources: from this aspect, it is possible to deduce how the acquired experience may have led to a growth on the curve of efficiency in the organization and re-alization of the event, as also confirmed by the same Municipality of Rome.

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
2003	**2848227**	506.400 (18%)	1.179.798 (41%)	1.162.029 (41%)	**1448227**	**1400000**	**n.a.**	**1400000**
2004	**3620851**	497.480 (14%)	1.501.269 (41%)	1.622.101 (45%)	**1820851**	**1500000**	**300000**	**1800000**
2005	**3456112**	375.000 (11%)	1.522.834 (44%)	1.558.278 (45%)	**1660900**	**1350000**	**445212**	**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.*								

Still with regards to the aim of our analysis, it is useful to underline the growing participation of private sponsors over the years (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 further evidenced in terms of its components: "Communication & Promotion" (E1), "Services" (E2) and "Events" (E3). It is interesting to note that, over the years, there has been a clear reduction in promotional expenses. This may have been 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 advertisement needs, due to the "word-of-mouth" effect, given the success of the first editions.

According to the provided data, 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 (€)
2003	n.a.	n.a.	n.a.
2004	88000	n.a.	n.a.
2005	120000	30000000,00	60000000,00

Events and visitors

In Table 3 is reported some data relative to the overall number of attendees to the variousorganized events (that is, visitors attending 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 (€)
2003	600000	1500000	n.a.	70	n.a.	n.a.	21428	16600
2004	1.600.000 (+30%)	2000000	300.000 (88.000 hotel)	300	n.a.	5333	6666	5407
2005	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 heavy blackout during the night, more than 1.5 mln visitors took part in the NBR. In 2004, thanks to the favourable meteorological conditions and to the higher number of shows on schedule, the visitors grew 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, 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 just the indoor ones organized in 2005. We thus tried to get evidence of other attendance reduction

factors by analyzing again other aspects that initially had been kept out of our model, and we effectively discovered that other factors might have contributed to such a decrease in presences, first of all the terrorism menace.[5]

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

Transportations

Table 4 shows data on transportation activities during the various NBR editions.

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
2003	n.a.	n.a.	n.a.	Free from h22.00	n.a.	n.a.	n.a.	1000	n.a.
2004	1000000	600000	1600000	1,00	n.a.	170	9200	n.a.	n.a.
2005	800000	430000	1230000	1,00	1123000	700	10000	n.a.	15-30%

In all editions (and in particular on 2004 and 2005) the public transportation companies have increased their service levels, extending daily lines until late night and by adding new night lines as well as new buses on existing lines. 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 rides by just buying a whole day travel card at a special price of 1 euro.

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[5] Data scored in 2006 confirm such an hypothesis.

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 the 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.

Downfalls and consequences in terms of employment

La Notte Bianca Romana (NBR) has 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 in the city, there is evidence of a peak increase in employment of about 200.000 employees, most of them 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 evidenced above in terms of public transportation and security measures intensification (the latter in order to face the perceived terrorism menace at the time), as well as also in terms of the increase of public places open to tourists and of events on schedule. Again, it's worth noticing that 265.000 euro out of the 560.000 budget (for the 2005 edition) have been spent to cover the costs for Municipal Police agents, 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 suffice to note the growing participation of private sponsors but also of tourists, as previously said, which caused some problems with the overall roman "hosting capacity".

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

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 also 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 potential expansion of the event following to the adoption of the previous hypotheses, data has been collected with reference to the overall hotel receptivity and capacity of the city (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
Total	802	40406	81523	817	40444	80908	845	41522	83260

Table 6: Other types of lodging in Rome

Year	2003			2004			2005		
Type	Structure	Rooms	Beds	Structure	Rooms	Beds	Structure	Rooms	Beds
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
Total	1530	9351	17006	1645	9914	18102	1761	10326	18678

2.   Description of the model: hypotheses and variables

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

- data series relative to the past editions, kindly provided by 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;[6]
- a careful study on the behaviours and strategies of involved stakeholders.

