

Characters and models of Rural Architecture in Puglia

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ABSTRACT

The farmhouse represents an example of rural buildings in the Puglia region, it consists of model types connected to functional efficiency and to saving the natural resources available, becoming an example of sustainable architecture.

The farmhouses built between the 16th and 18th century are the most significant model of traditional eco-sustainable architecture and can be broken down into the following types:

1. **Landscape – morphology:** connected to their insertion in a specific environmental context (with trulli in the Itria Valley and fortified farmhouse in the coastal areas);
2. **Climatic – orography:** connected to their location in the territory (with pitched roof in Capitanata and in Alta Murgia, flat roof in the plains and coastal areas, gabled roof with stone blocks in the Murgia hills of the Trulli);
3. **Farming– productive:** concerning the type of farming and production (agricultural – pasture, egg farming and/or vineyards);
4. **Defensive – functional:** concerning the presence of defensive elements (including fencing, wall-walks, watchtowers, trap doors, embrasures, raised steps, corner towers).

Apulian farmhouses are not only important historically and culturally, but also play a fundamental role in the agricultural production of the territory. This property must be safeguarded by envisaging structural recovery using traditional building techniques capable of preserving the rural identity and at the same time promoting eco-sustainable development criteria.

Keywords: farmhouses built, eco-sustainable architecture, traditional building techniques.

INTRODUCTION

Apulian rural buildings are a heritage in which the morphological aspects are connected to the historical and economic ones, which in turn depend on the geographical characteristics and on the social context for each historical period.

The use of rigorously local materials and techniques makes traditional architecture an ecological building technique, which develops in respect of environmental rationale and of the previously existing situation, so that man is always in a constant balance with nature. The use of tuffaceous rock, coming from local quarries is always correlated with the local characteristics, the microclimate, the exposure to the sun, the dominant wind direction and the local resources.

The craftsmanship of the stylistic elements, the organic expressivity of the rural complex, consisting of a “skilful blend” of closed volumes and open spaces, especially in the farmhouses with trulli, demonstrate how important it is to protect and recover these structures and exploit an architectural language in which there is a perfect harmony of natural, environmental, economic and functional elements. In rural building the compositional rules do not come from aesthetic requirements alone, but from territorial and climatic factors like the

position, the height, the defensive characteristics of the settlement from any predators and above all from the main necessities dictated by the sustenance of man and animals. Indeed rural architecture requires rooms for abode, for storage, for sheltering animals (stalls, sheep pens) as well as premises for producing and preserving food (granaries, bakeries, oil mills, grape press) and water accumulation (tanks) and snow (cool room) as well as open spaces for grazing (farmyards, sheep shelter, sheep pens).

Typological models

The different types of farmhouse create reference models for a classification regarding the morphology of the territory and the compositional structuring of the various additions.

The formal variants may depend on climatic situations (terraced or covered with double pitched roofs), on defensive requirements (presence of walls and of the tower) or on production systems (breeding, sheep farming). In the 17th and 18th century, architectural and decorative elements often made the construction less severe with the addition of loggias, decorative staircases, bell gables, festoons, mouldings and sculptures.

The chapel was erected against the dividing wall in a barrel-vaulted or cross-vaulted room. This defined the presence of religious power, whereas the size of the oil mill and of the stables was an index of productivity and economic power.

The strong complexity of the rural construction systems is due to the many elements making it up and to the determination of some primary constitutional elements, which construct increasingly complex and articulated systems through their many combinations, connections and repetitions.

From the vast compositional repertoire of rural architecture, it is possible to determine suitable case records of reference types by analysing the basic cells and the supporting elements surrounding them.

The genealogical classification that has been reconstructed contains the basic cells and the supporting elements which do not represent an organic settlement unit, but constitute the parts making up the rural settlements. Expressed with different morphologies (depending on a series of factors connected to geographic, orographic, economic factors, but mainly to the production functions), they respond to the two fundamental acts of living which define any primordial action of space appropriation: enclosing and covering.

The basic cells, made up of an elementary cell covered by a vault or by a pseudo-vault, are, in some cases, the only architectural volume of the settlement or in others, the original nucleus of future building transformations.

