

Experimental building techniques in the 1930's: the "Pater" system in the Ex-Circolo Skanderbeg of Tirana

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ABSTRACT

The subject of this study concerns the constructive experimentation developed in Italy and in its areas of influence around the '30s, in a period of autarchic economy. We investigate some techniques, many of which still poorly understood, applied in buildings for housing, industry and the provisional architecture, which included the use of wood as the main construction material, often in collaboration with the concrete.

The case of study is the ex-Circolo Italo-Albanese Skanderbeg (now Theatre Kombetar), a building constructed in the period of the Italian protectorate in Tirana. The building was commissioned in 1938 at the company Pater Costruzioni Edili Speciali of Milano.

For its economic and fast realization was applied an experimental construction system, which used different materials: concrete, wood and an innovative material, product in prefabricated slabs, called Populit. This was a lightweight material consisting of cement and scraps of wood, produced by SAFFA.

The vertical structure consists of a load-bearing skeleton in weakly reinforced concrete. A double plugging inside and outside made in Populit panels collaborated with the structure, as it was used as formwork. This structural system is similar to the platform frame system for the use of prefabricated elements of wood, but the use of enclosing structure collaborating seems to anticipate the latest 'panels' systems.

In addition to the technical aspects of the building's realization, analyzed through some critical re-designs, this study intends to address the issue of the formal and spatial implications arising from the use of new building techniques.

This study, developed in a Laboratory of Thesis in the Faculty of Architecture of Bari, wants to contribute to the knowledge of this yet existing building, which we believe be enhanced and restored, for its important role in the urban context, and its historical and documentary value.

Architectural and construction features of the building

This paper faces the issue of the new building technologies that have been developed in the '30s in Italy and in the Colonies, in a period of economic hardship caused by the war. This is a very interesting problem because this condition of emergency coincided with the research for new architectural languages and has stimulated an extraordinary inventiveness in the use of

traditional building materials and in the production of new materials. These experiences, born from the synergy between producing industries and designers had a later impact in Italy and can still offer stimulating suggestions in the search for new technologies. Furthermore, knowing them is also important for the conservation and restoration of modern architecture [1-3].

The Circolo Italo-Albanese Skanderbeg in Tirana is a case-study rather interesting. It was built in 1939 in an area almost free near the Ministry buildings designed by the architect Florestano Di Fausto and near the old Royal Palace. It was defined as "a colossal undertaking, grew (...) in a few months time due to Pater, the Italian magician that builds around the world four thousand and more buildings per year with wood chips..." [4].

The Circolo was one of the first buildings constructed by the Italian authorities to monumentalize the city of Tirana and to provide the needed services to the capital. It was in fact a cultural and recreation center with a pool, sports courts, a restaurant, a theater and offices, capable of being a center of attraction and a meeting place [5].

The building consists of two parts long and narrow, symmetric with respect to a longitudinal axis and "organically connected" with a porch with slender pillars "that allows you to enclose effects not obtainable with a single construction block" [6].

The wing on the right had a lounge, a restaurant, the game rooms, a library, a ballroom, and included the offices, the services and a kitchen; the wing to the left housed the theater; in the background were the sports areas (gym, indoor tennis court, services, changing rooms); at the center of the open space was placed a garden with a swimming pool, an outdoor dance floor and two outdoor courts for tennis.

The entire complex has undergone over the years, many changes: there are recognizable extensions and accretions that have changed the volumes and the conformation of the court. The porch is no longer present. Many of the original features of the Circolo are missing and in fact the right wing houses only the theater hall and the offices, the body to the left retains its original function and the bodies of the background complex, the most changed over time, host service functions for the theater (deposits, carpentry, tailoring, etc ...).

The Circolo Skanderbeg appears as a set of pure volumes, of 'boxes' functionally and structurally independent interlocked among themselves, according to the more suited features of continuous masonry that to the discontinuous structure with which it is realized. However, the abstract dryness of the language adopted denotes membership in the world of lightweight structures, continuous but not massive. (Figure 1).

The Pater construction system

The building complex was built in a few months with an experimental structural system patented by Pater-Costruzioni Edili Speciali of Milano. The speed and low cost of construction was made possible through the use of prefabricated materials made in Italy, to make up even for the scarcity of skilled labor in Albania.