The main goal of the model construction and the following 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, with the base assumption that the involved stakeholders will not change over time their initially declared strategies.[7]

Towards this end, the time unit has been defined as "months" and the initial time (t_0) has been set to 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.

## 2.1   Causal-loop diagram and non-linear functions

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

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[6] 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*.

[7] 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.
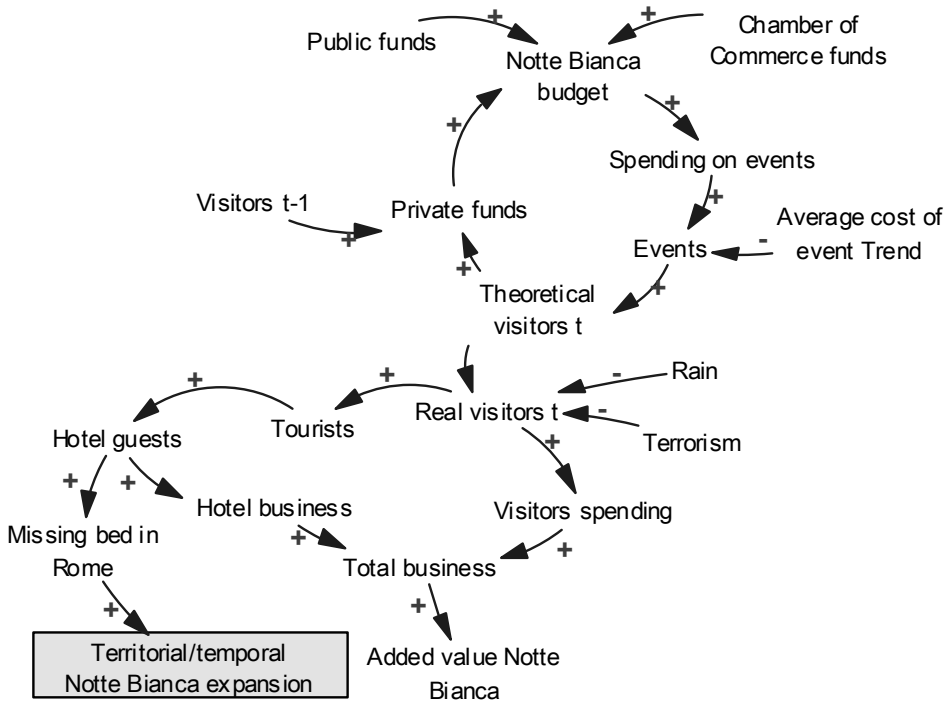
Figure 1: Causal relationships among relevant variables in the model

As shown in Figure 1, positive links 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*) exist. The last relationship is also positively influenced by the eventual decrease in the average cost per event (given a fixed budget, if the cost per event decreases, then there is money left to organize and schedule more events). And in fact, 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 behaviour of such variable.
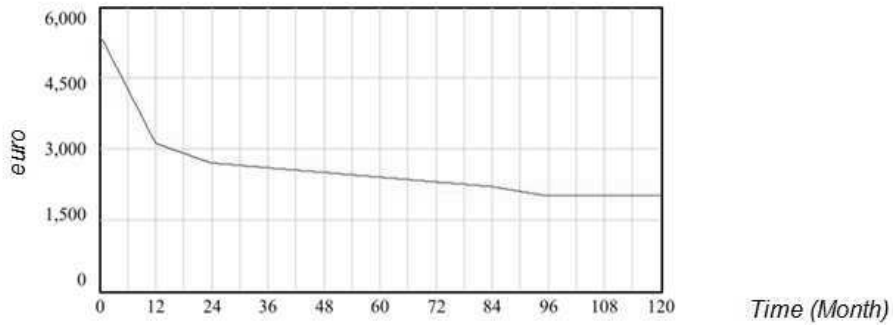
Figure 2: Behavior of the variable Average Cost per Event (euro)

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

The percentage of "lost" visitors due to rain, calculated on the basis of available data, has been found to be at 42% of the theoretically expected visitors. The chance of a rain event (which historically was equal to a probability of 0 in 2004 and 1 in 2005) in editions after 2005, has been calculated to be at 0.27.[8]

We also assumed in the model that the percentage of lost visitors, due to the menace of terrorism, will take on the "rise and fall" shape shown in the graphical function depicted in Figure 3.

