

New Urban Quality of via Sopramuro: metamorphic pattern of a technological design

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Abstract

This contribution presents the results of a technological reading, aimed to offer a methodological approach to each phase of the transformation process, in historical context via Sopramuro in Pendino neighbourhood in Naples. The technological project follows the sustainable design principles especially related to the sources saving and supplies to no-quality urban space the use of appropriate technology as added value. So technological progress as close connection between present lifestyles and historical context.

Keyword: Saving of Resources, Historical Context, Appropriate Technological Solutions, Harvesting Rainwater.

1. An important trajectory of Naples urban development

Naples' economic and commercial impulse has an explicit historical evidence in its market places, toponomy and in the available iconographic views.

This commercial flair of the City, has marked most of the urban system in time, since the traders' home were built up their shop and vice versa. And in so doing for whole neighbourhood, the aptitude of the city entered in urban pattern, becoming a distinctiveness and offering typical smell, colours and folklore, mainly in proximity to the access roads to the city.

This alternation between production/handicraft and sale-inhabitation has characterized the urban space living.

Some of this spaces lost the main role of urban protagonists after the opening of big commercial chains and malls, resulting in their increasing abandonment and environmental degradation.

Living and environmental protection are the fundamental needs that the actual construction and urban redevelopment strategies seek to answer (Violano and Buanne, 2017).

The technological project developed for the urban regeneration of Porta Nolana was divided in the following steps, which represent its experimental and research approach: Explorative and sensitive knowledge of the places, gathering the dimensional and spatial information and, also, suggestions and perceptions raised by the place's folkloric atmosphere; graphical representation and urban environment relief maps elaboration, focusing mainly on the permanent relation between living/working/travelling; analysis of expressed and unexpressed needs, targeting a better liveability and usability of the area; development of a technological project and a qualitative verification of its feasibility.

The evaluation of the environmental comfort in open urban spaces was performed applying the analytical method of the RUROS research, this has highlighted a relationship between environmental parameters and microclimatic conditions like air temperature (T_{air_met} , °C), global solar radiation (Sol_met , $W.m^{-2}$), wind speed (V_met , $m.s^{-1}$) and relative humidity (RH_met , %), to define the Actual Sensation Vote (AVS), a people's thermal sensation model that evaluate the thermal comfort conditions in outdoor spaces, calculated by the mathematic relation (1) (Violano and Buanne, 2017).



Fig 1_ Map extract from “Historic Centre of Naples - inscribed minor boundary modification” by http://whc.unesco.org/en/list/726/multiple=1&unique_number=1867

	SPRING	SUMMER	AUTUMN	WINTER	AVERAGE
AIR TEMPERATURE Tair_met (°C)	14	23	18	19	16
SOLAR RADIATION Sol_met (W · m ²)	211,3	282,5	138,3	78,1	177,55
WIND SPEED V_met (m · s ⁻¹)	2,9	2,9	2,2	2,2	2,55
RELATIVE HUMIDITY RH_met (%)	71	70	74	75	73
ASV	-0.34	0.16	-0.13	-0.62	

Tab 1_ Average seasonal weather data for Naples Capodichino, useful for calculating the ASV

This information for Neapolitan climate was carried out with the data of the Military Air Force Military Service of Naples Capodichino Meteorological Station, as described below (Tab 1).

Then the AVS can be calculated employing in the following format, that was elaborated for European Country:

$$(1) \quad ASV = (0.0049 \cdot T_{air_met}) + (0.001 \cdot Sol_met) - (0.0051 \cdot V_met) + (0.014 \cdot RH_met) - 2.079$$

From the calculation results that the comfort conditions of the area are quite discrete in all seasons for the outdoor sales activity, thus the Via Sopramuro urban revitalization design must not be a gentrification or homogenisation of traditional trade, but rather support and trying to make livable in the current users and environmental value scenarios.

SEASON	ASV	COMFORT	PERCENTAGE
SPRING	-0.34	0.65	65%
SUMMER	0.16	0.78	78%
AUTUMN	-0.13	0.70	70%
WINTER	-0.62	0.49	49%

Tab. 2. Percentage Values of Users in Comfort (ASV).