The complex is part of a wider context of experiences developed in the period between the two wars in Europe, especially in the area of buildings for housing, industry, temporary structures, which included the use of wood as the main construction material, in order to obtain

an economical cost, speed to run through the mechanization and standardization of production. It was about constructions where the rational and functional architectural language was a natural application.

The Pater construction system, which was named after the Swiss engineer Dario Pater, industry pioneer of prefabricated houses, is based on the cooperative use of different materials: concrete, wood from Italian species and Populit panels, a new material composed of mineralized wood fibers with high strength concrete, thermally and acoustically insulating.

The vertical load-bearing system of the Circolo Skanderbeg consists of a skeleton supporting structure in concrete slightly reinforced, coated both outside and inside with Populit panels with a thickness of 4 cm. Little pillars of 12x15 cm at a distance of about one meter and high 8.40 meters support at the top the trusses, composite structures obtained by gluing of trade timber in small denominations and low cost, covering a span of about 16 meters. The pillars are braced by two concrete kerbs, located respectively at the top of the structure and at the slab floor. The openings are formed between the concrete pillars and have consequently constant width. In the vertical structures, a cooperating role is played by wooden boards of a section of 3x15 cm which fill the space between the pillars of concrete. The specific location of the wooden elements, flanking both sides of the pillars of concrete, is to assume their role as a 'formwork'. They would have played the role of formwork during the pouring of concrete and then would have been left in place for providing a greater rigidity to the structure. It is assumed that for the other two sides the mold was made from panels of Populit, whereas the surface is rough and irregular with tracks very similar to the surface of the Populit panels that cover the structure.

In the Pater system one can track developments in traditional techniques, such as the platform frame (a modern evolution of the balloon frame) and some of its constructive aspects can be considered advances of the contemporary wooden structures. In fact, the construction system used in the Circolo refers on the one hand to the system platform frame in the use of prefabricated wooden high one-storey tall, in construction to overlapping planes and in the use of plugging panels and on the other hand seems to anticipate the recent 'panel construction'. This system is an evolution of the traditional wooden frame constructions towards the continuous systems, in which the building is divided into a system of horizontal and vertical load bearing slabs. In the Pater system, the use of the double buffering inside and outside in Populit plays a role cooperating with the bearing structure, as it is used as formwork, so it contains the structure forming, at least theoretically, a carrier package that includes the pillars of concrete, the wooden ones and the landlocked planking. (Figures 2-3).

The Populit also known by the name of Patercimento was a material very commonly used until the '60s and '70s, consisting of porous agglomerates of herbal substances, usually wood fibers mixed with concrete. It was produced by SAFFA, Società Anonima Finanziaria Fiammiferi e Affini having its registered office in Milan, the city where had also home the company Pater- Costruzioni Edili Speciali. The Populit was light in weight which ranged from 300 to 400 kg per cubic meter, which could be used in place of traditional partition wall, for completions of slab floor and ceilings, for partition walls and also for external cladding. This compound of agglomerates of vegetable substances (wood fibers of poplar chipboard, a waste product of the match factory and seaweed) mixed with high strength concrete that was obtained by the cementation of fibrous materials with porous and reticular structure, had a good thermal

and acoustic insulation, was resistant, rot-proof and could be sawed and nailed with ease. It was fabricated in the form of slabs, tiles and perforated hollow flat blocks. The finishing of the visible surfaces was usually with a thin layer of plaster. The dimensions of the plates were 200x50 cm; 180x50 cm; 100x50 cm, with thicknesses ranging from 1.5 to 15 cm. The laying of the panels was easy and rapid and the plastering of the exposed faces was performed on the construction site. A product particularly insulating and light was the "Populit type A", a composite slab consisting of a core of cork agglomerate and two layers of Populit [7].

Experimentation on new materials in the autarchic period

"In the execution of the work, and for all its parts, was adopted our solution Pater patents, in addition to the advantage of speed, economy, has the supreme of being perfectly framed self-sufficient in the plan" [8].