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[8] See note 6.
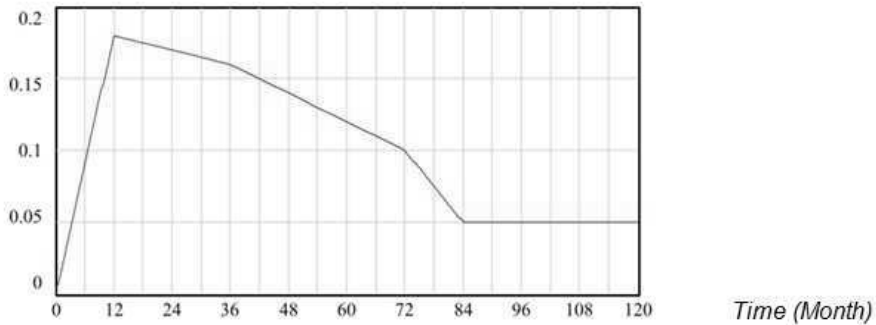
Figure 3: Percentage of "lost visitors due to terrorism" – graphical function

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%,[9] 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 the higher the funds will be. The loop then closes with a positive relationship on the NBR budget by also adding both public funds and funds coming from the Chamber of Commerce.

The behaviour of Municipal funds (*Public Funds*) over our 10-year projection has been designed on the basis of the strategies of the Municipality of Rome: as we 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, as the Municipality of Rome itself declared, won't be necessary to cut further.

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[9] Such a percentage has been calculated as the difference between the total "lost visitors" percentage and the "lost visitors due to rain" percentage.
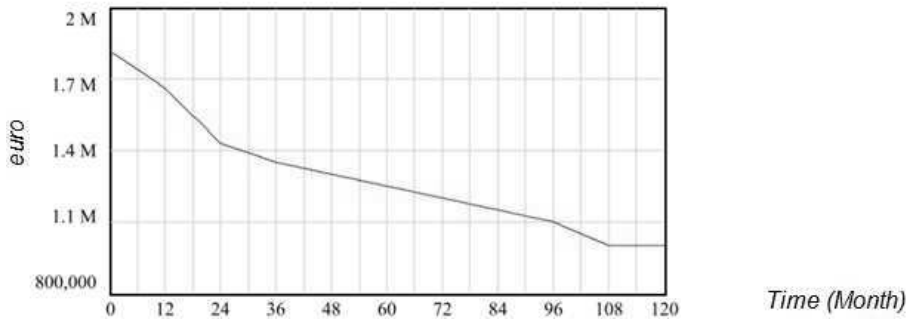
**Figure 4**: Behavior of Public Funds from the Municipality of Rome (euro)

The Chamber of Commerce declared instead its will to maintain almost un-changed (though with a slight decrease) their contribution to the initiative (Figure 5).
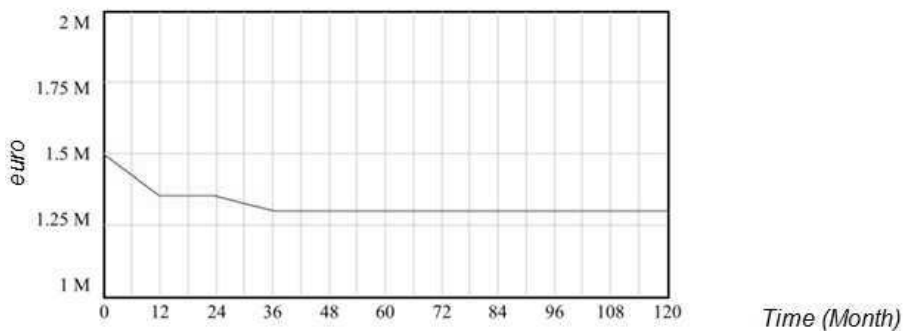
Figure 5: Behavior of funds contribution from the Chamber of Commerce
(euro)