2. Within urban framework

The market place of Porta Nolana, in Via Sopramuro (Pendino neighborhood), is historically linked to the sale of food, mainly fish. In fact, starting from 1438, Ferrante d'Aragona promoted the expansion of the city walls and the development of a market-dedicated area near to the new city walls. This was possible thanks mostly to the proximity to the sea and to Porta Nolana, one of the gateways to the city.

This city block was shaped in alleys and squares, and that formed a system of urban market that is still present today.

The market place of Porta Nolana flourished so that it became a traditional mark of characteristic language where its direct and indirect users still identify themselves.

Nowadays, this area is a model of urban complexity, in Via Sopramuro (literally “street above the walls”, meaning just outside the perimeter) in particular there are: historic elements, elements for the sale, high-density housing. They are all occurrences that coexist in the same space and constitute its characteristics. Via Sopramuro road has linear longitudinal development and on its curtain road there are advertising insignias, rainwater pipe, electric cables and merchandise in sales exposed.

Here the sale happens everyday, and exhibiting shop stands are opened on the road from early morning until late evening and they occupy the sidewalk and part of the carriageway, the consumers crowd, walk, watch and bargain in the middle of the road and they are drawing with colours, vibrant sounds, folkloristic atmosphere and prime quality products.

The co-existence of all these elements makes this street particularly complex, but heart of a local code marked with a strong identity.

As usually happens in the urban center most outer areas, this zone, despite the presence of important monuments such as Porta Nolana and the two side towers, once the daily market activity has ended, lays in a considerable, environmental and social degradation that is physiologic in similar zones.

Therefore it is hoped for a project that integrates the potential for urban comfort, and quality of the architectural environment.

The technological project can be improved them, setting itself up as integration process between present-day lifestyle and historical background.

3. The adaptive project that qualifies the urban space

Based on analysis carried out, the technological project, that was designed for specific conditions of fish sale, consists in the integration of water saving, aimed for the street cleaning when daily activity will be finished.

Water is a precious resource whose management must be geared towards avoiding waste. The historical role of water, which in this area of Naples washed the walls as natural protection, in the concept of this urban design evolves by flooding the streets to ensure cleanliness and health. The project uses water as a distinctive feature for the regeneration of the site, with the added value of being a recycled resource. The recovery and recycling of rainwater is pursued through three phases:

1. evaluation of feasibility of the system according to rainwater resources;
2. preparation of underground storage into place of use;
3. efficient allocation of resources for the street cleaning.

In order to verify the feasibility of the technological system, the determination of the need for water resource for the street cleaning was compared with that of the recoverable amount of the rainwater (water requirements).

The established water needs is 4600 litres a day and the rainwater supply is determined by water from monthly precipitation (the data are from the nearest weather station of Napoli Capodichino) and from rainwater that has accumulated in enhancing-surfaces on the rooftops of buildings of Via Sopramuro. The report sets out that it is possible to retrieve about 4200 litres a day from rainwater, therefore producing savings by more than 90% of resource.

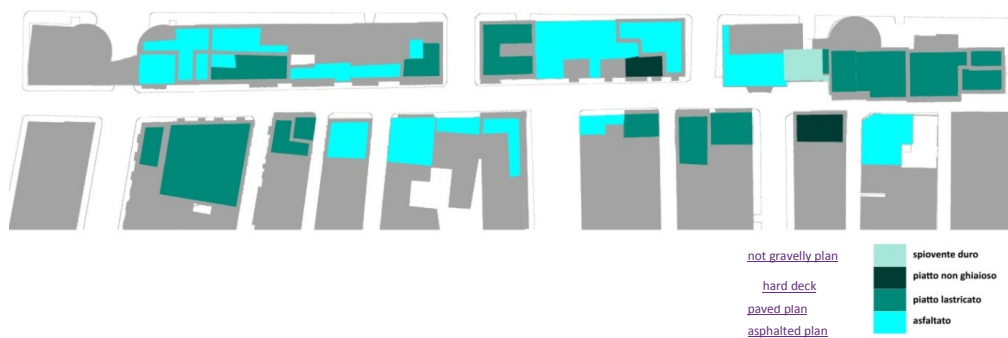


Fig 2_ Roofing plan of Via Sopramuro buildings. Evaluation of feasibility of the collector system.