The Circolo Skanderbeg is a response to autarchic policy that prevailed in Italy from the end of World War I and the beginning of the Second World War. The goal of this policy was to achieve maximum economic autonomy of the country, replacing imports with domestic production and enhancing local resources for self-sufficiency in the event of war. In all areas of production, the guiding principle was "improvement of processes, substitution of imported raw materials, new uses of native materials, found, inventions: in a word, technology" [9].

The key criteria in achieving self-sufficiency in the construction industry was to "eliminate the superfluous" [10].

Research and experiments intended to minimize the use of materials essential to the war industry (iron, coal, etc.) are intensified in building construction. During that period were issued a high number of invention and industrial process patents, including some of great interest, working on the concept of weakly reinforced concrete. The concrete was considered a material 'less autarchic' as it contained steel, a material of direct import and cement that, despite being produced in Italy, needed for its preparation, materials of foreign origin such as coal. The research were so directed towards the development of new building materials with mechanical properties similar to reinforced concrete that contained a small amount of concrete and steel, with the addition of pumice or fibers of various kinds (Pomicemento, Fibrocemento, Eternit, Salonit). The research is also addressed to the conception of new materials made from wood aggregated with other materials such as concrete, steel, bamboo, straw, fiber, and to the production of wood prefabricated panels [11-12].

A particularly intense research was conducted on the panels in insulating materials composites. The increasing adoption of construction systems in reinforced concrete framework, steel or even wood, had caused the walls absolve mostly functions of protection from the weather, of thermal and acoustic insulation, etc . So it was possible to replace the traditional load-bearing walls with curtain walls, also made by elements of great surface, light, insulating, economic and to equip with significant savings in labor, money, space and time. The research was particularly directed to the reuse of scraps of various processes by which light elements to produce panels and ceilings.

Based on the raw materials used and to their preparation, these were divided into:

1) Insulating wood-cellulose, such as linoleum, cork, Masonite, Celbes, Faesite;

- 2) Insulating bricks and concrete as Spugnocemento, Fibronit, Klinkaria, Silicaria, Fibrite, fiber cement compounds (S.A.F.E);
- 3) Materials agglomerates of wood chips, as the Populit and the Eraclit.

In Italy the buildings made entirely of wood, until the '20s were relatively few: the building material par excellence was the stone which was replaced by the concrete. During the '30s greatly increased the production of building structures in wood mainly because of the difficulty of importation of raw materials. In Italy, as in many other countries in Europe, were conducted systematic researches especially in the fields of buildings for housing, industry, temporary structures, using wood as the main building material, with a focus on cost containment. The problems to be addressed were the durability of the products, the resistance to weathering and biotic factors, the insulation of the external walls, mechanical or with chemical adhesives connections.

In the climate of autarchy, for the use of wood, it was recommended to replace the imported wood with native species, treated with chemical processing, or to use removable and recoverable scaffoldings and formwork of other materials than wood. The recourse to the use of the wood and its derivatives as alternative resources are imposed where they were required as fundamental features the resistance to traction and compression, thermal insulation, resistance to corrosion by acids. Another unique feature was particularly advantageous in the case of temporary buildings was the ability to assemble dry timber elements, which could so easily be recovered in the removal phase. Very interesting is the Montanari patent, in 1942 for a prefabricated hut that, for the particular construction system with no traditional joints, is removable and allows you to retrieve the timber and the 'morali' (ie joists 10x10 cm).

Architectural applications of wood and new materials that derive from it were regarding three main areas: holiday homes and large industrial facilities with wooden frame and the exhibition halls.

The houses for the holidays had to be made of materials of domestic origin, with elements light enough for easy transport, strong enough, insulators, to be mass produced, to contain costs, easy to put in place and that could be fitted in the factory. The holiday home was one of the themes which was dealt with at the V Triennale of Milano in 1933 with the "Mostra dell' Abitazione Moderna", an exhibition of scale models of houses and villas. Some of these buildings had a wooden frame and derivatives, such as the 5 houses of the " Colonia di case per vacanza," practical and economical housing solutions with different characters depending on the place which they were intended, all works of the arch. Griffini, Faludi, Bottoni. Even the Pater Company realized entire neighborhoods of prefabricated houses (Acilia, Riccione, Ronchi ...). The wood, much more resistant to corrosion by acids and vapors of processing compared to steel and concrete, it was also used in chemical plants for the production and storage of fertilizers and explosives. The few examples of industrial warehouses with wooden structure joints still in use even today, were based on a semi-prefabricated building system, formed by portals made of wooden elements of small dimensions, arranged so as to be subject only to normal stress. These portals were assembled on the ground, then got up and locked with cross-bracing adequately prepared.