On the lower part of our causal-loop diagram, it is possible to observe the links which put into 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 con-sideration of the international affirmation of the initiative, it has been assumed that the percentage of non-daily tourists will in the future follow the behaviour depicted in Figure 6.
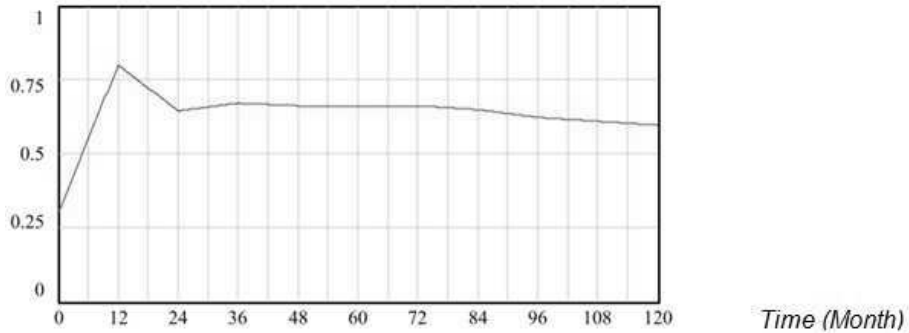
Figure 6: Non-daily tourists percentage

While the non-daily tourists grow, thus there is the need for either a territorial or a 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.

2.2   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[10] 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 million 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*".

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[10] 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*".

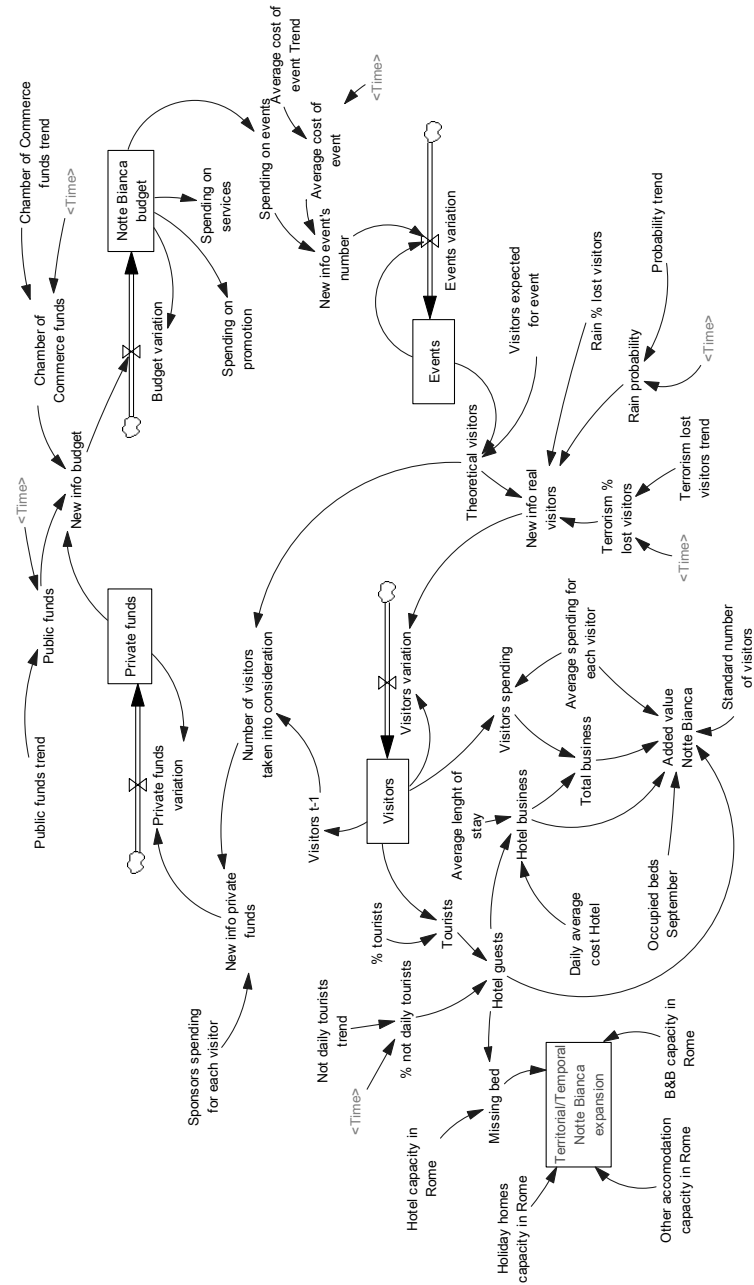For details on the auxiliary variables equations, see the Appendix.