The basic cells are used for sheltering the animals, storing tools or food (Stable/Sheep pen, Porch, Barn, Tank, Cool room) or are used for defensive purposes (Tower), religious purposes (Chapel), productive purposes (bakery, Oil mill) or temporary dwelling (Trullo, Casedda).

The supporting elements are generally walled uncovered spaces, subject to single or multiple use. The limit concept may be considered in a physical sense, in the presence of a fenced off area for grazing (*sheep shelter*) or of a cultivation, or in an abstract sense in the event of the fencing being a different land use (farmyard with stone pavement).

The working environments which best characterise the historical role of some rural constructions include the *oil mills* and *grape presses* usually created in ancient rupestral settlements in the underground levels of the main building or in the immediate vicinity, as can easily be seen in the farmhouses of the territory of Monopoli, Fasano and Bari.

The use of the environments is also highlighted by the type of existing vault: barrelled or cross for the residences of the *farmers*, cloister and barrelled vault with lunettes for the owner's quarters on the first floor.

The alternation of closed spaces and uncovered ones aggregated to the residential construction and protagonists of an agricultural economy mainly dedicated to grazing and breeding, creates a multi-faceted geometry with various forms.

The composition of the individual parts of a multi-cell system is of a dependent nature, because their independence is hierarchically sub-ordered compared to the whole of the building from which they cannot be separated. The elementary systems belong to a single act of construction with a synchronic process; in the event of construction over a long period of time, the initial project intention, which is usually expressed through simple and effective systems, is respected.

Different settlement models can be distinguished: elevation, blocks, courtyards and enclosure.

The elementary systems which develop using *elevation* refer to the type known as *Torre Masseria*, datable to around the 16th century and used for residential as well as productive and agricultural purposes. The building layout consists of the duplication of the ground floor rooms on the first floor. The result is an extruded form, which is subsequently completed by even very articulated defensive superstructures. According to the number of spatial modules which the tower is made up of, for each of the two levels, this type in elevation can be distinguished either on a *monocell basis* (*masseria Spina Piccola in Monopoli* and *masseria Ascanio in Nardò*) or on a *multicell basis* (*Masserie Lamacupa and San Domenico in Fasano*).

Isolated *block* architecture refers to elements defined by very compact volumes, whose figurative reference is the castle or the small rural house. The layout shows two series of rooms (exploiting the dual exposure, the thickness never exceeds three bays for pseudo-square buildings and two for rectangular ones) repeated for a certain number of vaults, often obtaining elongated forms, ordered on one or two symmetry axes. In spite of the customary division that allows the rooms to be easily attributed uses, where the ground floor contains the rooms for production and upstairs there are the living areas, it can be seen that the compositional layout is often very similar for the two levels. It is like a container which allows any kind of re-functional use leaving the architectural layout unchanged.

The *courtyard* kind is obtained when the rooms are arranged around a central space. The simple formation of an uncovered space which allows the normal aero-illumination of the internal facades determines the morphology of a courtyard building of *urban dimension*, where the relationship between layout and raised dimension is limited and therefore the central void looks like an uncovered internal room. This is common in settlement models in built up areas. Examples of courtyard farmhouses are: *Masseria Viglione in Santeramo in Colle*, *Masseria Palazzo D'Ascoli in Ascoli Satriano* and *Masseria Macagna in Sammichele*.

In the cases where there is a clear separation between the inside of the building form and its outside and this perimeter is only defined by a boundary wall, these systems can be called *enclosure*. An example is *Masseria Lamberti in Bari*: the empty space between the main nucleus and the deposits cannot be used as a courtyard like in a rural courtyard. In the same way it does not have the particularity of an urban courtyard because it is not integrated with the residential body. It is an intermediate space, often used as a garden or market garden.



1. Masseria San Domenico – Fasano (Br); 2. Masseria Trappeto – Nardò (Le).

Several elementary systems and several base cells and supporting elements give rise to *complex systems*. They are constructions whose original nucleus can be determined and this provides the dominant element from a volumetric viewpoint: the reference is to the types *Tower Farmhouse*, *Castle Farmhouse*, *Little Farmhouse* and *Farmhouse with Tower*.