The new street arrangement foreseen in the technological project arranges the road as it follows: reducing the actual dimensions from 6 metres each to 3 metres, in order to make easier the public access to the market; a diversification of the inclination paving percentage in two way: in the first section of standard inclination with a 2% slope and

1,20 metres long; the second one 1,80 metres long and with a 8% slope, to facilitate trade show products and the water flowing towards the sewage system for the cleaning street.

This new road section does not substantially modifies the commercial purpose of the area or the sensory perceptions that it raises in the user, but it allows to turn the use of a precious resource like water in a virtuous cycle of utilization, making the urban environment comfortable and performing for the particular market activity.

This harvesting rainwater cycle may be divided into three phases:

- the first consists in collecting rainwater by roofs; the water is filtered by remains and smells through the drain-trap, then it runs into the basin to be caught;
- the second consists in pumping up the water into the kerbstone of sidewalk with a 2% slope; water is further filtered into collection sump that is stored on the street by sidewalk;
- the third consists in washing, following the slope of the road and in the end, water is channelled into the sewers.

Therefore, this project, through rainwater rescuing and reusing, allows via Sopramuro to self-wash from the remaining part of market area and developing its economic activity. At the same time, the project restores the ancient street dignity and unity, highlighting the living and users' relation with the neighbourhood and its activities.

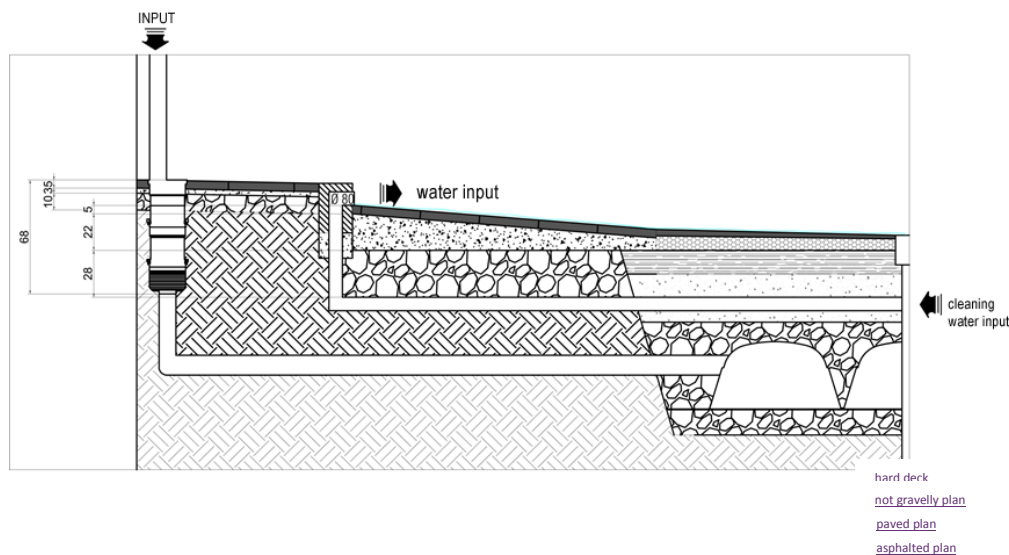


Fig 3_ Localization and water harvesting system.

4. Conclusion

The methodology applied for the technological project of Via Sopramuro regeneration offers a model of knowledge and systematization of sensitive information, in order to provide a lecture for a project proposal that truly integrates the cultural, social and environmental local issues and that doesn't impose a far removed from the context layout, but as an integrated and participated space reading. This places, in fact, so rich of identity, hardly acquire as their own a new space interpretation. Thanks to the presented methodology, it is possible to plan urban regeneration of open spaces in similar contexts.

Notes

¹ RUROS research published the results of an extended survey in seven European cities, Athens (GR), Thessaloniki (GR), Milan (IT), Friborg (CH), Kassel (D), Cambridge (UK) and Sheffield (UK), with the aim of identifying the relationship between climatic factors and comfort indices in open space, in terms of thermal user satisfaction (ASV), and providing the designer with simpler complex assessment models.

Cfr. http://cordis.europa.eu/project/rcn/54204_it.html.

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