**Figure 7**: S&F model structure for "La Notte Bianca Romana"

3.   Simulation results

The results of the simulation would seem to confirm the prospect of a possible further development of the " NBR". The following considerations refer to the principal 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[11] and the will by the Chamber of Commerce in continuing funding.[12]

This is because the Municipality of Rome aims to reduce financial contributions to a maximum amount of 1 million euro over a span of 6 to 8 years.[13]

Thus, the cost of the "NBR", which amounts to 3,6 million euro in 2004 will tend to fall below 3 million euro in the future (Figure 8).
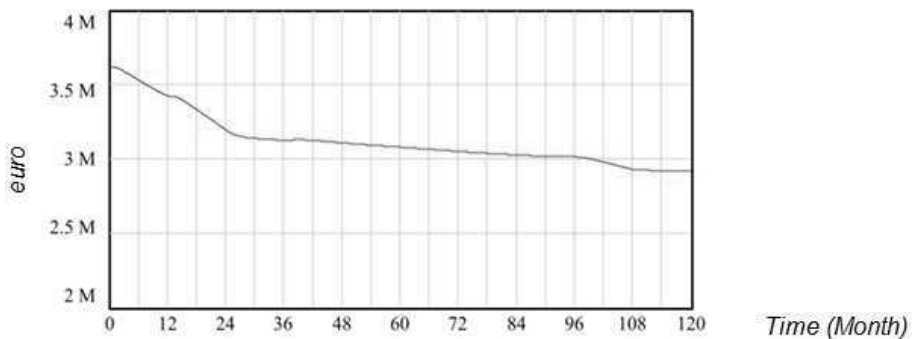
Figure 8: Budget trend (euro)

However, despite gradual reductions in funding (in the model, percentile of the total budget, see eq. n.3 and 4 in 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[14] thanks to lower transaction costs and to economies of scale, as well as also by reducing red tape (bureaucratic proce-

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[11] See Figure 12.
[12] See Figure 5.
[13] See Figure 4.
[14] See Figure 2.

dures) and generally improving organizational techniques (based on correcting past mistakes) thereby increasing overall efficiency[15].