A first level of order of the complex systems is determined by the type of open or closed layout. The *open layout* systems consist of a single building aggregate characterised by the continuity of the construction. The different elements are juxtaposed in adherence according to concave or convex morphologies, generating external spaces that are never completely enclosed by covered rooms nor by boundary structures which never interact with the buildings suggesting layouts, alignments or adherences. The open configurations can be summarised in linear, polar and open courtyard aggregations.

Linear aggregations are compositions of elementary modules along a main directrix, defining convex morphologies or systems where the external space is residual and thus not previously determined by an intentional design, despite having different uses. This choice of composition often recurs, above all because it is the one which establishes simple and easily controllable distribution relations.

Polar aggregations differ from the previous ones for the composition around a main nucleus and show the presence of several buildings with a centrifugal character. The external space always remains residual and the original elements can be clearly identifiable unless they are hidden by more recent excrescences.

Open systems can be aggregated by circumscribing portions of space whose morphology denotes an intentional design to attribute function and meaning. However, these spaces are never completely enclosed in the context using closure with boundary walls or rooms. The constructed forms deriving from it have a continual (the building is one although it is made up of several arms) and concave (it leaves a free area enclosed by at least three sides) physiognomy. These systems are defined *open courtyard*. A first variant obtained with the repetition of extended bodies of the thickness of a spatial bay, connected to the ends and distributed on an orthogonal mesh produces an open courtyard system.

The complex systems are manifested with the aggregation of elementary systems of various kinds and extremely frequently within a recognisable perimeter. The internal uncovered spaces may be delimited using the same buildings, whose external bay is also perimeter of the whole building, or by using an enclosure with certain access points. In the first case it means *courtyard* systems, which can be interpreted as a further level of complexity achieved by open systems, also with courtyard layout, for which suitable buildings are inserted to block the free fronts. The layouts concluded with an *enclosure* can be classified according to the capacity of the same wall to affect the location of the buildings. If the enclosure delimits the areas

surrounding the farmhouse, and its construction, either prior to or after the buildings, does not affect the volume, the rural complex is called *free structuring*. In this type the individual buildings, connected or fragmented, are arranged freely in space defined by the boundary wall.

Sustainability of the Apulian rural heritage

Rural building is developed through models strictly dictated by functional effectiveness, by saving the natural resources available and by establishing a significant example of sustainable architecture.

Buildings are positioned and distributed according to the kind of soil, the climatic conditions connected to the presence of moisture, wind, sun and rain. The farmhouses built between the 16th and the 18th century are the most significant model of traditional eco-sustainable building and can be broken down into the following types:

1. landscape type - morphologic, connected to their insertion into a certain environmental context (with trulli in the Valle D'Itria, fortified in the coastal areas);
2. climatic type - orographic, connected to the location in the territory (with pitched roof in Capitanata and in Alta Murgia, flat roof in the flat and coastal areas with "pignon" slabs in the Murgia dei Trulli);
3. cultural type - productive, concerning the type of cultivation and production (agricultural - farming, olive farming and/or vine growing-wine making);
4. Defensive-functional type, concerning the presence of defensive elements (enclosure, walkway, watchtower, trap doors, arrow loops, rises with staircases, corner towers).

Apulian rural buildings are a heritage in which the morphological aspects depend on microclimatic and geographical characteristics as well as on the social context.

The building process is characterised by the absence of polluting residual products, because the processing discards of the stone elements are used to make the internal walls, the supports to the vaults and the levelling screed. Furthermore the lime-based whitewash and the layer of external lime-based plaster help maintain the cleanliness of the living rooms and protect the walls from moisture.

Finally, the often enormous dimensions of the external walls made with parallel rows of tuff blocks or with local stone originally laid dry by simply overlying the hewn stones, and only later held together using mortar, are determined by static-performance requirements.

One of the peculiar features of the Mediterranean landscape is witnessed by the presence of a thick network of limestone drystone walls. In some regions like Apulia, this presence takes on an extraordinary importance because, with the exception of the cereal fields of Capitanata, drystone walls weave an orderly seamless maze.

The drystone walls provide a natural response to a multitude of symbolic and productive requirements: fences for the animals, road borders, borders for trails, marking property boundaries and allotments even minute ones, protecting farmhouses, fields, vegetable gardens, vine groves, olive groves and "gardens".