The wood, besides being used in industrial plants, was also used in construction and in the preparations made for exhibitions, fairs and national and international exhibitions, very frequent at that time. We remember the Padiglione dei Congressi of the arch. Adalberto Libera

and Mario De Renzi, in 1937. The Congress Hall had a wooden structure with a trussed roof. Even the Padiglione dei Gruppi Universitari Fascisti e delle Organizzazioni Giovanili of the PNF of the arch. Franco Petrucci in 1937, had a wooden structure resting on a foundation of brick or stone, with wooden beams cover a trellis to support the sheds.

Research on the use of wood, even though it produced a wealth of knowledge, were soon neglected because the wooden artifacts proved to be no less expensive than those built with traditional materials and new such as iron, aluminum and others [13-15].

For a new building life

The Plan of Tirana in 2003 included the demolition of the complex of the Circolo Skanderbeg. Considering the historical and documentary value of the building, also with respect to the construction technique adopted, and the important urban role it plays, it is deemed necessary to its preservation.

An educational project carried out in a laboratory degree in the Faculty of Architecture of the Polytechnic of Bari academic year. 2007-08 assumes an intervention of re-functioning of the complex [16].

The right wing is designed to Museum of the City of Tirana, while the left wing was preserved as a theater annexing space that should be devoted to classrooms, laboratories, and exhibition rooms.

It was also decided to demolish all the extensions and superfetations made over the years, maintaining the original parts of the complex and making a transverse volume between the two longitudinal bodies, with a link between the various levels, accessible by a monumental staircase, below which there is a conference room.

The expansion is achieved by the interaction of wood portals grafted on a stone base and a continuous envelope also made of wood. The museum space-to-ceiling, below which develops a large room underground, is divided into long galleries through a series of wall boxes containing niches and small exhibition areas.

The facade of the enlargement, composed of movable panels that adjust, along with those of the hedge, the entry of light, with big inscriptions in relief or carved of futuristic ancestry, as if they were 'graphic pages', thus creating the fusion between architecture and visual arts typical of the years in which was born the building.

The ephemeral nature that had characterized the construction of the building is declined in the light of new requirements and construction technologies, accepting the appearance of temporary pavilion and reinterpreting it as a great 'machine exhibition' [17]. (Figure 4 and following).