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.
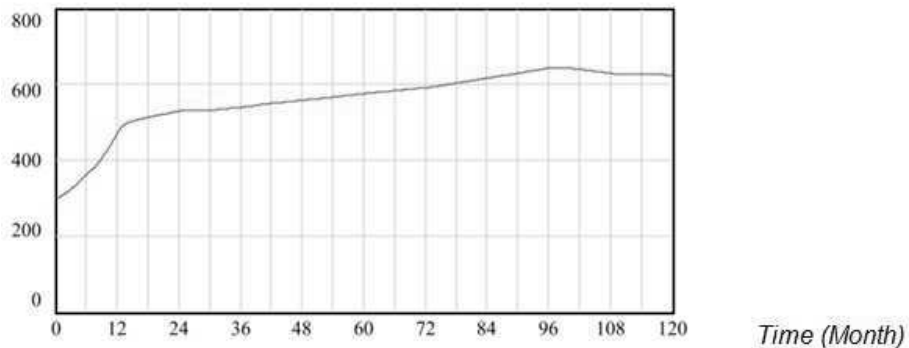
Figure 9: Event's trend

The variety of events is the most important factor in determining how many people are expected to arrive (*theoretical visitors*).[16]

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[17] and/or the threat of terrorism[18] and on the probability of rain[19]).[20]
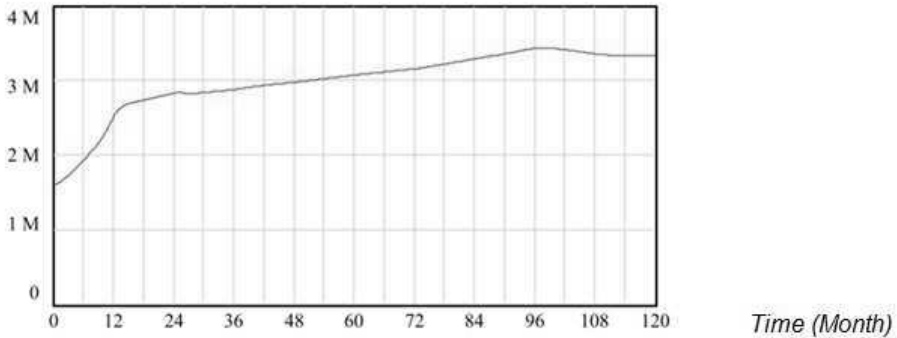
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[15] See Paragraph 2.2.
[16] Eq. n. 5 e 6, Appendix.
[17] Eq. n. 7, Appendix.
[18] See Figure 3.
[19] The probability of rain (0 in 2004 and 1 in 2005) has been calculated in the editions following the year 2005 at 0,27% (see note 6).
[20] Eq n. 8, Appendix.

Figure 10: Theoretical visitors trend

In 2004, 2 million visitors enjoyed 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 might be present in future editions (Figure 11).
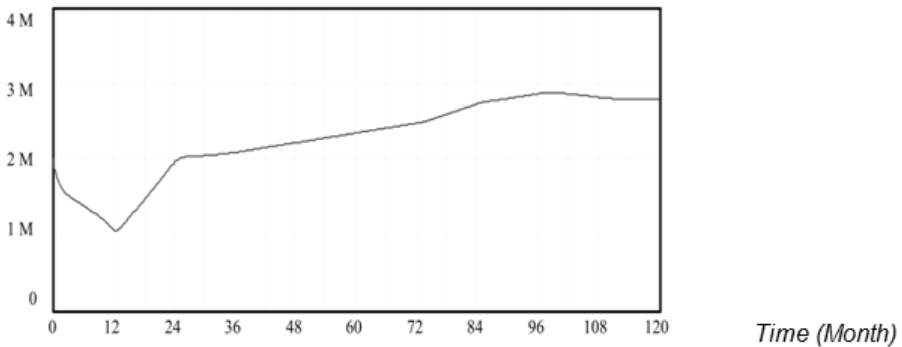
**Figure 11**: Actual visitors trend

Sponsors will eventually decide in which way they may fund the "NBR" at year t basing their decisions on how many people participated at t-1 and how many people the organizers predict will participate at time t.[21]

The simulation runs show that more and more sponsors are financially contributing to the "NBR" (see Figure 12).