Structural aspect

Horizontal structures, like vertical ones, are made with construction systems and materials sourced locally. From the classical vaults made with hewn local stones or lightened, in the most evolved forms, with cylindrical brick elements (bubbole) and with shoulders deriving from cutting quarry stones, to the flat roofs or inclined ones, all made with local stone and waste and wooden bearing structure.

Wooden floors are, perhaps, a less sustainable technological solution than the use of stone, because it uses a material which is renewable in the long term and is more easily degradable

than stone due to its susceptibility to attack from xylophagous insects and fungi.

Systems aspect

From a system viewpoint, Apulian farmhouses have architecture whose operation is aimed at guaranteeing maximum possible comfort by using technological systems like water supply and heating which envisage the reuse of resources already present on the territory. The absence of surface springs and rivers has led to seeking underground water supply. The *wells* are dug in soils with “circulating water” with an internal quadrangular or circular shape. The internal lining is made with permeable limestone, cemented with bolus so as to let the abundant groundwater filter through. The mouth of the well is often protected with a solid block with a central hole or formed of four tuff stone blocks arranged in a square or made in more refined and monumental shapes.

In the middle of the courtyard, totally paved with stone, there is often a tank into which the rainwater coming from the roof of the whole building is conveyed with skilful arrangement of the blocks.

The *tanks* are excavated in the soil, or created in a more or less deep natural hollow or created starting from the land level, and have an internal “bell” or “pseudo-prismatic” shape; whereas externally they have shapes which vary in inclination and height.

The *cold rooms* were used to accumulate snow so that food could be stored there and consumed over a period of time. The cold rooms made of stone with barrelled vaults were insulated in the lower part by using bundles of wood and above by arranging soil.

A further type consists of the *roof tank*: it was a buried room with a barrelled vault for collecting and storing the water with a gabled roof, which comes out of the ground and had a well mouth for collecting the water, which goes into an adjacent tank for watering the animals.

Its ingenious operation is based on water drawing by **capillary infiltration through the adjacent soil into the subsoil and by condensation phenomenon.**

Indeed the difference between the internal temperature of the tank and the external one makes the collected water condense and when it evaporates it deposits on the lower part of the barrelled vault and then drips down. The phenomenon is amplified as the tank fills due to the cooling caused by the rising water.

The main orientation of the rural buildings is southwards for the main facade, where almost all windows open. The northward facades are almost all without windows or with small windows for aeration. The location of the building and the fixtures are created by taking into consideration not only the daily sunshine, but also the cold winter winds. Indeed, they are protected by building the settlement on natural slopes in the hilly areas, or by the presence of internal courtyards and high stone boundary walls, for buildings in plain areas.

The location of the building is also chosen in relation to the morphology of the area and of the soil, preferring limestone beds as they offer a solid base for the foundations with a reduced depth and the possibility of creating a ventilated cavity with openings for storing food or a cellar by digging in the tuff stone, which can be reused.



3. Detail of fireplace. 3. Detail of chimney stacks.

The volumetric organisation and the orientation of the building affect the internal microclimate. The natural cooling and the shading are obtained by vegetation (thick oak trees, climbing plants, etc.). In the warmest and least ventilated areas, the room layout is based on more open schemes with different exposure to favour natural thermoventilation. In the colder climatic areas the volumes are more compact with small fixtures.

In order to obtain optimal environmental conditions, specific types and technologies are adopted:

- Typical courtyard configuration in the warmest areas;
- Use of construction materials in relation to their capacity for creating an optimum microclimate;
- Construction choices concerning the roof (clay roof tiles creating a ventilated roof and with tuff stone or stone fillings to increase the thermal inertia and energy accumulation);
- Layout of the openings (larger southwards and smaller northwards to create ventilation);
- Constructing large fireplaces for both cooking and winter heating;
- The rising currents and the convection movements created when the fire is lit guarantee good air exchange and a reduction of the condensation phenomenon, which favours dehumidification of the walls and floors.