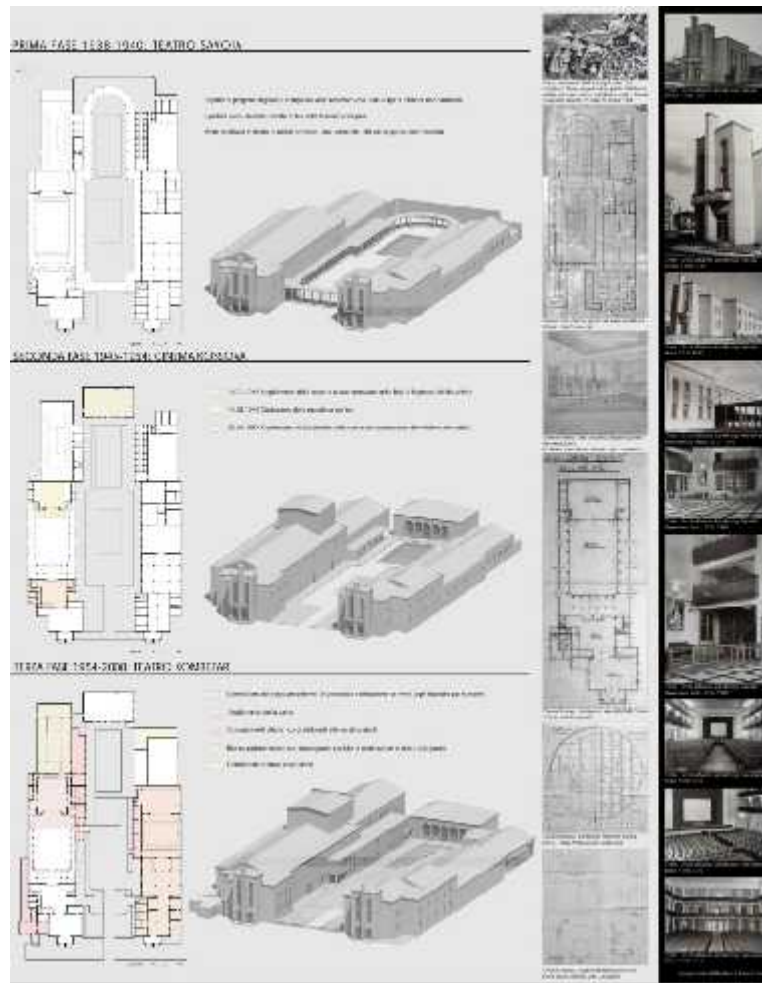
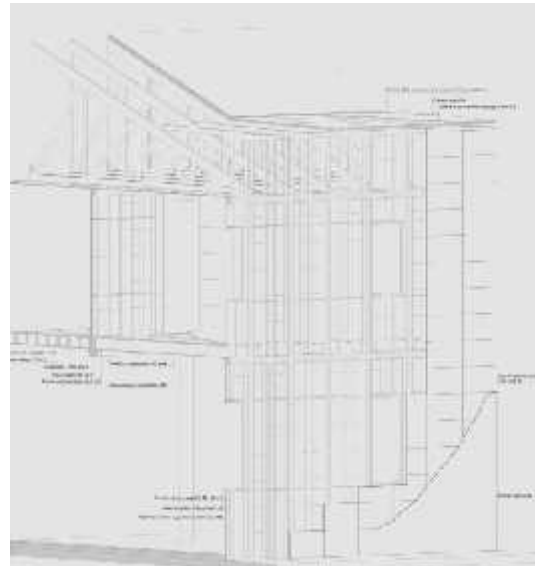


Figure 1. Ex-Circolo Skanderbeg: transformation phases 1938-2008





Figures 2-3. Details of the Pater construction system

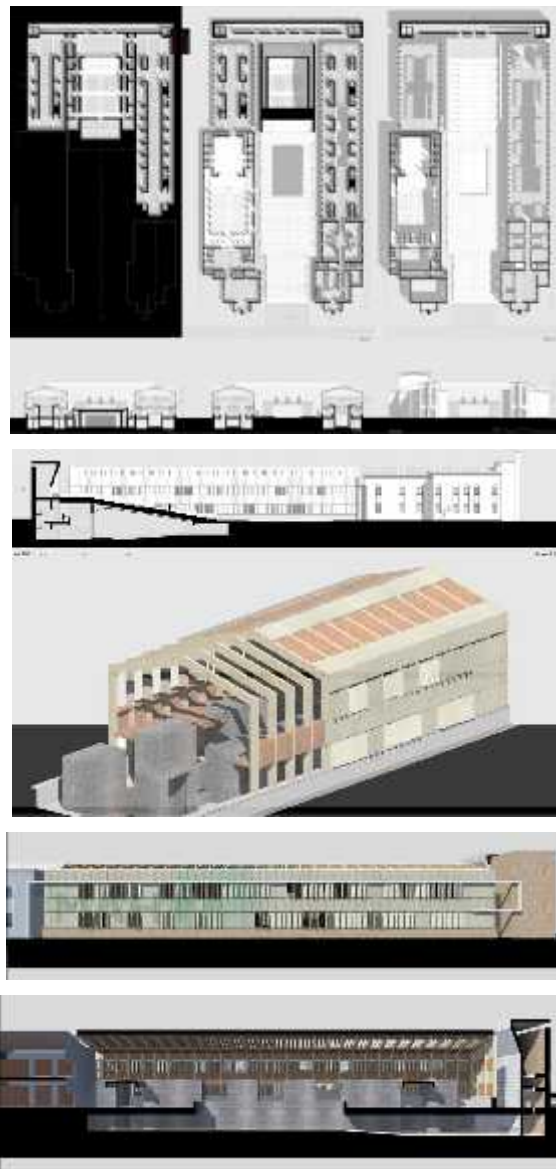




Figure 4 and following. Project for the Museum of the City of Tirana

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