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[21] Eq. n. 27-30, Appendix.
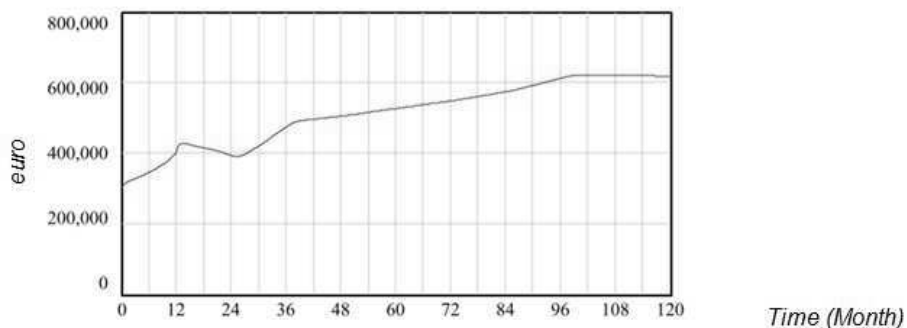
Figure 12: Private funds' trend – sponsor (euros)

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

There are two other important aspects that the model addresses and which are influenced directly by the variable "*visitors*". The first one has to do with the economic gains of the "NBR", with particular reference to the lodging capacity.

The second refers to an eventual expansion (both territorial and/or temporal), of the "NBR".

The simulations reveal 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 one day in Rome)[22] and, as a consequence, this brings to an increase in "*hotel business*", as calculated by means of the constants "*daily average cost hotel*" and "*average length of stay*" (Figure 13, left).[23]

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[22] Eq. n. 11-13, Appendix and Figure 6.
[23] Eq. n. 14-16, Appendix.
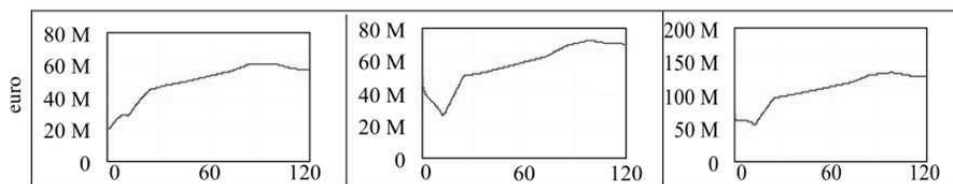
Figure 13: Hotel business; Visitors spending; Total business (X-axis unit: Time/Month)

By considering that every visitor spends an average of 25,00 euro during the "NBR" (usually for transportation, food and shopping) it is possible to calculate how the variable "*visitors spending*" will proceed in the future:[24] in 2005, the NBR-induced economic activity lead to an overall income of 30 million euro, showing a likely path for a great future growth of the induced business (Figure 13, center). Furthermore, by putting together the two variables "*hotel business*" and "*visitors spending*" (see Appendix, eq. n. 17) it is possible to infer the "*total business*" (Figure 13, right) of the "NBR" and how this trend will continue to improve in the future.

The *added value* of the "NBR" (Figure 14), which amounted to 30 million euro in 2005, is still less than the overall business value, mainly since the month of September is considered to be "high season" in the tourist market: this means that 70% of sleeping accommodations would be occupied in any case (Appendix, eqs. n. 18 - 20).

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

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[24] Eq. n. 9 e 10, Appendix.
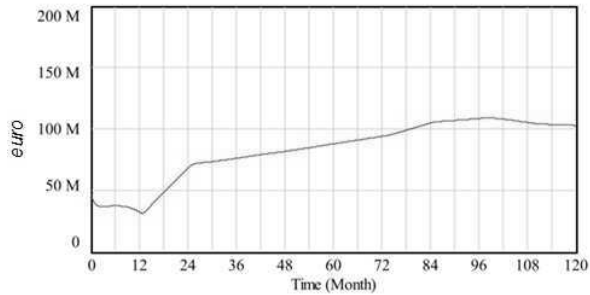
Figure 14: Added value of the NBR