During hot and dry summers, in the absence of sufficient water resources or masses to influence the microclimate, priority was given to *controlling the sun's rays* by adopting design solutions (orientation of the building, arrangement of natural and artificial shielding surfaces) to reduce the thermal power exchanged by radiation between the capturing surface (farmhouse and external/adjacent spaces) and the sun's rays. This was achieved by controlling the reflected component or by optimising the effects of controlled shading/sunlighting hours in the different periods of the year, but above all in the warm-dry summer periods. The main orientation of the facades is South, South-East.

In this way all the surfaces are not shaded for all the hours of the morning and of the early afternoon and totally exposed to direct and reflected sunlight, thus maximising the thermal exchange by radiation.



5. Openings and main facades Masseria Santissimo – Turi (Ba). 6. Internal courtyard Masseria Miani – Polignano (Ba).

The secondary facades of the living areas face North, West, North-West, and are totally in the shade for most of the day and without openings or with small windows for aeration. The service areas like kitchens, fireplaces, bathrooms, stores open onto them;

Roofing shields

Their function is to control the direct sunlight that is horizontal or sloping elements of a variable shape.

This solution can be carried out by means of *artificial screens*, like protruding roofs, porticoes and canopies. Canopies fitted on wooden or iron beams and covered with clay tiles are very frequent in courtyards or in sheep shelters.



7. Artificial roofing screens Masseria Petrosino – Turi (Ba). 8. Vegetation screens Masseria Caramanna, Monopoli (Ba).

Vegetation screens like tall trees with a large crown are mainly used for protecting houses especially in compact and isolated building types in which there is no internal courtyard, or for directly protecting the main facade by inserting one or more tall trees with an ample crown. Specially arranged isolated trees with a large crown are also employed as a protection for sheep shelters, paved courtyards and fields for grazing, offering shelter for the animals in the sunniest hours.

Wall screens

Their function is to control reflected sunlight; that is vertical or slightly inclined elements, attached to the ground, which hide from view most of the sunlight reflecting surfaces (the soil and the paved surfaces) surrounding the environment or the space to be protected.

This solution may be obtained by means of *artificial screens*, like drystone walls, courtyards protected by high boundary walls (4-5 m) and *vegetation screens*, like bushes, shrubs, characterised by a base of the crown close to the ground and a limited height.



9. Masseria Jesce – Altamura (Ba). 10. Detail of the collection of rainwater.

Hybrid screens

They consist of gratings and pergolas on which climbing plants grow like vines and ivy; they have less limitations and have less constraints than vegetation screens. They can be designed and created in the shapes and sizes required, so as to obtain, when fully grown, maximum efficacy in controlling direct and reflected sunlight in space and in the period in which this need is required. In the Farmhouses in Turi, the deciduous species found combine the need for summer cooling with winter exposure to sunlight, as they vegetate in the summer and are bare in the winter.

Artificial barriers

They are mainly used for deviating the wind flow or as a solid break with a function similar to the one already mentioned for buildings; they can be summarised as follows:

- drystone walls of variable height, used as a windbreak for protecting grazing land, sheep shelters and recently sown land, preventing the seeds from being removed or accumulated in an irregular manner.
- boundary walls for courtyards, about 3-4 m high, used to protect the paved courtyards and production areas within farms like: entry to the parking areas near the stables, passages and spaces concerning haylofts, silos, areas for processing the foods.



11. Wind airflow barriers: drystone wall. 12. Masseria Comiteo – Crispiano (Ta).

CONCLUSION

Creating synergies and interaction between innovation and tradition is the way to go if we still want to retain our history and at the same time requalify the landscape affected by man to modern ways of life. It is, therefore, necessary for these buildings and rural sites to become places of collective use apart from bearing witness to architectural history. They must become an economic and cultural resource, a strategic place which blends knowledge with operation, technology with restoration, architecture with history, economy with management. Many Apulian farmhouses have already become restaurants and luxury hotels with health farm areas, but many more can still be recovered and transformed into modern farms. For this reason it is necessary to exploit these ancient stone structures. Indeed, they provide absolute protection from any type of pollution, respect of the architecture, the appropriate use of materials and of the conditions of environmental sustainability. These must remain the discerning conditions for any operation intending to establish a new balance between urban culture and agricultural tradition, between form and function, between man and nature.

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