As shown in Figure 15, there are excellent possibilities for expansion after the 2005 edition.
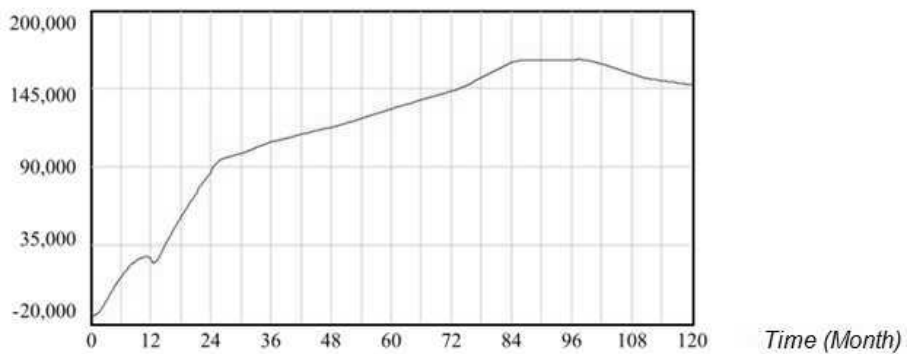
Figure 15: Territorial expansion of the "NBR": tourists not received by the
Roman accommodation structures

4.   Conclusions

The results obtained by simulating our model confirm the substantial positive economic impact of the "NBR" and its potential for further development.

We have found out how the number of events will generally tend to grow and, as a consequence, so will the number of actors involved (sponsors, visitors, tourist, hotels, etc…). More visitors and in particular an increase in the number of tourists that will stay in town for more than a day will create the basis for a further expansion of this important manifestation, both territorially and on a time basis but also in the number of actors involved.

Eventually, if the NBR is not prolonged for more days (*temporal* expansion of the manifestation)[25] with the purpose of regulating visitors' turnover on a longer period of time, inevitably the various lodging structures of the town, such as B&B and holiday housing, will be involved and subsequently new actors in the areas surrounding Rome(in particular the lodging structures in Ciampino and Frascati) will be, formally or informally, involved too.

Figure 15 shows the trend in the number of "long-term tourists" (in the model "*non-daily tourists*") who could not be received by the Roman accommodation structures[26], thus indirectly confirming the concept of territorial (and/or temporal) expansion of the NBR.

It is 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 96th (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 someway pulled also by the overall growth dynamics 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 dynamics are not clearly visible due to systems' delays and to the chosen time horizon. However, such an observation allowed us 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.

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[25] A solution adopted in the 2006 and 2007 editions.
[26] Hotels and other kinds of room and board businesses.
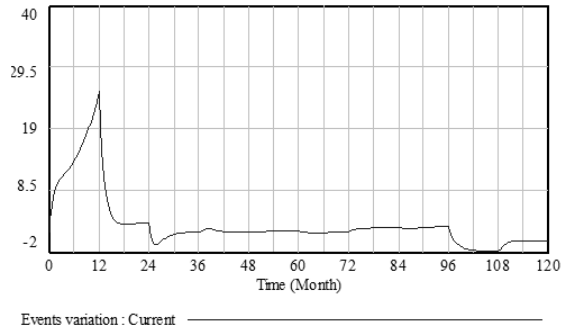
Figure 16: Events variation

5. Future developments of the model

The proposed model can be further improved so 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 new functions in order to sustain the hypothesis of an eventual "emptying" of the levels that are kept under observation (implying the "death" of the manifestation). The way in which the flows have been defined would potentially allow to meet this possibility.

Bearing such an idea in mind, it would be best to initially connect 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, then there is no variation, while, at the extremes (x = 100% or 0%), a total " emptying" of the variable " visitors " would occur (thus leading to the "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 al-

lotted to events, services and promotional expenses, it will be possible to evaluate strategic choices of promoters and funders as well.

Eventually, new factors need to be introduced in order to study how sponsors behave, considering that 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, we find:

- 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).

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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